

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC APPLICATION OF NORTHERN)	
KENTUCKY WATER DISTRICT FOR A)	
CERTIFICATE OF PUBLIC CONVENIENCE)	CASE NO. 2021-00047
AND NECESSITY TO CONSTRUCT THE)	
FORT THOMAS TREATMENT PLANT)	
BASIN IMPROVEMENTS PHASE 2 AND)	
FOR APPROVAL OF FINANCING)	

APPLICATION FOR APPROVAL OF CONSTRUCTION AND FINANCING

Northern Kentucky Water District (NKWD), by counsel, petitions for an order approving the construction of improvements to the Ft. Thomas Treatment Plant, Phase 2 as described below pursuant to KRS 278.020. Approval of the financing pursuant to KRS 278.300 is also requested.

In support of the application, the following information is provided:

1. NKWD's office address is 2835 Crescent Spring Rd., Erlanger, KY 41018-0640. Its principal officers are listed in its current Annual Report on page 6, which is filed with the Commission as are its prior years Reports and is incorporated by reference. Its contact officer is:

Lindsey Rechten, Vice President Finance and Support Services
2835 Crescent Spring Rd.
Erlanger, KY 41018-0640
(859) 578 9898 Phone
(859) 578-3668 fax
lrechten@nkywater.org

2. NKWD is a non-profit water district organized under Chapter 74 and has no separate articles of incorporation;

3. A description of NKWD's water system and its property stated at original cost by accounts is contained in its Annual Report.

4. NKWD serves retail customers in Kenton, Boone and Campbell Counties and sells water at wholesale to non-affiliated water distribution systems in Kenton, Boone, Pendleton and Campbell Counties.

5. NKWD proposes to construct new facilities as described in Exhibit A. A petition for Confidentiality for Exhibit A-2, Engineering Technical Memorandum and Ft. Thomas Improvement Plans and Drawings Exhibit A-4 is attached. The recommended improvements are described in detail in Section 7 pages 21-22 of the Engineering Technical Memorandum, Exhibit A. The improvements were recommended as part of the Asset Management Program, updated in 2011, previously filed with the Commission, which is attached as Exhibit A-1. NKWD previously received approval for the Fort Thomas treatment Plant Improvements, Phase 1 in Case No. 2015-00108.

This project will be paid from the District's Five-Year Capital Budget, PSC No. 167 "FTTP sedimentation basins and chemical improvements" with a budget of \$6,000,000 which includes construction cost, engineering, and contingencies. A summary of the project costs is provided below:

Design Engineering	\$201,868.00
Construction Engineering	\$10,000.00
Contractor's Bid	\$5,584,000.00
Misc. & Contingencies	\$204,132.00
TOTAL PROJECT COST	\$6,000,000.00

The project will be funded through multiple sources. The District intends to use \$3,935,000 of State Revolving Loan Fund (SRF) and \$2,065,000 from a future Bond Anticipation Note (BAN).

6. The construction is in the public interest and is required to allow NKWD to continue to provide adequate service to its customers. The project, its cost, need and other details are contained in Exhibits A -1 through A-5. The District has received all approvals from the DOW for the Plans and Specifications and funding for these improvements. See Exhibit B.

7. The total financing will be approximately \$6,000,000 with \$3,395,000 SRF loan from the Kentucky Infrastructure Authority and \$2,065,000 BAN. NKWD is seeking approval of the total \$3,395,000 KIA loan and the total financing of \$6,000,000 in this application. See Exhibit D for details of the loan and the KIA approval letter.

8. Easements and rights of way are not required, see Exhibit B.

9. This service will not compete with any other utility in the area.

10. The proposed construction project identified in Exhibit A is scheduled to begin construction in upon PSC approval and beginning in May 2021 and completed in May 2023. Board approval of the final bids for the project is included in Exhibit C. The bids were opened January 13, 2021 and are subject to acceptance for 90 days. **The bids will expire April 13, 2021.**

11. No new franchises are required.

12. Specifications and descriptions are in Exhibit A and Bid Documents. Facts relied on to justify the public need are included in the project descriptions in Exhibit A.

13. Maps are included in the confidential portions of Exhibit A.

14. The construction costs will be funded by as described above.

15. Estimated operating costs for operation and maintenance, depreciation and debt service after construction are shown in Exhibit D.

16. A description of the facilities and operation of the system are in Exhibit A.

17. A full description of the route, location of the project, description of construction and related information is in Exhibit A.

18. The total estimated cost of construction at completion is referenced in Exhibits A, B and C.

19. CWIP at end of test year is listed in the Annual Report incorporated by reference.

20. Plant retirements are listed in the Annual Report. No salvage values are included as booked.

21. The use of the funds and need for the facilities are justified based on the engineering report included as Exhibit A

22. No rate adjustment is being proposed.

23. Depreciation cost, cost of operation after installation and debt service are in Exhibit D.

24. The financing is based on the need to finance this project. The construction project, identified in Exhibit A, is scheduled to be constructed in 2021.

25. The following information is provided pursuant to **807 KAR 5:001(12)**:

a. Financial operations for twelve-month period not less than 90 days prior –
See Exhibit E.

b. No stock is authorized; No stock is issued.

c. There are no stock preferences.

d. Mortgages are listed in Exhibit E.

e. Bonds are listed in Exhibit E.

f. Notes are listed in Exhibit E.

g. Other indebtedness is listed in Exhibit E.

h. No dividends have been paid.

i. Current balance sheet and income statement are attached as Exhibits F.

26. The following information is provided as required by 807 KAR 5:001 (18):

a. A general description of the property is contained in the Annual Report. The 2019 Report and attached financial information is the latest available from the District.

b. No stock is to be issued; No bonds are to be issued in this case.

c. There is no refunding or refinancing.

d. The proceeds of the KIA financing are to acquire and install the property

described in Exhibit A.

e. The par value, expenses, use of proceeds, interest rates and other information is not applicable because no bonds are being issued at this time.

27. The following exhibits are provided pursuant to 807 KAR 5:001 (18)(2):

a. There are no trust deeds. All notes, indebtedness and mortgages are included in Exhibit E.

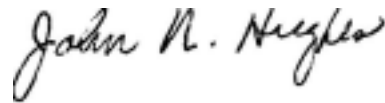
b. No property is to be acquired. 807 KAR 5:001(18)(2)(c).

28. Plant additions will be classified according to USoA. See Exhibit D.

29. The Kentucky Debt Officer was notified of the KIA loan. See Exhibit B.

For these reasons, the District requests issuance of an order granting authority to construct and finance the facilities and for any other authorization that may be necessary.

SUBMITTED BY:



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LIST OF EXHIBITS

Section 8(1)	Full name and post office address of applicant and a reference to the particular provision of law requiring Commission approval.	Application
Section 8(2)	The original and 10 copies of the application with an additional copy for any party named therein as an interested party.	n/a
Section 8(3)	If applicant is a corporation, a certified copy of the Articles of Incorporation and all amendments thereto <u>or</u> if the articles were filed with the PSC in a prior proceeding, a reference to the style and case number of the prior proceeding.	n/a
Section 9(2)	1. The facts relied upon to show that the proposed new construction is or will be required by public convenience or necessity.	Exhibit A
	2. Copies of franchises or permits, if any, from the proper public authority for the proposed new construction or extension, if not previously filed with the commission.	Exhibit B
	3. A full description of the proposed location, route, or routes of the new construction or extension, including a description of the manner in which same will be constructed, and also the names of all public utilities, corporations, or persons with whom the proposed new construction or extension is likely to compete.	Exhibit A
	4. Three (3) maps to suitable scale (preferably not more than two (2) miles per inch) showing the location or route of the proposed new construction or extension, as well as the location to scale of any like facilities owned by others located anywhere within the map area with adequate identification as to the ownership of such other facilities.	Exhibit A
	5. The manner, in detail, in which it is proposed to	Exhibits

	finance the new construction or extension.	A, D
	6. An estimated cost of operation after the proposed facilities are completed.	Exhibit D
KRS 322.340	Engineering plans, specifications, plats and report for the proposed construction. The engineering documents prepared by a registered engineer, requires that they be signed, sealed, and dated by an engineer registered in Kentucky.	Exhibit A
Section 8(1)	Full name and post office address of applicant and a reference to the particular provision of law requiring Commission approval.	Application
Section 8(2)	The original and 10 copies of the application with an additional copy for any party named therein as an interested party.	n/a
Section 8(3)	If applicant is a corporation, a certified copy of the Articles of Incorporation and all amendments thereto <u>or</u> if the articles were filed with the PSC in a prior proceeding, a reference to the style and case number of the prior proceeding.	n/a
KRS 278.300(2)	Every financing application shall be made under oath, and shall be signed and filed on behalf of the utility by its president, or by a vice president, auditor, comptroller or other executive officer having knowledge of the matters set forth and duly designated by the utility.	Application
807 KAR 5:001:		
Section 11(1)(a)	Description of applicant's property. Statement of original cost of applicant's property and the cost to the applicant, if different.	Annual Rpt
Section 11(1)(b)	If stock is to be issued: and kinds to be issued. --Description of amount and kinds to be issued. --If preferred stock, a description of the preferences.	none
	If Bonds or Notes or Other Indebtedness is proposed:	Exhibit F

	--Description of the amount(s)	
	--Full description of all terms	
	--Interest rates(s)	
	--Whether the debt is to be secured and if so a description of how it's secured.	
Section 11(1)(c)	Statement of how proceeds are to be used. Should show amounts for each type of use (i.e., property, debt refunding, etc.)	Exhibit A
807 KAR 5:001:		
Section 11(1)(d)	If proceeds are for property acquisition, give a full description thereof. Supply any contracts.	n/a
Section 11(1)(e)	If proceeds are to refund outstanding obligations, give:	n/a
	--Par value	
	--Amount for which actually sold	
	--Expenses and application of proceeds	
	--Date of obligations	
	--Total amount	
	--Time held	
	--Interest rate	
	--Payee	
Section 11(2)(a)	Financial Exhibit (see below)	
Section 11(2)(b)	Copies of all trust deeds or mortgages. If previously filed, state case number.	Annual Rpt
Section 11(2)(c)	If Property to be acquired:	Exhibit A
	--Maps and plans of property.	
Section 11(2)(c)	--Detailed estimates by USOA account number.	Exhibit D

ALL INFORMATION BELOW IN SECTIONS 6(1) THROUGH 6(9) SHOULD COVER THE PERIOD ENDING NOT MORE THAN 90 DAYS PRIOR TO DATE ON WHICH

APPLICATION WAS FILED:

807 KAR 5:001

Section 6(1)	Amount and types of stock authorized.	None
Section 6(2)	Amount and types of stock issued and outstanding.	None
Section 6(3)	Detail of preference terms of preferred stock.	None
Section 6(4)	<u>Mortgages:</u>	Exhibit E
	--Date of Execution	
	--Name of Mortgagor	
	--Name of Mortgagee or Trustee	
	--Amount of Indebtedness Secured	
	--Sinking Fund Provisions	
Section 6(5)	<u>Bonds</u>	Exhibit E
	--Amount Authorized	
	--Amount Issued	
	--Name of Utility Who Issued	
	--Description of Each Class Issued	
	--Date of Issue	
	--Date of Maturity	
	--How Secured	
	--Interest Paid in Last Fiscal Year	
Section 6(6)	<u>Notes Outstanding:</u>	Exhibit E
	--Date of Issue	
	--Amount	
	--Maturity Date	
	--Rate of Interest	

	--In Whose Favor	
	--Interest Paid in Last Fiscal Year	
Section 6(7)	<u>Other Indebtedness:</u>	
	--Description of Each Class	
	--How Secured	
	--Description of Any Assumption of Indebtedness by Outside Party (i.e., any transfer)	
	--Interest Paid in Last Fiscal Yr.	none
Section 6(8)	Rate and amount of dividends paid during the five (5) previous fiscal years and the amount of capital stock on which dividends were paid each year.	None
Section 6(9)	Detailed income statement and balance sheet.	Exhibits F

NORTHERN KENTUCKY
WATER DISTRICT

Case No. 2021-00047

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

NORTHERN KENTUCKY WATER DISTRICT
Fort Thomas Treatment Plant Basin Improvements – Phase 2
184-4006

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<u>EXHIBIT</u>	<u>TITLE</u>
A	ENGINEERING REPORTS AND INFORMATION Asset Management Plan, Engineering Technical Memorandum; Engineer’s opinion of probable construction cost; plans titled “Fort Thomas Treatment Plant Basin Improvements - Phase 2” dated November 2020, sealed by a P.E.; specifications titled “Fort Thomas Treatment Plant Basin Improvements - Phase 2” dated November 2020 and sealed by a P.E.; Addendum 1 dated December 11, 2020 Addendum 2 dated December 29, 2020 Addendum 3 dated January 8, 2021
B	Certified statement from an authorized utility Official confirming: (1) Affidavit (2) Franchises (3) Plan review and permit status (4) Easements and Right-Of-Way status (5) Construction dates and proposed date in service (6) Plant retirements
C	BID INFORMATION AND BOARD RESOLUTION Bid tabulation, Engineer’s recommendation of award, Board resolution.
D	PROJECT FINANCE INFORMATION Customers added and revenue effect, Debt issuance and source of debt, Additional costs and operating and maintenance, USoA plant account, Depreciation cost and debt service after construction.
E	SCHEDULE OF MORTGAGES, BONDS, NOTES, AND OTHER INDEBTEDNESS
F	CURRENT BALANCE SHEET AND INCOME STATEMENT

NORTHERN KENTUCKY
WATER DISTRICT

Project

*Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky*

184-4006

ENGINEERING REPORTS AND INFORMATION

2008 Asset Management Program Update (A.1)

Engineering Technical Memorandum (A.2)

Engineer's Opinion of Probable Construction Cost (A.3)

Plans prepared by GRW, Inc., titled "Fort Thomas Treatment Plant Basin Improvements – Phase 2" dated November 2020, sealed by a P.E. (A.4)

Specifications prepared by GRW, Inc., titled "Fort Thomas Treatment Plant Basin Improvements – Phase 2" dated November 2020, sealed by a P.E. (A.5)

Addendum 1 dated December 11, 2020 | Addendum 2 dated December 29, 2020 |
Addendum 3 dated January 8, 2021 (A.6)

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

2008 Asset Management Program Update



Northern Kentucky Water District

2835 Crescent Springs Rd. • PO Box 18640 • Erlanger, KY 41018-0640

2008 Asset Management Program Update

November 2011

FINAL DRAFT



Report Prepared By:

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4775-011



The Water Division of ARCADIS

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IV. Identified Needs and Improvements



4. Identified Needs and Improvements

4.1. Large Capital Projects in 5-Yr CIP

The results of the asset renewal and replacement planning were combined with evaluations of alternatives to meet the District's needs in areas of increased capacity and regulatory compliance. Areas of focus for this AMP Update included:

- Raw Water Supply
- Water Treatment Plants
- Pumping Stations and Storage Tanks
- Other (including laboratory equipment)

4.1.1. Raw Water Supply Evaluation

4.1.1.1. Ohio River Pump Station No. 2

In the 2004 Asset Management Plan, NKWD identified the Ohio River Pump Station No. 2 (ORPS2) as one of the Districts' assets that was most critically in need of improvements. The 100 plus year old pump station delivers raw water to the Memorial Parkway Water Treatment Plant (MPTP). Currently, ORPS2 contains three 10 MGD pumps with one of the three being inoperable. The remaining two pumps are able to provide the necessary 10 MGD firm capacity of raw water necessary at the MPTP. To accommodate their expanding service population over the foreseeable future, NKWD has decided to upgrade the capacity at the MPTP to 15-20 MGD at some point during the duration of this planning period. The timing of this improvement depends on available treatment plant capacity pending detailed hydraulic analyses. In order to meet that increased raw water demand and address the identified physical condition of the pump station, NKWD has several alternatives to satisfy these necessary improvements. This analysis will evaluate the raw water pumping alternatives and provide preliminary capital cost estimates associated with each alternative to assist NKWD in the critical task of improving their raw water intake asset in ORPS2.

The first alternative available to the District (Alternative A) would be a complete rehabilitation and upgrade of the existing ORPS2. The renovated pump station would house two 12 MGD pumps to meet off-peak pumping capacity needs and a third 12 MGD pump would be added giving ORPS2 a future firm pumping capacity of 24 MGD. The pump station's concrete and brick have significantly deteriorated over the years and rehabilitation would be challenging and unpredictable. Numerous amounts of structural

and destructive testing would have to be performed to accurately assess the condition of the existing superstructure. It is also not conceivable to assume the continued operation of this facility during the rehabilitation process. It is very possible that ORPS2 could be out of service for almost two years during construction. Because of the building's being listed as a historical site by the AWWA, any rehabilitation and upgrade efforts must retain the historical integrity of the structure. This alternative would result in larger design fees and disclaimers associated with the unpredictability and dangers present with the task of renovating a 100 plus year old facility. Further, by providing this summary of probable costs, Malcolm Pirnie and GRW are in no way conclusively stating that a rehabilitation of this facility can actually be accomplished.

**Table 4-1.
Probable Costs for Alternative A - Rehabilitate and Upgrade Existing
ORPS2**

Item	Cost
Structural renovation (floors, walls, roof, etc.)	\$10,800,000
Protective Cofferdams in River	\$1,600,000
Equipment (HVAC, electrical, etc.)	\$1,800,000
Misc. Improvements (bar screens, stairs, etc.)	\$2,900,000
Three 12 MGD Pumps	\$2,450,000
Back-up Generator	\$1,700,000
24" DIP from PS to Top of Hill	\$1,700,000
24" DIP from Top of Hill to MPTP	\$2,300,000
Design and Fees (40%)	\$10,100,000
Subtotal	\$35,350,000
Contingency (40%)	\$14,150,000
Total	\$49,500,000

The second alternative available to the District (Alternative B) would be to retire the existing ORPS2 and replace it with a new 24 MGD intake structure and pumping facility. The new pump station would also house three 12 MGD pumps giving the ORPS2 a firm pumping capacity of 24 MGD. A large percentage of the cost for this alternative would be in the rock excavation for the superstructure, the building of coffer dams, and the pumping equipment itself. This alternative would provide NKWD a new, reliable source of raw water in comparison to what is currently available. Since there is no retrofitting to an existing facility, this alternative provides minimal effect on current operations during construction. This alternative also provides more flexibility in design and offers a greater accuracy in estimating construction costs.

Table 4-2.
Probable Costs for Alternative B - Replace ORPS2 with a New Intake & Pumping Facility

Item	Cost
Raw Water Intake Structure and Equipment	\$22,400,000
Electrical Services Updates	\$500,000
Back-up Generator	\$1,700,000
24" DIP from PS to Top of Hill	\$1,700,000
24" DIP from Top of Hill to MPTP	\$2,300,000
Design and Fees (25%)	\$7,150,000
Subtotal	\$35,750,000
Contingency (25%)	\$8,900,000
Total	\$44,650,000

The third alternative available to the District (Alternative C) would be to retire the existing ORPS2 and supply MPTP from the existing Ohio River Pump Station No. 1 (ORPS1). Currently, ORPS1 is nominally sized for six 12 MGD pumps and supplies the District's Fort Thomas Water Treatment Plant (FTTP). The FTTP has a rated capacity of 44 MGD and the firm capacity of ORPS1 is 60 MGD. Due to site constraints, a future expansion of the FTTP has not been considered. If ORPS1 is also to supply MPTP with the future treatment capacity of 15-20 MGD, then an upgrade and possible expansion of ORPS1 would be necessary to circumvent any redundancy and reliability issues. The first option considered was to upgrade the size of the existing pumps at ORPS1 therefore raising the firm capacity at the pump station to supply raw water to both treatment plants. As it currently stands, the weight of each existing pump meets or narrowly exceeds the floor loading design capacity of the pump foundation at ORPS1. Therefore, due to floor loading issues, it is not feasible to just upgrade the size of the pumps currently in ORPS1 without considering methods to increase the floor loading capacity and pipe gallery modifications. This option was not further considered due to the assumption that it is not feasible to remove ORPS1 from service to accomplish the structural and piping modifications. The second option would be to build an addition onto the current ORPS1 structure that could house three 10 MGD pumps giving ORPS1 an additional 20 MGD of firm capacity. This would provide NKWD with the capacity and reliability to now provide MPTP with raw water from ORPS1. In addition to the upgrades at ORPS1, a transmission main would need to be constructed to supply MPTP with raw water from ORPS1. This option is the basis for the costs presented below in Table 4-3. This alternative will no longer provide the District with the redundancy of having two separate raw water intake pumping sources and would require significant hydraulic modeling to ensure proper pumping operations.

**Table 4-3.
Probable Costs for Alternative C - Retire ORPS2 and Supply MPWTP from Existing ORPS1**

Item	Cost
Pumping Station Structure Upgrades	\$17,250,000
Three 10 MGD Pumps	\$1,950,000
Changes to ORPS1 Gallery Piping	\$1,150,000
24" DIP from ORPS1 to ORPS2	\$2,700,000
24" DIP from ORPS2 to Top of Hill	\$1,700,000
24" DIP from Top of Hill to MPTP	\$2,300,000
Additional Back-up Generator	\$1,700,000
Electrical Services Updates	\$500,000
Design and Fees (25%)	\$7,300,000
Subtotal	\$36,550,000
Contingency (30%)	\$11,000,000
Total	\$47,550,000

All estimates do not include any costs associated with easement or land acquisition. The costs for Alternatives B and C are similar, but Alternative B is being recommended because it provides more redundancy and less disruption to operations at ORPS1. However, additional detailed evaluation would be needed to verify costs for these options.

4.1.1.2. Licking River Pump Station

The following level of service improvements were identified during a site visit to the Licking River Pump Station and are included in the 5-year CIP as 09-05.

- **Improvements to the Building Superstructure** - A large number of structural deficiencies that were identified in the 2004 AMP have been addressed. A number of small cracks were still visible in the concrete and brick on both the interior and exterior of the building. The current condition of the roof is unsatisfactory and operations staff indicated there is no efficient method to remove and service the station's pumps. Current openings in the roof to pull pumps are not sized properly creating difficulties when removed via crane on the Licking River. It is recommended that a new roof be installed with properly sized hatches to facilitate removal of the pumps along with a new 2-ton hoist. Hatches should double as sky lights to improve lighting inside the pump room. Ventilation inside the building is provided by one roof mounted fan and one wall fan with fresh air louvers located on the river side wall. Temperatures inside the building were slightly higher than normal with both ventilation fans running. The operations staff indicated some deterioration in some of the ladders used to maneuver alongside the exterior of the building. The District expressed interest in implementing a programmatic approach to building maintenance allowing a budgeted amount of money to be set aside each year to aide

in the rehabilitation efforts of the building. The estimated annual cost for building rehabilitation is \$40,000/year. The estimated cost for roof replacement is \$205,000.

- **Replacement of Sluice Gates** - Currently there are three sluice gates located at various points of the intake structure that have not been operated in several years, according to the operations staff, and need to be replaced. The majority of this work would need to be completed in wet conditions by divers. A capital cost was generated to replace the current gates as well as their corresponding electric operators. The estimated cost to replace the sluice gates is \$185,000.
- **Raw Water Main Relocation** - The aerial portion of the 16" raw water main that runs across the Licking River was previously identified as a security risk in a vulnerability assessment due to the lack of redundancy. However, discussion on feasibility of building this line suggests this is not a realistic budget and it may not be possible to build a buried main at this site (affordably). This project is being removed from the budget.
- **Variable Frequency Drive Pump Upgrade and Relocation** - NKWD and its operations staff indicated strong interest in moving the existing drives and MCC out of the pump station into a newly constructed, climate controlled electrical building located on the river bank side of the walk bridge (approximately 400 feet from the pumps). This change would also correspond with installation of variable frequency drives on the remaining two pumps. These improvements would improve reliability, provide operational flexibility and result in a facility that is more easily maintained. Also, by moving the existing drives and MCC outside of the pump room, this will improve any current deficiencies in ventilation. The estimated cost for upgrading and relocating the VFD are \$940,000. To perform this work the follow tasks are required:

1. New VFD's to control current 150 Hp, 250 Hp and 350 Hp pump motors.
2. New building to house the MCC and VFD drives.
3. New MCC with service rated feed along with TVSS.
4. New service feeds to the pumps out from the new building.
5. Commissioning, tuning and debugging of the new drives.
6. Spare parts needed for the VFD's.
7. The demolition work needed for removal of the drives, conduit and wire, clean up, removal of the old electrical feed to the motors and MCC.
8. Installation of the new motor (need to be at least a class F to handle the VFD requirements).
9. New service feed to the new MCC panel.

4.1.2. Water Treatment Plant Evaluation

4.1.2.1. Memorial Parkway WTP

Regulatory

Regulatory needs at the Memorial Parkway WTP include the addition of granular activated carbon (GAC) for advanced treatment to meet the Stage 2 Disinfectant/Disinfection By-product (D/DBP) Rule and potentially a UV disinfection facility to meet the Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), or to provide an additional disinfection barrier.

Several site alternatives were analyzed and the selected alternative was to locate the GAC facility in the footprint of Sedimentation Basins No. 5 and No. 6. The following assumptions for capacity and redundancy were made in developing the basis of design for the GAC facilities:

- The GAC facility will include 6 GAC contactors, GAC feed pump station, GAC backwash system, contactor-to-waste function, combination backwash waste/contactor-to-waste equalization basin, and carbon loading/unloading facilities.
- Normal operation will provide at least a 20-minute EBCT with all contactors in-service at a maximum production rate of 20 MGD.
- Duty and standby pumps are provided for each of the pumping systems required for these facilities.
- Provisions to enable incorporation of UV disinfection at the future treatment capacity of 20 MGD.

All six GAC contactors will have the same type of equipment and operational mode as shown in Table 4-4.

**Table 4-4.
Design Criteria for GAC Contractors MPTP**

Parameter	Value
No. of Contactors	6
Contactor Length (feet)	34
Contactor Width (feet)	15
Surface Area per Contactor (sf)	510
GAC Media Depth (inches to top of underdrain)	144
Design Flow per Contactor at Current Design Capacity (MGD)	3.3
Surface Loading Rate at Current Design Capacity (gpm/sf)	4.5

As the preliminary design progressed, a final opinion of probable costs was developed. The cost opinion is considered a Class 3 estimate in accordance AACE and has a predicted accuracy of -20% to +30%. The detailed cost opinion is shown in Table 4-5, and includes the UV disinfection facility.

**Table 4-5.
Opinion of Probable Project Costs-MPTP**

Item	Capital Cost (\$ Million)
GAC Facilities (Contactor building, site work, GAC PS, EQ Basin)	\$18.5
UV Facility	\$2.3
Contingency	\$4.1
Engineering (Legal, administration)	\$3.1
Total	\$28.0

Capacity

Capacity needs at the MPTP will include an upgrade of the plant capacity from a 10 MGD to 15 MGD or 20 MGD facility sometime between 2020 and 2030. Additional coagulation, sedimentation, filter, clearwell and pumpage capacity is anticipated.

Level of Service

During a recent site visit to the MPTP facility, a number of items were identified in need of repair. The findings of this visit are described in the following paragraphs.

- **Replacement of Raw Water Reservoir suction/discharge piping** - The District indicated, during our site visit, that the original suction/discharge piping located at

both existing raw water lagoons is undersized therefore creating a hydraulic bottleneck that possibly limits the capacity of the treatment plant. This piping supplies the raw water pump station by conventional gravity methods. It is recommended that the existing suction/discharge piping be upsized and replaced to accommodate additional capacity at MPTP. Estimated cost is \$285,000.

- **Dredging of Residuals in North and South Raw Water Reservoirs (2012-2013) -** The South Reservoir is currently being used as the raw water presedimentation basin and feeds the plants raw water pump station while the North Reservoir is currently being used only as a sludge and backwash holding basin. Based on comments by the operating staff, it is believed that the North Reservoir is over 80% filled with solids and when the water level reaches a certain height water spills over the dam separating the two reservoirs. Due to possible improvements to the Sludge Handling Facility and implementation of Advanced Treatment facilities at MPTP, the District expressed interest in postponing any possible improvements to the condition of both Raw Water Reservoirs past the year 2012.
- **Addition of Backup Generator -** The District expressed interest in providing MPTP with an additional back-up generator to provide the plant with a source of additional power reliability for the Actiflo® process and plant's general operations. Currently, the existing generator at MPTP only serves the lighting panels for the Filter Building, Chemical Building, Backwash Pump Station, and the Raw Water Pump Station. The generator is part of the Advanced Treatment Project AMP 09-03. The estimated cost for the addition of a backup generator is \$900,000.
- **Demolition or Conversion of Current Chemical Building -** The current condition of the Chemical Building's superstructure is unsatisfactory. Visible structural defects are numerous and a large portion of the buildings upper levels have been taken out of service. Over the past several years, the District has had numerous studies completed on the possible demolition of the existing building or possible conversion of the existing building to a single story maintenance shop. Either alternative would be an acceptable recommendation since the District seeks to take some type of action towards the condition of the existing building. A specific project has not been included for this work.
- **Replacement of valve actuators on Filters 4, 5, and 6 -** Currently, the District uses pneumatic actuators for all valves involved in the filter process at MPTP. NKWD has stated they would like to replace the current pneumatic valve actuators on Filters 4, 5, and 6 with electrically controlled actuators. This is part of Advanced Treatment Project AMP 09-03.
- **Sludge Process Equipment Rehabilitation (annual programmatic budget and AMP 17-02 & 29-01) -** The residuals handling system at MPTP is currently not in operation due to numerous problems associated with the process equipment in the Sludge Handling Building. Instead of a single project to rehabilitate the residuals handling system and place it back in service, the District expressed strong interest in

supplementing projects with an annual programmatic budget approach to rehab/upgrade the existing inoperable facilities. An upgrade to the following process equipment is recommended - Sludge Press Rehab, Conveyer System Rehab, Sludge Pump Replacement, Electrical Upgrade, and Dumpster Area Rehab. Once the recommended improvements are addressed and the facility is put back in service, the current practice of using the North Raw Water Reservoir for residuals storage may be eliminated. The estimated annual cost associated with rehabilitation of the sludge process equipment is \$120,000/year.

4.1.2.2. Fort Thomas WTP

Regulatory

Regulatory needs at the FTTP include the addition of granular activated carbon (GAC) for advanced treatment to meet the Stage 2 Disinfectant/Disinfection By-product (D/DBP) Rule and potentially a UV disinfection facility to meet the Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) or to provide an additional disinfection barrier.

Several site alternatives were analyzed and the selected alternative was to locate the GAC facility adjacent to the existing laboratory building. The following assumptions for capacity and redundancy were made in developing the basis of design for the GAC facilities:

- The GAC facility will include 8 GAC contactors, a GAC feed pump station, GAC backwash system, contactor-to-waste function, combination backwash waste/contactor-to-waste/filter-to-waste equalization basin, and carbon loading/unloading facilities.
- Normal operation will provide at least a 20-minute EBCT with all contactors in-service at a maximum production rate of 44 MGD.
- Duty and standby pumps are provided for each of the pumping systems required for these facilities.
- Provisions to enable incorporation of UV disinfection at the current treatment capacity of 44 MGD.
- A GAC supplier will provide virgin carbon to the site and truck the spent GAC off-site.

All eight GAC contactors will have the same type of equipment and operational mode as shown in Table 4-6.

**Table 4-6.
Design Criteria for GAC Contactors-FTTP**

Parameter	Value
No. of Contactors	8
Contactor Length (feet)	44
Contactor Width (feet)	20
Surface Area per Contactor (sf)	880
GAC Media Depth (inches to top of underdrain)	144
Design Flow per Contactor at Design Capacity (MGD)	5.5
Surface Loading Rate at Design Capacity (gpm/sf)	4.3

As the preliminary design progressed, a final opinion of probable cost was developed. The cost opinion is considered a Class 3 estimate in accordance AACE and has a predicted accuracy of -20% to +30%. The detailed cost opinion in 2007 dollars is shown in Table 4-7, and includes the UV disinfection facility.

**Table 4-7.
Opinion of Probable Project Costs-FTTP**

Item	Capital Cost (\$ Million)
GAC Facilities (Contactor building, site work, GAC PS, EQ Basin)	\$33.5
UV Facility	\$2.8
Contingency	\$7.3
Engineering (Legal, administration)	\$5.4
Total	\$49.0

Capacity

There were no assets identified at the FTTP that required improvements to provide capacity for meeting future growth through the year 2030.

Level of Service

During a recent site visit to the FTTP facility, a number of items were identified in need of repair. The findings of this visit are described in the following paragraphs.

- **Repair of Concrete Flocculation/Sedimentation Basins #2 & #3** - Visual inspection of sedimentation basins #2 & #3 showed numerous areas of deterioration in the concrete and similar deteriorations were apparent in the corresponding flocculation basins. It is recommended that the District take the necessary measures to

repair the concrete as part of capital improvement planning at FTTP before the condition worsens. The estimated cost for these repairs is \$900,000.

- **Improvements to Flocculation Process Equipment** - NKWD expressed interest in revising the current flocculation arrangement for three of the four existing basins. It is recommended that NKWD revise current flocculator drive arrangements in basins #1, #2 & #3 similar to the direct drive assembly in basin #4. The current two stage horizontal flocculator arrangement should be converted to a three stage vertical flocculator arrangement to alleviate current alignment issues, age, and system wear. The estimated cost associated with revising the drive arrangement on flocculation basins #1, #2 & #3 is \$71,500. The estimated cost associated with revising the flocculation paddle arrangement is \$42,500.
- **Addition of Protective Covers to all Four Sedimentation Basins** - NKWD expressed interest in the addition of protective covers over all four existing sedimentation basins at FTTP. This capital improvement will aide in blocking sunlight which is a proven and effective method for algae control. By covering the basins, it may no longer be necessary to feed copper sulfate to all four sedimentation basins. Upon further investigation, the cost to span the dimension with support members to cover the basin was higher than anticipated. This project will not be carried forward.
- **Replacement of Filter Backwash Tank** - During our site visit, NKWD indicated that the current condition of the underground Filter Backwash Tank is unsatisfactory and may still leak even after recent attempts to recondition the aging tank. The District expressed strong interest in replacing the existing underground tank with a slightly larger tank. A lower cost alternative, with less functionality, would be to make remedial repairs to the existing tank. The District may elect to cancel this project if the new backwash pumps installed with the Advanced Treatment Project are found to be reliable. The estimated cost for upgrading and replacing the Filter Backwash Tank is \$460,000.
- **Perform Comprehensive Hydraulic Analysis of FTTP** - NKWD expressed strong interest in completing a comprehensive hydraulic analysis of the operations at FTTP. There may be hydraulic bottlenecks that are preventing the Plant from operating at its optimal capacity. One area of concern that was specifically mentioned by the District was the Filter Influent Flume.
- **Replacement of Sludge Building Interior Process Equipment** - NKWD indicated that, even though there are no current operational issues with any of the existing sludge handling process equipment, the aging equipment is quickly approaching the end of its useful life and should be considered for scheduled replacement. Two new sludge belt filter presses, conveyor system, decant valves, and repairs to the dumpster room were all specifically mentioned by the District and are recommended to be addressed as part of the capital improvements at FTTP. NKWD recommended delaying the above mentioned capital improvements until the year 2012-2013 in order

to concentrate solely on Advanced Treatment improvements in the near future. The estimated cost associated with replacing the sludge belt filter press is \$1,600,000 and the estimated cost associated with replacement of the sludge press process equipment is \$270,000.

4.1.2.3. Taylor Mill WTP

Regulatory

Regulatory needs at the TMTP include the addition of granular activated carbon (GAC) for advanced treatment to meet the Stage 2 Disinfectant/Disinfection By-product (D/DBP) Rule.

Both basin-style and vessel-style contactors were investigated for the GAC facility to be located west of the current treatment processes at the TMTP. Vessel-style contactors were selected and the following assumptions for capacity and redundancy were made in developing the basis of design for the GAC facilities:

- The GAC facility will include 28 GAC pressurized vessels, GAC feed pump station, GAC backwash system, contactor-to-waste function, combination backwash waste/contactor-to-waste equalization basin, and carbon loading/unloading facilities.
- Normal operation will provide at least a 20-minute EBCT with all contactors in-service at a maximum production rate of 10 MGD.
- Duty and standby pumps are provided for each of the pumping systems required for these facilities.

Twenty-eight pressurized contactors will be provided. It is anticipated that the contactors will have the following characteristics as shown in Table 4-8.

**Table 4-8.
Design Criteria for GAC Contactors-TMTP**

Parameter	Value
No. of Contactors	28
Contactor diameter (feet)	10
Approximate Contactor height (feet)	22
Design Flow per Contactor at Design Capacity (MGD)	0.42

As the preliminary design progressed, a final opinion of probable costs in 2007 dollars was developed. The cost opinion is considered a Class 3 estimate in accordance AACE

and has a predicted accuracy of -20% to +30%. The detailed cost opinion, which includes the UV disinfection facility, is shown in Table 4-9.

**Table 4-9.
Opinion of Probable Project Costs-TMTP**

Item	Capital Cost (\$ Million)
GAC Facilities (Contactor building, site work, GAC PS, EQ Basin)	\$15.3
Contingency	\$3.1
Engineering (Legal, administration)	\$2.3
Total	\$20.7

Capacity

There were no assets identified at the TMTP that required improvements to provide capacity for meeting future growth through the year 2030.

Level of Service

During a recent site visit to the TMTP facility, a number of items were identified in need of repair. The findings of this visit are described in the following paragraphs.

- **Replacement of Concrete Sedimentation, Flocculation, and Rapid Mix Basins -** Recent tests by a concrete testing company have validated the operations staff's concerns that both the north and south sedimentation basins are rapidly deteriorating. Visual inspection showed similar, but less severe, deterioration in the concrete of the adjoining flocculation and rapid mix basins. It is recommended that the District replace the concrete sedimentation, flocculation, and rapid mix basins as part of capital improvement planning at TMTP. The existing rapid mixer was last replaced in 1989 and should also be replaced with a new mixer as part of the basin replacement. The District has expressed interest in replacing the existing tube settlers in both basins but has elected to wait until replacement of the existing basins is completed. This project is combined with the Advanced Treatment Project. The estimated cost for replacing the concrete basins is \$3,405,000. The estimated cost for replacing the rapid mixer is \$4,500. The estimated cost for replacing the tube settler is \$235,000.
- **Replacement of Sludge Building Interior Process Equipment -** NKWD indicated that, even though there are no current operation issues with any of the existing sludge

handling process equipment, the aging equipment is quickly approaching the end of its useful life and should be considered for scheduled replacement. A new belt filter press, conveyor system, decant valves, and repairs to the dumpster room were all specifically mentioned by the District and are recommended to be addressed as part of the capital improvements at TMTP. NKWD recommended delaying the above mentioned capital improvements until the year 2014 in order to concentrate solely on Advanced Treatment improvements in the near future. The estimated cost for the sludge belt filter press replacement is \$800,000. The estimated cost for replacing the sludge press process equipment is \$175,000.

4.1.3. Pumping Station Evaluation

Regulatory

There were no regulatory improvements identified for any of the pump stations through the year 2030.

Capacity

A pump station capacity analysis was conducted as part of the Hydraulic Model Update, see Section 1 of this report.

Level of Service

Bromley Pump Station

During a recent site visit to the Bromley Pump Station, a number of items were identified in need of repair. These items are included in the R&R portion of the CIP. The findings of this visit are described in the following paragraphs.

- **Improvements to Interior of Pump Room Building** - Unlike at the Carothers Pump Station, the renovations to the Bromley Pump Station had not been completed at the time of out site visit. It could be assumed that similar renovations would have a similar impact on the capital improvement recommendations at this pump station. According to the operations staff, the Bromley Pump Station is at the top of the District's renovations list. The current condition of the interior of the building was fair and the staff indicated no problems with daily operations of the pump station. All pumps have been recently refurbished by NKWD staff. All three concrete pump support blocks were in poor condition, with significant concrete deterioration visible at the Pump #1 support block. All non-buried piping showed extensive corrosion and, according to the operations staff, is to be painted as part of the renovations program. Piping supports underneath control valves were either non-existent or crude

pieces of wood and should be addressed. One of the three pump motors in use appeared to be much older than the other two pump motors. It is recommended to phase out the old pump motor in order to standardize the existing pump motors therefore minimizing spare parts. There was not an adequate method to maneuver around the pump room without jumping over non-buried piping. In case of an emergency, this would present safety concerns. The District expressed interest in implementing a programmatic approach to building maintenance, above and beyond the existing O&M capital budget, allowing a budgeted amount of money to be set aside each year to aide in the rehabilitation efforts of the building. The estimated annual cost for building rehabilitation is \$10,000. The estimated cost associated with pump motor standardization is \$50,000

- **HVAC Improvements to Pump Room** - Ventilation within the pump room is provided by a single fan located in the ceiling of the pump room. Temperatures inside the pump room were well above normal, with the fan running, during summer month operation. It should also be noted that the discharge damper was disconnected during the site visit and should be addressed. It is recommended that at least one additional ceiling fan be installed to help improve cross-flow ventilation. The fans should be operable either by a local thermostat or by manual switch. The estimated cost for HVAC improvements is \$2,700.

Carothers Pump Station

During a recent site visit to the Bromley Pump Station, a number of items were identified in need of repair. These items are included in the R&R portion of the CIP. The findings of this visit are described in the following paragraphs.

- **Improvements to Interior of Pump Room Building** - Currently, NKWD is in the process of a systematic program of renovating and rehabilitating all of their distribution pump stations. The District did not divulge a schedule or criticality assessment but stated rather that the program is driven on an "as needed basis" and as O&M capital funds are made available. At the time of our site visit, the Carothers Pump Station renovations had recently been completed, therefore this pump station had little or no capital improvement needs. The current condition of the interior of the building was satisfactory and every piece of non-buried piping was painted recently and in fairly good condition. The restroom in the building was not in service and, according to the operations staff, has been that way for numerous years. The District expressed little interest in improving the operation of the stations lavatory.
- **Addition of a Back-up Generator** - NKWD expressed interest in providing this pump station with a back-up generator. Due to space limitations on the property this improvement might not be feasible. An existing generator at the FTTP will become redundant since a new generator is included as part of the recent Advanced Treatment project at that site. Therefore the old generator may possibly be moved to the Carothers Pump Station. There is discussion of also moving that same generator to

service the TMPS or the Central Facilities Building. For the purposes of this planning document, it will be assumed that because of the space limitations at this site that a new nominally sized, portable generator will be purchased to satisfy this capital improvement. The estimated cost for the back-up generator is \$220,000

Dudley 1040 & 1080 Pump Stations

During a recent site visit to the Bromley Pump Station, a number of items were identified in need of repair. These items are included in the R&R portion of the CIP. The findings of this visit are described in the following paragraphs.

- **Improvements to Interior Process Equipment of Pump Room Building 1080 -**
The interior of the buildings was in overall good condition. All pumps have been recently rebuilt by NKWD staff within the last 4 years and all control valves have been reconditioned within the last 5 years. The operations staff indicated that all four pumps are in good operating condition. Some non-buried piping showed minor corrosion and, according to the operations staff, is scheduled to be painted. At this time, there are no identified capital improvement recommendations and any minor improvements to this pump station can be addressed within the O & M budget.
- **Improvements to Interior Process Equipment of Pump Room Building 1040 -**
The current condition of the interior of the buildings was satisfactory. The operations staff indicated that all four pumps are in good operating condition and have been recently refurbished by NKWD staff within the last 7 years. The District expressed concern about the age (originally installed in 1965) and lack of efficient hydraulic performance of three of the four station's vertical can pumps. It is recommended that all three of the existing vertical can pumps be systematically replaced as part of the on-going capital improvements to this station. All non-buried piping showed minor corrosion along with small patches of moss growth and, according to the operations staff, is scheduled to be painted. NKWD also expressed interest in implementing new soft start instrumentation at this pump station for all four pumps similar to that currently in use at the 1080 station. This improvement would help cut down on peak power demand during pump run time and start-up. The estimated cost associated with pump replacement is \$800,000. The estimated cost for soft start RVAC retrofit is \$60,000. The estimated cost for soft start auto transformer overhaul is \$240,000.
- **HVAC Improvements to Pump Room 1080 & 1040 -** During our site visit, it was observed that NKWD consistently placed the insect screens/bird screens on the inside of the existing pump station louvers. This creates an ideal spot for insects and birds to build nests between the louver blades and the screens and may create a serious health hazard associated with droppings. It is recommended that the District possibly replace these louvers with the screen on the outside. The estimated cost for louver replacement is \$1,500.

- **Replacement and Upgrade of Isolation Valves for both 1040 & 1080 Tanks -**
NKWD expressed strong interest in replacing isolation valves located on the inlet side of the two 5 MGD storage tanks. The operation of these isolation valves should be tied into and controlled by the District's existing SCADA system. Currently, in case of a transmission main break, the District has no preventative measures in place to reduce the volume of water lost. The estimated cost for replacing the isolation valves and upgrading SCADA is \$55,000.

4.1.4. Storage Tank Evaluation

Within the 5-Year planning window the only new tank recommended is the replacement of the Rossford Tank due to age and condition. Additional storage capacity is projected to be needed to meet future demand increases beyond the 5-year horizon as discussed in Section 1, Hydraulic Model Update. Recommendations for storage tank maintenance can be found in Section 4.2.4, Storage Tank Evaluation.

4.1.5. Other

4.1.5.1. Laboratory Equipment

The replacement of laboratory equipment was included in the evaluation of the capital improvements plan as shown in Table 4-10. The equipment was assigned a service life of either 10 or 15 years. Equipment was assumed to be replaced with the same model or equivalent. This evaluation assumed that the exact same number and type of equipment would continue to be needed throughout the planning horizon.

**Table 4-10
Laboratory Equipment Replacement Schedule**

Replacement Year	Purchase Year	Equipment	Make/Model	Location	Instrument Service Life	2008 Cost	Annual Replacement Cost	Final Cost (including inflation)
2008	2000	TOC Analyzer No. 1	Tekmar Fusion **	Organics Lab	10 years	\$37,000		
2009	1988	Incubator No. 1	Fisher Scientific CO2 incubator/ 605	Micro Lab	15 years	\$26,000		
2009	1988	Autoclave No. 1	Market Forge Sterilmatic/STME	Micro Lab	15 years	\$12,000		
2009	2000	AA Varian No. 1	Spectra AA 280 **	Analytical Chemistry Lab	10 years	\$75,000		
2009	1997	AA Perkin Elmer No. 1	Furnace 41102L, Flame AA analyst 400 **	Analytical Chemistry Lab	10 years	\$22,000	\$172,000	\$172,000
2011	1996	Autoclave No. 1	Market Forge Sterilmatic/STME	Micro Lab	15 years	\$12,000	\$12,000	\$13,230
2012	1997	Muffle Furnace No. 1	Lindberg	Wet Chem Lab	15 years	\$7,000	\$7,000	\$8,103
2014	1999	D.I. Unit	Barnstead Infinity/D9011	Micro Lab	15 years	\$4,000		
2014	2005	GC (for HAAs) No. 2	Thermo Trace GC Ultra	Organics Lab	10 years	\$37,000		
2014	2005	Ion Chromatograph No. 2	Dionex	Analytical Chemistry Lab	10 years	\$60,000	\$101,000	\$128,904
2016	2007	GC Mass Spec No. 2	Agilent GC 7890A, MS 5975C	Organics Lab	10 years	\$50,000	\$50,000	\$70,355
2017	2008	Discrete Analyzer No. 2	OI Analytical DA3500 **	Wet Chem Lab	10 years	\$58,000	\$58,000	\$85,692
2018	2008	TOC Analyzer No. 2	Tekmar Fusion **	Organics Lab No. 2	10 years	\$37,000		
2018	2003	Muffle Furnace	Lindberg Blue	Wet Chem Lab	15 years	\$7,000	\$44,000	\$68,258
2019	2009	AA Varian No. 2	Spectra AA 280 **	Analytical Chemistry Lab	10 years	\$75,000		
2019	2009	AA Perkin Elmer No. 2	Furnace 41102L, Flame AA analyst 400 **	Analytical Chemistry Lab	10 years	\$22,000		
2019	2004	D.I. Unit	Barnstead Diamond/D12651	Micro Lab	15 years	\$5,000	\$102,000	\$166,147
2024	2009	Incubator No. 2	Fisher Scientific CO2 incubator/ 605	Micro Lab	15 years	\$26,000		
2024	2009	Autoclave No. 2	Market Forge Sterilmatic/STME	Micro Lab	15 years	\$12,000		
2024	2014	GC (for HAAs) No.2	Thermo Trace GC Ultra	Organics Lab	10 years	\$37,000		
2024	2014	Ion Chromatograph No. 2	Dionex	Analytical Chemistry Lab	10 years	\$60,000	\$135,000	\$280,655
2026	2011	Autoclave No. 2	Market Forge Sterilmatic/STME	Micro Lab	15 years	\$12,000		
2026	2016	GC Mass Spec No.e 2	Agilent GC 7890A, MS 5975C	Organics Lab	10 years	\$50,000	\$62,000	\$142,105
2027	2012	Muffle Furnace No.e 2	Lindberg	Wet Chem Lab	15 years	\$7,000		
2027	2017	Discrete Analyzer No. 2	OI Analytical DA3500 **	Wet Chem Lab	10 years	\$58,000	\$65,000	\$156,430
2028	2018	TOC Analyzer No. 3	Tekmar Fusion **	Organics Lab	10 years	\$37,000	\$37,000	\$93,497
2029	2019	AA Varian No. 3	Spectra AA 280 **	Analytical Chemistry Lab	10 years	\$75,000		
2029	2019	AA Perkin Elmer No. 3	Furnace 41102L, Flame AA analyst 400 **	Analytical Chemistry Lab	10 years	\$22,000	\$97,000	\$257,370

4.1.6. Project Recommendations

A brief description of all the recommended projects in the 5-Year CIP can be found in Table 4-11 followed by a table of the project costs and projected dates when projects will be needed are presented in Table 4-12. A map of all the recommended improvements is provided as Figure 4-1.

Additionally, in order to provide options within the CIPs, multiple approaches were developed to evaluate the timing of projects, and how this timing affects the capital required to fund the AMP throughout the 20-year planning horizon. These approaches are defined below:

Minimum Approach. The minimum approach includes projects required to meet regulations and replace failing critical assets. The minimum approach also includes what is considered to be a minimum amount of funding for maintenance and repairs just to keep the facilities in operation.

Moderate Approach. The moderate approach includes projects required to meet or exceed regulations, replace aging assets at levels below highest level, and improve reliability. The moderate approach also includes funding for what is considered to be an average level of maintenance and repairs for all facilities.

Aggressive Approach. The aggressive approach includes projects required to exceed regulations, replace all categories of aging assets at highest level and significantly improve reliability at the earliest timeframe practical. The aggressive approach also includes adequate funding for maintenance and repairs required for all facilities as well as funding for unanticipated maintenance.

Appendix F contains the results of this analysis for all recommended improvements from 2009-2030.

**Table 4-11.
5-Year CIP Project Description**

Designation	Description
Yearly	<p><u>Distribution System R&R</u> This program involves the systematic replacement of water mains in areas which the District has experienced problems such as discolored water, poor flows, or failures.</p>
Yearly	<p><u>Coordinated Main Replacement</u> This program involves working with various cities and agencies in the service area to replace water mains in streets that are being resurfaced. Working together saves the District restoration costs and coordinates our work with the street work.</p>
Yearly	<p><u>Mains to Unserved Areas</u> These funds are utilized to extend water mains into unserved areas. The total project funding may include these funds along with grant funds, county funds, and surcharges to the customers.</p>
Yearly	<p><u>Annual General Facility R&R – Plants, Tanks, and Pump Stations</u> This program involves rehabilitation and replacement of aging infrastructure and miscellaneous improvements at the treatment plants, tanks, pump stations, and regulator and meter pits. This may include improvements to address recommendations such as adding flow meters on the discharge of all pumps and gravity feed lines from FTTP and MPTP, surge suppression at pump stations, and connecting pressure regulating valves and large meter pits into SCADA.</p>
09-01	<p><u>FTTP – Advanced Treatment Project</u> NKWD must comply with Stage 2 of the Disinfection By-Product Rule (DBPR) in April 2012. The DBPR will require all water systems to comply with a local running annual average of 80 ug/L and 60 ug/L for THM and HAA5 respectively at worst-case sampling points in the distribution system. NKWD will not be able to comply with this new regulation with the existing treatment processes at the FTTP. This project will install granular activated carbon (GAC) and ultraviolet (UV) disinfection at the FTTP. The standby generator will also be replaced.</p>
09-02	<p><u>TMTP – Advanced Treatment Project</u> The preliminary treatment process housing the rapid mix, flocculation basins, and sedimentation basins at the TMTP are approximately 50 years old and need to be replaced because they are failing. The existing basins will be demolished and a granular activated carbon (GAC) feed pump station and emergency power generators installed in their place. The preliminary design report for advanced treatment options includes GAC at TMTP in order to meet the 2012 regulations. The ultraviolet (UV) disinfection units will be moved to the new GAC building.</p>

**Table 4-11.
5-Year CIP Project Description**

Designation	Description
09-03	<p><u>MPTP – Advanced Treatment Project</u> This project will add granular activated carbon (GAC) and ultraviolet (UV) disinfection at MPTP in order to meet new regulations. The improvements will be located in the abandoned sedimentation basins. The project also includes replacing the standby power generator and upgrading filter control valves on 3 of the 6 filters as the other 3 were upgraded in 2007 with the underdrain and media installation.</p>
09-04	<p><u>FTTP Filter Renovations</u> Industry standards recommend that filter media be changed out approximately every 20 years. The filter media in the 12 filters at FTTP is all older than 20 years and has started to exhibit performance problems. For example, 6 of the 12 filters significantly underperform, resulting in increased turbidity breakthrough and more frequent and longer backwashing. In this project the filter media will be replaced along with the surface wash system which will be replaced by an air scour system. The filters at the two other treatment plants all have air scour which reduces backwashing by about 50%, resulting in savings of finished water.</p>
09-05	<p><u>LRPS Structural Improvements, Roof Replacement, Sluice Gates, Actuators, and VFD</u> This project will repair small cracks in the concrete and brick on the interior and exterior of the building and the ladders on the outside of the building that are deteriorating. This project will replace the roof that is in unsatisfactory condition and will upsize the hatches to facilitate removal of pumps. This project will replace the existing inoperable sluice gates that are located at multiple levels of the intake with new electrically actuated gates. The addition of a variable speed drive for increased pumping flexibility will be evaluated as well.</p>
09-06	<p><u>TMTP Valves and Actuators</u> This project will replace aging valves and actuators in the pump station at the Taylor Mill Treatment plant.</p>
09-07	<p><u>Dudley 1040 – Pump Replacement</u> This project will replace up to four pumps in the Dudley 1040 pump station and may add variable speed drives to two of the pumps. This station is the primary supply of water for northern Kenton County service area. The pumps were installed in 1965 and are at the end of its useful service life.</p>

**Table 4-11.
5-Year CIP Project Description**

Designation	Description
09-08	<p><u>Washington Trace from Twelve Mile to Hwy 1996</u></p> <p>The proposed project involves construction of a new 12-inch water main along Oneonta and Washington Trace Roads from Stonehouse to Carthage Road in Campbell County, Kentucky. The length of this project is approx. 14,300 LF. Several new right-of-ways of easements will be needed. This project is designed to strengthen and improve the transmission system and local distribution system to meet population growth and commercial development needs. This project is designed to extend water service to additional customers, support existing water systems, improve water quality, and improve fire protection in the area. The District's Master Plan identified this as a needed hydraulic improvement.</p>
09-09	<p><u>US 27 from East Alexandria Pike to Main Street</u></p> <p>The proposed project involves constructing a new 24-inch water main along AA Highway from East Alexandria Pike to Four Mile Pike, Alexandria, Campbell County, Kentucky. The length of this project is approx. 9,700 LF. No new right-of-ways of easements will be needed. This project is designed to strengthen and improve the transmission system and local distribution system to meet population growth and commercial development needs. This project is designed to support existing water systems, improve water quality, and improve fire protection in the area. The District's Master Plan identified this as a needed hydraulic improvement.</p>
09-14	<p><u>Dolwick 1080/1040 Interconnect</u></p> <p>This project involves constructing a new 12-inch water main along Dolwick from the existing 12-inch on Dolwick to Turfway Road. This project is designed to provide a back-up feed to the Airport and the surrounding commercial and industrial area. The project will connect two different pressure zones together through a special valve.</p>
09-15	<p><u>42-inch Transmission from FTTP to Mook Road</u></p> <p>The proposed project involves constructing a new 42-inch water main along U.S. 27 and Mook Road from the FTTP to the Mook Road 36-inch in the City of Wilder and Southgate, Campbell County, Kentucky. The length of this project is approx. 8,500 LF. New right-of-ways of easements will be needed. The estimated cost for the project is \$2,900,000. This project will replace the existing 24-inch main which is approximately 100 years old. This project is designed to strengthen and improve the transmission system to meet population growth and commercial development needs. The District's Master Plan identified this as a needed hydraulic improvement.</p>

**Table 4-11.
5-Year CIP Project Description**

Designation	Description
09-16	<u>Siry to Flatwoods (Subdistrict F)</u> These remaining funds from Subdistrict F will be utilized to extend water mains along Siry & Flatwoods Roads. This project will provide an additional feed to Pendleton County Water and is part of the District Hydraulic Master Plan. The total project funding will include these funds along with grant funds, county funds and surcharges. The approx. length of the project is 3.6 miles.
10-01	<u>Dudley Discharge Redundancy – Phases 1, 2, and 3</u> This project involves constructing a new 36-inch/24-inch/16-inch water main through the City of Crestview Hills, Kenton County, Kentucky. This project is designed to strengthen the District’s water transmission system and provide some redundancy for the District’s existing 36-inch water main. The District’s Master Plan Addendum for Reliability and Redundancy Analyses identified this as a needed improvement.
10-02	<u>Stonehouse Rd (Twelve Mile Road) from KY 10 to KY 1566</u> The proposed project involves constructing a new 8-inch water main along Twelve Mile Road from Ky. 10 to Ky. 1566 in Campbell County, Kentucky. The length of this project is approx. 8,200 LF. No new right-of-ways of easements should be needed. This project is designed to strengthen and improve the transmission system and local distribution system to meet population growth and commercial development needs. This project is designed to extend water service to additional customers, support existing water systems, improve water quality, and improve fire protection in the area. The District’s Master Plan identified this as needed hydraulic improvement.
10-06	<u>Senour Avenue West of Clover Ridge</u> This project involves construction a 16-inch transmission water main along Senour Road from the existing 16-inch on Senour to Taylor Mill Road. This project is designed to provide additional water to the Independence area. The District’s newest Master Plan identified this as a needed improvement.
11-01	<u>Replace PLCs at TMTP</u> This project will replace the existing PLCs at the Taylor Mill Treatment Plant installed in 1992 that have reached the end of their useful service life. The PLCs are used to control the filter operations including normal filtering flow rates and monitoring points, filter backwash, and filter-to-waste operation.
11-02	<u>FTTP Filter Building Improvements</u> This project will repair the walls, windows, and coatings that are failing due to condensation in the filter bays at the FTTP.
11-07	<u>IT Improvements – Year 1</u> This project includes implementation of improvements to the WAN, conversion to GeoDatabase, inventory control, and IT Tracking system.

**Table 4-11.
5-Year CIP Project Description**

Designation	Description
12-01	<p><u>Rossford Tank</u> The project involves the replacement of the current 300,000 gallon Rossford tank with a larger 1 million gallon tank. The District has already secured land adjoining the existing tower for the replacement tower. The existing Rossford Tank will be retired and the Lumley Tank could also be retired.</p>
12-02	<p><u>MPTP Reservoir Pump Station Suction Piping Replacement</u> A review of the Memorial Parkway Treatment Plant by CH2MHill and later by Quest/JJG showed that the suction piping for the reservoir pumping station has deteriorated and needs to be replaced. This pipe will be upsized to facilitate future capacity expansion of the plant.</p>
12-03	<p><u>Carothers Road Pump Station Generator</u> This project will provide backup power to the Carothers Road Pump Station which serves as the sole supply of water to the southern part of the Newport service area under normal operations. This area may be served through emergency interconnections from the Ft. Thomas system. This project will reduce our risk of being without power at this station.</p>
12-04	<p><u>FOTP Residuals Handling Improvements</u> The residuals processing system at the Fort Thomas Treatment Plant was built in the early 1990s and the equipment is reaching the end of its service life. The preliminary concept for this project includes replacing the two existing belt filter presses, belt conveyors, and polymer feed system; adding a third dumpster bay to provide additional storage of pressed cake prior to hauling; improving HVAC to reduce condensation; adding two flow equalization tanks ahead of the presses to maintain a more constant feed consistency; upsizing the recycled water line to the reservoirs; adding a new pipe to return settled water from the sedimentation basins to the reservoirs for routine cleaning; and adding a lamella plate settler housed in a building to treat water prior to returning to the reservoirs or allowing discharge to a creek under a KPDES permit.</p>
12-06	<p><u>Burns Rd. Between Persimmon Grove & Flatwoods</u> This project involves constructing a new 8-inch water main along Burns Road from Persimmon Grove to Flatwoods Road. This project is designed to strengthen the District's water transmission system. The District's Master Plan Addendum for Reliability and Redundancy Analyses identified this as a needed improvement.</p>
12-07	<p><u>KY 1280 Between US 27 & Burns Rd.</u> This project involves construction a new 8-inch water main along Ky. 1280 from Burns Road to U.S. 27. This project is designed to strengthen the District's water transmission system. The District's Master Plan Addendum for Reliability and Redundancy Analyses identified this as a needed improvement.</p>

**Table 4-11.
5-Year CIP Project Description**

Designation	Description
12-08	<u>Madison Ave. Parallel 24-inch Main Between Dudley & Hands Pike</u> This project involves constructing a new large transmission water main along Madison Pike from the existing 42-inch at Dudley Pike to Hands Pike. This project is designed to provide additional water to the Richardson Road Pump Station and Hands Pike Pump Station. The District's newest Master Plan identified this as needed improvement.
12-9	<u>Orphanage Rd. Parallel 24-inch Main Between Redwood & Valley Plaza</u> This project involves constructing a 24-inch transmission water main along Orphanage Road from the existing 24-inch at Horsebranch Road between Redwood School and Valley Plaza. This project is designed to provide additional water to the 1040 pressure zone. The District's newest Master Plan identified this as needed improvement.
12-10	<u>Hands Pike Between KY16 & Edwin</u> The proposed project involves constructing a new 12-inch water main along Hands Pike from Ky. 16 to Edwin Drive, Covington, Kenton County, Kentucky. The length of this project is approx. 2,500 LF. No new right-of-ways of easements will be needed. This project is designed to strengthen and improve the transmission system and local distribution system to meet population growth and commercial development needs. This project is designed to support existing water systems, improve quality, and improve fire protection in the area. The District's Master Plan identified this as a needed hydraulic improvement.
12-11	<u>KY 16 Between Hands Pike & Klette Rd</u> The proposed project involves constructing a new 12-inch water main along Ky. 16 from Hands Pike to Klette Road, Covington/Independence, Kenton County, Kentucky. The length of his project is approx. 3,000 LF. No new right-of-ways of easements will be needed. This project is designed to strengthen and improve the transmission system and local distribution system to meet population growth and commercial development needs. This project is designed to support existing water systems, improve water quality, and improve fire protection in the area. The District's Master Plan identified this as a needed hydraulic improvement.
12-15	<u>Highland Avenue 12-inch from Kyles Lane to new reg pit near Hanser pit</u> The proposed project involves constructing a new 12-inch water main along Highland Ave. from Kyles Lane to regulator pit at Hanser Drive in Fort Wright, Kenton County, Kentucky. New right-of-ways of easements may be needed. This project is designed to strengthen and improve the transmission system and local distribution system to meet population growth and commercial development needs. This project is designed to support existing water systems, improve water quality, and improve fire protection in the area. The District's Master Plan identified this as a needed hydraulic improvement.

**Table 4-11.
5-Year CIP Project Description**

Designation	Description
12-16	<u>KY 16 from I-275 to TM Swim Club upgrade 16-inch with KDOT project</u> This project involves constructing a new 16-inch water main along the new alignment of KY 16. This project is designed to strengthen the District's water transmission system. The District's Master Plan Addendum for Reliability and Redundancy Analyses identified this as a needed improvement.
12-17	<u>KY 16 from TM Swim Club to TM Standpipe upgrade 16-inch with KDOT project</u> This project involves constructing a new 16-inch water main along the new alignment of KY 16. This project is designed to strengthen the District's water transmission system. The District's Master Plan Addendum for Reliability and Redundancy Analyses identified this as a needed improvement.
12-18	<u>IT Improvements - Year 2</u> This project includes implementation of improvements to the WAN, conversion to GeoDatabase, inventory control, IT Tracking system, and intergration with software systems.
13-01	<u>FTTP Backwash Tank Replacement</u> The existing backwash supply tank was constructed in 1936 and is a rectangular basin that is mostly buried. This structure is in need of significant concrete repair and needs to be replaced with a new tank.
13-02	<u>Dudley - Install Isolation Valves</u> This project will install valves to isolate the two 5 million gallon Dudley tanks in the event of a rapid loss of water such as a large water main failure. The valves would be SCADA controlled so that they would close automatically and signal the pumps at the Taylor Mill Pump Station to turn off as well.
13-03	<u>Taylor Mill PS Pump Replacement (proposed 1, 5, 6 and 2 or 3)</u> This project will replace four of the six pumps at the Taylor Mill Pump Station. The new pumps will replace pumps at the end of their useful service life. The proposed pumps to replace are numbers 1, 5, 6 and either 2 or 3.
13-04	<u>LRPS New Generator & Walkbridge Upgrade</u> This project will make improvements to the walkbridge and install standby power to the Licking River pump station which supplies water to the Taylor Mill Treatment Plant.
13-05	<u>Improvements to FTTP Flocculation/Sedimentation Basins 2 & 3</u> Sedimentation basins 2 and 3 were constructed in 1936 and presently have two-stage flocculation. It is recommended to modify the basins for three-stage flocculation with vertical flocculation paddles instead of horizontal. This configuration is preferred for improving the effectiveness of removing the particulates through sedimentation. It is also recommended to replace the rakes and repair the concrete walls that are deteriorating.

**Table 4-11.
5-Year CIP Project Description**

Designation	Description
13-07	<p><u>Low Gap Rd. Between Tollgate Rd & 8-inch Dead End</u></p> <p>The proposed project involves construction a new 8-inch water main along Low Gap Road from Ky. 9 to existing water main dead-end in the City of Alexandria, Campbell County, Kentucky. The length of this project is approx. 1,300 LF. No new right-of-ways of easements will be needed. This project is designed to strengthen and improve the transmission system and local distribution system to meet population growth and commercial development needs. This project is designed to extend water service to additional customers, support existing water systems, improve water quality, and improve fire protection in the area. The District's Master Plan identified this as a needed hydraulic improvement.</p>
13-08	<p><u>Interconnect 1080 & 1017</u></p> <p>The proposed project involves constructing a new 12-inch water main along KY 536 (Pond Creek Road) from KY 1936 (Pond Creek Road) to Decoursey Pike in Campbell & Kenton Counties, Kentucky. The length of this project is approx. 2,000 LF. New right-of-ways of easements should be needed. This project is designed to strengthen and improve the transmission system and local distribution system to meet population growth and commercial development needs. This project is designed to support existing water systems, improve water quality, and improve fire protection in the area. This water main will need to cross the Licking River. The District's Master Plan identified this as a needed hydraulic improvement.</p>
13-12	<p><u>US 27 24-inch from Sunset to Martha Lane Collins</u></p> <p>This project involves constructing a 24-inch transmission water main along U.S. 27 from Sunset Ave. to Martha Lane Collins. This project is designed to provide additional water to the 1017 pressure zone. The District's newest Master Plan identified this as a needed improvement.</p>
13-13	<p><u>Independence Rd. Between KY17 & 12-inch Pipe</u></p> <p>This project involves constructing a new 12-inch water main along Independence Road from Ky. 17 to the existing 12-inch main. This project is designed to strengthen the District's water transmission system. The District's Master Plan Addendum for Reliability and Redundancy Analyses identified this a needed improvement.</p>
13-14	<p><u>IT Improvements - Year 3</u></p> <p>This project includes implementation of improvements to the WAN, IT Tracking system, and intergration with software systems.</p>
14-01	<p><u>Laboratory Generator</u></p> <p>This project will install standby power to the laboratory at the Ft. Thomas Treatment Plant that performs the analyses of water for the entire system that is necessary for compliance with KDOW testing requirements.</p>

**Table 4-11.
5-Year CIP Project Description**

Designation	Description
14-02	<p><u>TMTTP Sludge Pumps, Conveyors & Press</u> This project will replace the existing sludge processing equipment at the Taylor Mill Treatment Plant that has reached the end of its useful service life. A new belt filter press, conveyor, decant valves and repairs to the dumpster room are recommended.</p>
14-03	<p><u>ORPS2 Replacement Design and Construction</u> This project will replace the existing Ohio River Pump Station No. 2 that supplies water to the Memorial Parkway Treatment Plant because the existing station was built in the late 1800s and has reached the end of its useful service life. The facility has numerous structural issues that need addressed to remain in operation and would take significant work to bring into current building code compliance if altered. The first year budget includes design engineering services for all improvements and installation of two phases of raw water main. The second and third year budgets include engineering services during construction and the contractor's construction cost for the station.</p>
14-05	<p><u>36-inch Licking River Crossing</u> This project involves constructing a new 36-inch redundancy water main across the Licking River between Kenton & Campbell Counties. This project is designed to strengthen the District's water transmission system and provide additional redundancy for the District's existing 36-inch concrete water main. The District's Master Plan Addendum for Reliability and Redundancy Analyses identified this as a needed improvement.</p>
14-09	<p><u>Vineyard (Gunkel Rd.) Between Eight Mile & Fender Rd.</u> The proposed project involves constructing a new 8-inch water main along Gunkel Road from Eight Mile Road to Fender Road in southern Campbell County, Kentucky. The length of this project is approx. 9,000 LF. No new right-of-ways or easements will be needed. This project is designed to strengthen and improve the transmission system and local distribution system to meet population growth and commercial development needs. This project is designed to extend water service to additional customers, support existing water systems, improve water quality, and improve fire protection in the area. The District's Master Plan identified this as a needed hydraulic improvement.</p>
14-10	<p><u>IT Improvements - Year 4</u> This project includes implementation of improvements to the WAN, IT Tracking system, and integration with software systems.</p>

**Table 4-11.
5-Year CIP Project Description**

Designation	Description
15-04	<p><u>Bromley Pump Replacement and Misc. Improvements</u> This project will replace the existing pumps at the Bromley Pump Station that have reached the end of their useful service life. The smaller pump was installed in 1968 and the two larger pumps in 1986. The chlorine storage and feed facility will be replaced along with various electrical and security improvements, replacement of valves and actuators.</p>
15-05	<p><u>Upgrade SCADA/Instrumentation/Security Equipment at Plants and PS</u> This project will upgrade the SCADA operating system, replace the PLCs at the plants and pump stations that were installed between approximately 1998 and 2003 as they will have reached the end of their useful life, and replace security systems that were installed primarily from the Vulnerability Assessment recommendations in the same time period.</p>
15-07	<p><u>IT Improvements - Year 5</u> This project includes implementation of improvements to the WAN, IT Tracking system, and integration with software systems.</p>
16-05	<p><u>Hands Pike Pumps and Misc Improvements</u> The pumps, motors, and motor control centers installed in 1983 will be at the end of their useful lives and due to be replaced. It is recommended the lighting, electrical, and exhaust fans be inspected and replaced if needed. As an option to improving Hands Pike, the station could be retired when the new Richardson Road Pump Station is in place (proposed 2018).</p>
16-06	<p><u>Horsebranch Road 24-inch from 36-inch to Thomas More Parkway</u> This project involves construction of a approximately 1,800 feet of 24-inch main along Horsebranch Road to Thomas More Parkway.</p>
17-01	<p><u>Raw water line to FTTP South Reservoir</u> This project involves replacing the 30-inch raw water main installed in 1936 feeding the south reservoir at FTTP with a new 36-inch line. This improvement will bring more water to the south reservoir.</p>
17-02	<p><u>MPTP Residuals Handling Improvements</u> This project will allow the residuals handling building to be placed back into operation. Improvements include adding a gravity thickener to process settled process solids and solids removed from the reservoir by a dredge, installation of 3 positive displacement pumps, modifications to truck loading area roof height, conversion of the existing sludge holding tank to a holding tank for belt filter press filtrate and gravity thickener supernatant and return pumps, and electrical upgrades.</p>

**Table 4-11.
5-Year CIP Project Description**

Designation	Description
17-04	<u>SR17 From Hands Pike to Apple Drive</u> This project involves the construction of approximately 28,000 feet of 24-inch water main along SR 17 between Hands Pike and Apple Drive. It will serve as a primary north/south water main to increase flow to both the existing Independence Tank and a new tank east of Independence.
17-08	<u>Replace Bellevue Tank</u> The Bellevue Tank was built around 1930 and is approaching the end of its useful service lives. Since the tank was painted in 1999, it is recommended a detailed inspection of the tanks be performed when the coatings reach 15 to 20 years old. Based on the condition of the tanks, the District will need to decide if the condition is adequate for repainting and keeping the tank in service for at least another 15 to 20 years or whether a new tank is needed.
18-01	<u>New KY17 PS To Replace Richardson Rd. PS</u> The pumps at Richardson Road station are currently running at much lower head than their design and will need to be replaced to meet future demand conditions. Due to limited capacity in the discharge pipe it is recommended this station be replaced with a new station at a different location along SR 17. The existing Richardson Road Pumping Station would be retired and the Hands Pike Pumping Station could also be retired.
18-02	<u>1.0 MG Elevated Storage Tank East of Independence</u> Based on demand projections and a storage gap analysis additional storage in the southern Kenton County area will be needed sometime between 2015 and 2020. This project consists of building a new 1.0 MG tank east of Independence.
18-03	<u>Replace Dayton Tank</u> The Dayton Tank was built around 1930 and is approaching the end of its useful service lives. Since the tank was painted in 2001, it is recommended a detailed inspection of the tanks be performed when the coatings reach 15 to 20 years old. Based on the condition of the tanks, the District will need to decide if the condition is adequate for repainting and keeping the tank in service for at least another 15 to 20 years or whether a new tank is needed.
18-04	<u>US 27 Pump Station VFDs</u> It is recommended that variable frequency drives be added to at least 2 of the pumps to reduce pressure surges in the system.
18-09	<u>SR17 to Stephens Rd cross country 16-inch to New Tank in Independence</u> This approximately 4,500 feet of 12-inch pipe between SR 17 and Stephens Road is needed to connect the new 1.0 MG Tank east of Independence.
18-10	<u>24-inch on US 27 Between FTTP and Martha Layne Collins replace 16-inch</u> It is recommended that the existing 16-inch main between the FTTP and Martha Layne Collins be replaced with a 24-inch main for approximately 16,000 feet.

**Table 4-11.
5-Year CIP Project Description**

Designation	Description
19-01	<u>1.0 MG Elevated Storage Tank – Southern Campbell County</u> Based on demand projections and a storage gap analysis, additional storage will be needed in the southern Campbell County area between 2015 and 2020. This project will construct a new 1.0 MG tank in southern Campbell County near KY 9 and Lick Hill. The Main Street Tank may need retired for water quality reasons when this new tank is in place.
19-03	<u>New Pump Station near the existing Ripple Creek PS</u> The existing Ripple Creek Pump Station will be unable to supply enough water to all of southern Campbell County at some time between 2020 and 2030. A new pump station is recommended at the same location or in very close proximity to the existing station.
19-07	<u>24-inch along US 27 from Martha Layne Collins to Ripple Creek PS</u> It is recommended a new parallel 24-inch main be constructed from Martha Layne Collins to the Ripple Creek Pumping Station. The distance is about 12,000 feet.
19-08	<u>16-inch along AA Highway from Hwy 547 & California Cross Rd.</u> This project involves the construction of approximately 32,000 feet of 16-inch water main along the AA Highway (KY 9) between Hwy 547 and California Cross Road that will extend transmission capacity into southern Campbell County. At this time the Main Street Tank could be retired.
19-09	<u>36-inch Redundancy from 42-inch at Mook Rd to 36-inch Licking River Crossing</u> This project consists of constructing 6,300 feet of 36-inch main along Mook Road and across the Licking River into Covington.
19-10	<u>Replace Lumley Tank</u> The tank was built in 1934 and will be at the end of its service life. The tank was last coated in 1999 and will need repainted between 2014 and 2019. This tank can be retired following the construction of the larger Rossford Tank.
20-01	<u>Electrical Upgrades at FTTP</u> It is anticipated that upgrades to the power supply and distribution within the plant will be needed to replace systems at the end of their useful life.
20-02	<u>Retire TM Standpipe Build Elevated 1040 Tank</u> The tank was last coated in 2006 and would be due to be repainted around 2021. In order to increase pressure in Taylor Mill, it is recommended the existing standpipe be retired and a new elevated tank be constructed in its place. The system would be served directly from the 1040 pressure zone by removing the Sandman PRV. The new tank would be about 175 feet tall and should be in the same general vicinity as the existing standpipe. The recommended volume is not confirmed but is estimated to be about 500,000 gallons.

**Table 4-11.
5-Year CIP Project Description**

Designation	Description
20-03	<u>Pump Station Improvements at Dudley 1040</u> It is recommended the pumps be retrofitted with variable speed drives and the motor control centers and electrical, mechanical, and lighting systems be upgraded.
20-08	<u>Replacement Ida Spence Tank (or retire and serve from 1040)</u> This tank was last coated in 2005 and will need repainted around 2020. The tank is approaching the end of its useful life having been built in 1953. The tank will need replaced, or it could be retired along with Latonia Pumping Station and the area served through a regulator off the 1040 pressure zone. Some system improvements would be needed to facilitate this conversion.
21-01	<u>Chemical Feed Systems Upgrades at TMTP</u> It is anticipated that chemical feed systems installed in 1998 will need rehabilitated or replaced. Systems include corrosion inhibitor, coagulants, caustic soda, fluoride, polymer, sodium hypochlorite, and sodium bisulfite. Components include piping, valves, actuators, tanks, and pumps.
21-02	<u>Filter Valves and Actuators at FTTP</u> It is recommended the filter valves and actuators at FTTP be replaced as they will be at the end of their useful life.
21-03	<u>Pump Station Improvements at Carothers</u> The pumps, motors, and motor control centers and electrical systems should be replaced.
22-01	<u>20-inch Gravity Discharge from MPTP</u> The two 20-inch gravity discharge lines from MPTP into Newport are over 100 years old. It is recommended these mains be replaced given their importance as the sole supply to Newport and future greater dependency when on these mains when Covington is served by MPTP. The total length is estimated to be 32,000 feet of two parallel 20-inch mains.
22-02	<u>Pump Station Improvements at Bristow Road</u> This project consists of replacing the 3 pumps with new 4,200 gpm pumps rated at 50 feet of head. The new pumps will be better matched to demand conditions and feeding the tanks in the 1080 system. The pumps should be installed with VFDs.
23-010	<u>Chemical Feed Systems Upgrades at FTTP</u> It is anticipated that chemical feed systems installed in 2001 will need rehabilitated or replaced. Systems include copper sulfate, corrosion inhibitor, coagulants, caustic soda, fluoride, polymer, sodium hypochlorite, and potassium permanganate at ORPS1. Components include piping, valves, actuators, tanks, and pumps.

**Table 4-11.
5-Year CIP Project Description**

Designation	Description
23-02	<u>Pump Station Improvements at Dudley 1080</u> It is recommended the pumps, motors, and motor control centers be replaced along with upgrades to the mechanical, electrical, and lighting systems.
24-01	<u>Pump Station Improvements at Latonia</u> It is recommended the pumps, motors, and motor control centers be replaced along with upgrades to the mechanical, electrical, and lighting systems.
25-01	<u>Pump Station Improvements at Waterworks Road</u> It is recommended the pumps, motors, and motor control centers be replaced along with upgrades to the mechanical, electrical, and lighting systems. An emergency generator will also be installed.
25-02	<u>MPTP Expand to 20 MGD</u> In order to meet additional demand requirements in the system, the MPTP will be used to supply water to northern Kenton County and Campbell County. Improvements will include addition of a larger raw water pump in the Reservoir Pumping Station and replacement of the existing 24-inch discharge line with a 36-inch main, addition of another ACTIFLO® train,
26-01	<u>Pump Station Improvements and Electrical Improvements at TMTP</u> This project will replace two of the six pumps at the Taylor Mill Pump Station. The new pumps will replace pumps at the end of their useful service life. The proposed pumps to replace are numbers 4 and either 2 or 3. Power distribution at the plant may need replaced and should be evaluated to prioritize needs.
27-05	<u>20-inch to Connect 11th Street in Newport to 12th Street in Covington</u> This project consists of extending one of the gravity lines from MPTP down 11 th Street in Newport to supply a new pump station near the Licking River and then connecting back into the main at 12 th and Wheeler in Covington. The addition of 5,700 feet of 20-inch is needed.
27-06	<u>12-inch Parallel Main Btwn Vulcan and Lytle</u> The addition of a 12-inch parallel main approximately 6,300 feet in length is needed between Vulcan and Lytle Roads. This main will provide additional capacity needed to serve the Industrial and Devon Tanks.
28-01	<u>New pump station from Newport to Covington</u> This station will utilize Memorial Parkway Treatment Plant as a second supply to serve northern parts of Kenton County along with FTTP. Currently MPTP cannot be used to supply any water to Kenton County.
28-03	<u>24-inch Parallel Main Persimmon Grove from AA Hwy to Jerry Wright</u> Additional transmission is needed to provide adequate turnover and maintain the South County Tank and Claryville Tank water levels under future demand. This project consists of building 16,000 feet of 24-inch parallel main along Persimmon Grove and Jerry Wright Road.

**Table 4-11.
5-Year CIP Project Description**

Designation	Description
28-04	<u>16-inch Main Jerry Wright, Lickert, Old SR 4 to Claryville Tank</u> Additional transmission is needed to provide adequate water levels in the South County Tank and Claryville Tank water levels under future demand. This project consists of constructing 9,000 feet of 16-inch along Lickert Road and Old State Route 4.
29-01	<u>MPTP add second gravity thickener</u> This project involves the addition of a second gravity thickener and pumps to process increased production capacity and reservoir solids at MPTP.
29-02	<u>ORPS2 Addition of One 10 MGD Pump</u> In order to meet increased system demands, it will be necessary to add one 10 MGD pump to the raw water pumping station.
29-04	<u>20-inch Percival Rd from 24-inch in Banklick/Walton Nicholson to New Tank</u> This 20-inch water main will provide flow to the new southern Kenton County Tank needed to maintain pressures in the around Walton under 2030 projected demand conditions.
29-05	<u>1 MG Tank in Southern Kenton County near Walton</u> Based on demand projections and a storage gap analysis, additional storage will be needed in southern Kenton County sometime by 2030. This project consists of building a new 1.0 MG tank near Walton. A check valve will be installed in Independence Road to keep Bristow Road Pumping Station from pumping directly to the Independence Tank. This valve will help supply more water to the new tank.
30-01	<u>Chemical Feed Systems Upgrades at MPTP</u> It is anticipated that chemical feed systems installed in 2006 will need rehabilitated or replaced. Systems include copper sulfate, corrosion inhibitor, ferric sulfate, polyaluminum chloride, caustic soda, fluoride, polymer, sodium hypochlorite, and powdered activated carbon. Components include piping, valves, actuators, tanks, and pumps. Systems will be sized to meet 20 MGD treatment capacity.
30-02	<u>Pump Station Improvements at US 27</u> It is recommended the pumps, motors, and motor control centers be replaced along with upgrades to the mechanical, electrical, and lighting systems.
30-07	<u>Replace Kenton Lands Tank</u> The tank was built in 1954 and will be at the end of its service life. The tank was last coated in 2010 and will need repainted between 2025 and 2030.

**Table 4-12
Master List of 5-Year CIP Projects 2009 – 2030**

Designation	Location	Project Description	Cost
09-01	FTTP	FTTP Advanced Treatment - Design & Construction	\$30,000,000
09-02	TMTP	TMTP Advanced Treatment and Generator - Design & Construction	\$28,350,000
09-03	MPTP	MPTP Advanced Treatment - Design & Construction	\$15,300,000
09-04	FTTP	FTTP Filter Renovations	\$1,665,000
09-05	LRPS	Structural Impr., Roof Replacement, Sluice Gates, Actuators, VFD	\$984,750
09-06	TMTP	Valves & Actuators	\$168,300
09-07	Dudley 1040	Replace Four Pumps, 2 constant speed and 2 VFDs	\$440,550
09-08	Distribution	Washington Trace from Twelve Mile to Hwy 1996	\$964,970
09-09	Distribution	US27 from E. Alex Pike to Main Street/Phase 4 and 5 unfunded	\$1,947,000
09-10	Distribution	Yearly 2009 Distribution System R & R	\$3,100,000
09-11	Distribution	2009 Mains to Unserved Areas	\$250,000
09-12	Distribution	2009 Coordinated Main Replacement	\$2,000,000
09-13	Distribution	Kenton County Water Main Replacement Match	\$600,000
09-14	Distribution	Dolwick 1080 / 1040 Interconnect	\$850,000
09-15	Distribution	42" Transmission Main from FTTP to Mooock Rd, Construction	\$2,500,000
09-16	Distribution	Siry to Flatwoods (Subdistrict F)	\$1,100,000
10-01	Distribution	Dudley Discharge Redundancy Imp. - Phase 1	\$760,000
10-01	Distribution	Dudley Discharge Redundancy Imp. - Phase 2	\$960,000
10-01	Distribution	Dudley Discharge Redundancy Imp. - Phase 3	\$945,000
10-02	Distribution	Stonehouse Rd (Twelve Mile Rd) from KY 10 to KY 1566	\$1,120,000
10-03	Distribution	Yearly 2010 Distribution System R & R	\$3,500,000
10-04	Distribution	2010 Mains to Unserved Areas	\$250,000
10-05	Distribution	2010 Coordinated Main Replacement	\$2,500,000
10-06	Distribution	Senour Ave. West of Cloverridge	\$750,000
10-07	Distribution	Subdistrict H Upgrade	\$497,018
10-07	Distribution	Subdistrict H Surcharge	\$946,670
10-08	Distribution	US27/AA Hwy/KY 547- unfunded Phase 3, 4, 5	\$2,971,200
11-01	TMTP	Replace PLCs for Filters at TMTP	\$350,000
11-02	FTTP	Repair Walls and Windows in FTTP Filters	\$530,000
11-03	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$829,000
11-04	Distribution	Yearly 2011 Distribution System R & R	\$4,000,000
11-05	Distribution	2011 Mains to Unserved Areas	\$250,000

Table 4-12
Master List of 5-Year CIP Projects 2009 – 2030

Designation	Location	Project Description	Cost
11-06	Distribution	2011 Coordinated Main Replacement	\$2,500,000
11-07	Distribution	Subdistrict I Surchage	\$257,576
11-08	Technology	IT Improvements - Year 1	\$175,000
12-01	Rossford	1.0 MG Rossford Elevated Storage Tank	\$3,125,000
12-02	MPTP	MPTP PS Suction Piping	\$1,000,000
12-03	Carothers	Carothers Rd. PS Generator	\$386,678
12-04	FTTP	Residuals Handling Upgrade Project - Design & Construction	\$6,500,000
12-05	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$928,000
12-06	Distribution	Burns Rd. Between Persimmon Grove & Flatwoods	\$1,554,000
12-07	Distribution	KY 1280 Between US 27 & Burns Rd.	\$357,000
12-08	Distribution	Madison Ave. Parallel 24" Main Between Dudley & Hands Pike	\$2,132,000
12-09	Distribution	Orphanage Rd. Parallel 24" Main Between Redwood & Valley Plaza	\$1,390,000
12-10	Distribution	Hands Pike Between KY16 & Edwin	\$608,000
12-11	Distribution	KY 16 Between Hands Pike & Klette Rd	\$613,000
12-12	Distribution	Yearly 2012 Distribution System R & R	\$4,000,000
12-13	Distribution	2012 Mains to Unserved Areas	\$250,000
12-14	Distribution	2012 Coordinated Main Replacement	\$2,500,000
12-15	Distribution	Highland Avenue 12" from Kyles Lane to new reg pit near Hanser pit	\$480,000
12-16	Distribution	KY 16 from I-275 to TM Swim Club upgrade 16" with KDOT project	\$450,000
12-17	Distribution	KY 16 from TM Swim Club to TM Standpipe upgrade 16" with KDOT project	\$350,000
12-18	Technology	IT Improvements - Year 2	\$405,000
13-01	FTTP	FTTP Backwash Tank Replacement	\$782,000
13-02	Dudley	Dudley - Install Isolation Valves	\$345,119
13-03	TM TP PS	Taylor Mill PS Pump Replacement (proposed 1, 5, 6 and 2 or 3)	\$3,731,013
13-04	LRPS	LRPS New Generator & Walkbridge Upgrade	\$4,100,000
13-05	FTTP	Improvements to FTTP Flocculation/Sedimentation Basins 2 & 3	\$2,784,000
13-06	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$888,000
13-07	Distribution	Low Gap Rd. Between Tollgate Rd & 8" Dead End	\$375,000
13-08	Distribution	Interconnect 1080 & 1017	\$1,200,000
13-09	Distribution	Yearly 2013 Distribution System R & R	\$4,000,000
13-10	Distribution	2013 Mains to Unserved Areas	\$250,000
13-11	Distribution	2013 Coordinated Main Replacement	\$2,500,000
13-12	Distribution	US 27 24" from Sunset to Martha Lane Collins	\$1,280,000
13-13	Distribution	Independence Rd. Between KY17 & 12" Pipe	\$115,000
13-14	Technology	IT Improvements - Year 3	\$343,000

**Table 4-12
Master List of 5-Year CIP Projects 2009 – 2030**

Designation	Location	Project Description	Cost
14-01	FTTP	Laboratory Generator	\$237,000
14-02	TMTP	TMTP Sludge Pumps, Conveyors & Press	\$1,537,000
14-03	ORPS2	ORPS2 Replacement Design and Construction	\$42,250,000
14-04	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$983,000
14-05	Distribution	36" Licking River Crossing	\$4,503,000
14-06	Distribution	2014 Distribution R&R	\$4,000,000
14-07	Distribution	2014 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
14-08	Distribution	2014 Mains into Unserved Areas	\$250,000
14-09	Distribution	Vineyard (Gunkel Rd.) Between Eight Mile & Fender Rd.	\$608,000
14-10	Technology	IT Improvements - Year 4	\$86,000
15-01	Distribution	2015 Mains into Unserved Areas	\$250,000
15-02	Distribution	2015 Water Main Replacement Program	\$5,000,000
15-03	Distribution	2015 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
15-04	Bromley	Bromley Pump Replacement and Misc. Improvements	\$1,716,000
15-05	Plants/PS	Upgrade SCADA/Instrumentation/Security Equipment at Plants and PS	\$10,172,000
15-06	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,007,000
15-07	Technology	IT Improvements - Year 5	\$300,000
16-01	Distribution	2016 Mains into Unserved Areas	\$250,000
16-02	Distribution	2016 Water Main Replacement Program	\$5,250,000
16-03	Distribution	2106 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
16-04	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,018,000
16-05	Hands Pike	Hands Pike Pumps and Misc Improvements	\$700,000
16-06	Distribution	Horsebranch Road 24" from 36" to Thomas More Parkway	\$800,000
17-01	FTTP	Raw water line to FTTP south reservoir	\$700,000
17-02	MPTP	MPTP Residuals Handling Improvements	\$4,600,000
17-03	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,038,000
17-04	Distribution	SR17 From Hands Pike to Apple Drive	\$12,740,000
17-05	Distribution	2017 Mains into Unserved Areas	\$250,000
17-06	Distribution	2017 Water Main Replacement Program	\$5,500,000
17-07	Distribution	2017 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
17-08	Bellevue	Replacement Bellevue Tank	\$1,300,000
18-01	New PS	New KY17 PS To Replace Richardson Rd. PS	\$1,900,000
18-02	New Tank	1.0 MG Elevated Storage Tank East of Independence	\$4,375,000
18-03	Dayton Tank	Replace Dayton Tank	\$3,700,000
18-04	US 27 PS	US 27 Pump Station VFDs	\$449,000

Table 4-12
Master List of 5-Year CIP Projects 2009 – 2030

Designation	Location	Project Description	Cost
18-05	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,061,000
18-06	Distribution	2018 Mains into Unserved Areas	\$250,000
18-07	Distribution	2018 Water Main Replacement Program	\$5,750,000
18-08	Distribution	2018 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
18-09	Distribution	SR17 to Stephens Rd cross country 16" to New Tank in Independence	\$1,068,570
19-01	New Tank	1.0 MG Elevated Storage Tank - Southern Campbell County	\$4,500,000
19-02	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,084,000
19-03	New PS	New Pump Station near the existing Ripple Creek PS	\$2,079,000
19-04	Distribution	2019 Mains into Unserved Areas	\$250,000
19-05	Distribution	2019 Water Main Replacement Program	\$6,000,000
19-06	Distribution	2019 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
19-07	Distribution	24" along US 27 from Martha Layne Collins to Ripple Creek PS	\$5,810,000
19-08	Distribution	16" along AA Highway from Hwy 547 & California Cross Rd.	\$10,330,000
19-09	Distribution	36" Redundancy from 42" at Mooock Rd to 36" Licking River Crossing	\$4,100,000
19-10	Lumley Tank	Replace Lumley Tank	\$1,400,000
20-01	FTTP	Electrical Upgrades at FTTP	\$1,000,000
20-02	TM Tank	Retire TM Standpipe Build Elevated 1040 Tank	\$2,100,000
20-03	Dudley 1040 PS	Pump Station Improvements at Dudley 1040 (VFDs)	\$1,275,000
20-04	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,110,000
20-05	Distribution	2020 Mains into Unserved Areas	\$250,000
20-06	Distribution	2020 Water Main Replacement Program	\$6,500,000
20-07	Distribution	2020 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
20-08	Ida Spence	Replacement Ida Spence Tank (or retire and serve from 1040)	\$2,121,000
21-01	TMTP	Chemical Feed Systems Upgrades at TMTP	\$1,380,000
21-02	FTTP	Filter Valves and Actuators at FTTP	\$650,000
21-03	Carothers	Pump Station Improvements at Carothers	\$500,000
21-04	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,138,000
21-05	Distribution	2021 Mains into Unserved Areas	\$250,000
21-06	Distribution	2021 Water Main Replacement Program	\$6,500,000
21-07	Distribution	2021 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
22-01	MPTP	20" Gravity Discharge from MPTP	\$16,000,000
22-02	Bristow	Pump Station Improvements at Bristow Road	\$600,000
22-03	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,163,000
22-04	Distribution	2022 Mains into Unserved Areas	\$250,000

Table 4-12
Master List of 5-Year CIP Projects 2009 – 2030

Designation	Location	Project Description	Cost
22-05	Distribution	2022 Water Main Replacement Program	\$6,500,000
22-06	Distribution	2022 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
23-01	FTTP	Chemical Feed Systems Upgrades at FTTP	\$2,295,000
23-02	Dudley 1080 PS	Pump Station Improvements at Dudley 1080	\$3,600,000
23-03	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,190,000
23-04	Distribution	2023 Mains into Unserved Areas	\$250,000
23-05	Distribution	2023 Water Main Replacement Program	\$6,500,000
23-06	Distribution	2023 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
24-01	Latonia PS	Pump Station Improvements at Latonia	\$600,000
24-02	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,218,000
24-03	Distribution	2024 Mains into Unserved Areas	\$250,000
24-04	Distribution	2024 Water Main Replacement Program	\$6,500,000
24-05	Distribution	2024 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
25-01	Waterworks PS	Pump Station Improvements at Waterworks Road (include generator)	\$1,500,000
25-02	MPTP	MPTP Expand to 20 MGD - Actiflo	\$7,400,000
25-03	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,246,000
25-04	Distribution	2025 Mains into Unserved Areas	\$250,000
25-05	Distribution	2025 Water Main Replacement Program	\$6,500,000
25-06	Distribution	2025 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
26-01	TMTP PS	Pump Station Improvements at TMTP	\$3,100,000
26-02	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,277,000
26-03	Distribution	2026 Mains into Unserved Areas	\$250,000
26-04	Distribution	2026 Water Main Replacement Program	\$6,750,000
26-05	Distribution	2026 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
27-01	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,310,000
27-02	Distribution	2027 Mains into Unserved Areas	\$250,000
27-03	Distribution	2027 Water Main Replacement Program	\$7,000,000
27-04	Distribution	2027 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
27-05	Distribution	20" to Connect 11th Street in Newport to 12 Street in Covington	\$6,000,000
27-06	Distribution	12" Parallel Main Btwn Vulcan and Lytle	\$2,500,000
28-01	New PS	New pump station from Newport to Covington	\$7,000,000
28-02	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,342,000
28-03	Distribution	24" Parallel Main Persimmon Grove from Riley to Jerry Wright	\$11,200,000
28-04	Distribution	16" Main Jerry Wright, Lickert, Old SR 4 to Claryville Tank	\$3,600,000



**Table 4-12
Master List of 5-Year CIP Projects 2009 – 2030**

Designation	Location	Project Description	Cost
28-05	Distribution	2028 Mains into Unserved Areas	\$250,000
28-06	Distribution	2028 Water Main Replacement Program	\$7,500,000
28-07	Distribution	2028 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
29-01	MPTP	MPTP add second gravity thickener	\$1,000,000
29-02	ORPS2	ORPS2 add 1 10 MGD pump	\$1,900,000
29-03	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,376,000
29-04	Distribution	20" Percival Rd from 24" in Banklick/Walton Nicholson to New Tank	\$16,000,000
29-05	New Tank	1 MG Tank in Southern Kenton County near Walton	\$7,000,000
29-06	Distribution	2029 Mains into Unserved Areas	\$250,000
29-07	Distribution	2029 Water Main Replacement Program	\$8,000,000
29-08	Distribution	2029 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
30-01	MPTP	Chemical Feed Systems Upgrades at MPTP	\$1,751,000
30-02	US 27 PS	Pump Station Improvements at US 27	\$1,500,000
30-03	WQ&P	Annual General Facility R&R - Plants, Tanks, Pump Stations	\$1,411,000
30-04	Distribution	2030 Mains into Unserved Areas	\$250,000
30-05	Distribution	2030 Water Main Replacement Program	\$8,500,000
30-06	Distribution	2030 Coordinated Roadway Imp./Water Main Replacement	\$2,500,000
30-07	Kenton Lands	Replace Kenton Lands Tank	\$4,600,000

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

Engineering Technical Memorandum

(Included as separate file)

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

Engineer's Opinion
Of Probable
Construction Cost



engineering | architecture | geospatial

Project:	Fort Thomas WTP Basin Improvements		
Owner:	Northern Kentucky Water District		
Project No.:	4789		
Date:	9/28/2020	Dwg. No.:	
Estimator:	AAB/TLS	Type:	Final

Opinion of Construction Costs - 2 Stage Flocculation with 6 Invent Flocculators				
Item Description	No. of Units	Units of Measure	Unit Cost	Total Cost
Div. 01 - General Requirements				
Contractor mobilization / project supervision / submittals	7%	% Const. Cost	\$ 445,500.00	\$ 445,500.00
Contractor Equipment Rental	12	Months	\$ 10,000.00	\$ 120,000.00
Div. 02 - Existing Conditions				
Demo Flocculation Basin 1	1	EA	\$ 90,000.00	\$ 90,000.00
Demo Flocculation Basin 4	1	EA	\$ 80,000.00	\$ 80,000.00
Demo Sedimentation Basins 1 and 4 (including tube settlers & clarifier mechanisms; clarifier bridges removal)	2	EA	\$ 38,000.00	\$ 76,000.00
Demo Tube Settlers in Basins 2 & 3	2	EA	\$ 15,000.00	\$ 30,000.00
Remove Existing Floor Coating in NaOCl Feed Pump Area	1	LS	\$ 10,000.00	\$ 10,000.00
Demo Existing NaOCl Discharge Piping	1	LS	\$ 7,500.00	\$ 7,500.00
Demo Existing Rapid Mixer & Solid Cover Plate Support Beams and Stop Gate Anti-Friction Guides	1	LS	\$ 28,000.00	\$ 28,000.00
Demo Existing 8" Sludge Valves and Actuators at Basins 1 & 4	2	EA	\$ 2,500.00	\$ 5,000.00
Div. 03 - Concrete				
Concrete Columns Between Stages 1 and 2 in Flocculation Basin for FRP Baffle Attachment	2	PER BASIN	\$ 11,000.00	\$ 22,000.00
Grout for floor of Basin 1 & 4 Flocculation Zones	210	CY	\$ 200.00	\$ 42,000.00
Div 05 - Metals				
Basin 1 & 4 Galvanized Steel Framing and Grating for Flocculator Bridges/Walkways	2	PER BASIN	\$ 75,000.00	\$ 150,000.00
Davit Crane Base Mounts	9	EA	\$ 3,100.00	\$ 27,900.00
Alumnium Handrails	1,000	FT	\$ 160.00	\$ 160,000.00
Rapid Mixer and Solid Cover Plate Support Beams	1	LS	\$ 12,000.00	\$ 12,000.00
Div. 06 - Wood, Plastics, and Composites				
FRP Ladders in Basins 1 & 4	7	EA	\$ 2,000.00	\$ 14,000.00
Rapid Mix - Stop Gate Anti-Friction Guide Replacement	1	LS	\$ 2,000.00	\$ 2,000.00
FRP Baffles in Basins 1 & 4	2	EA	\$ 144,000.00	\$ 288,000.00
Div. 09 - Finishes				
Surface Prep & Coating for Flocculation Zone of Basins 1 and 4	6700	SF	\$ 11.00	\$ 73,700.00
Coatings for Damaged NaOCl Feed Pump Area	550	SF	\$ 18.00	\$ 9,900.00
Blast and Repaint Existing Clarifier Bridges for Basins 1 and 4	2	EA	\$ 20,000.00	\$ 40,000.00
Blast and Repaint Existing Piping Inside Basins 1 & 4	2	EA	\$ 5,000.00	\$ 10,000.00
Field Coating Plate Settler Support Steel Truss	4	EA	\$ 10,000.00	\$ 40,000.00
Div. 15 - Mechanical				
2" PVC Piping at Rapid Mix	1	LS	\$ 1,500.00	\$ 1,500.00
2" PVC Piping, Fittings, Valves, and Pressure Gauges for NaOCl	1	LS	\$ 20,000.00	\$ 20,000.00
Div 26 - Electrical				
Controls, Wiring, Conduit, etc.	1	LS	\$ 220,000.00	\$ 220,000.00



engineering | architecture | geospatial

Project: Fort Thomas WTP Basin Improvements
Owner: Northern Kentucky Water District
Project No.: 4789

**Opinion of Construction Costs -
 2 Stage Flocculation with 6 Invent Flocculators**

Date: 9/28/2020
Estimator: AAB/TLS
Dwg. No.:
Type: Final

Item Description	No. of Units	Units of Measure	Unit Cost	Total Cost
Div 46 - Wastewater Equipment				
A. Flocculation Equipment - Basins 1 & 4				
1. Invent Vertical Flocculators - 2 zones/basin with 3 flocculators/zone	2	BASIN	\$ 191,000.00	\$ 382,000.00
2. Control Panel and VFD	12	EA	\$ 12,000.00	\$ 144,000.00
B. Clarifier Mechanisms - Basins 1 & 4				
1. ClearStream Flow Type with Control Panel and DBS Drive	2	EA	\$ 175,000.00	\$ 350,000.00
C. Plate Settlers - Basins 1 & 4				
1. JMS	2	EA	\$ 935,500.00	\$ 1,871,000.00
D. Plate Settlers - Basins 2 & 3				
1. JMS	2	EA	\$ 935,500.00	\$ 1,871,000.00
E. Rapid Mixer Replacement				
1. Replace with Same Lightnin Rapid Mixer	1	LS	\$ 45,000.00	\$ 45,000.00
2. Control Panel	1	LS	\$ 10,000.00	\$ 10,000.00
F. 8" Sludge Valve Replacement in Basins 1 & 4				
1. 8" Plug Valve, Electric Actuator & Coupling Adapter	2	EA	\$ 17,000.00	\$ 34,000.00
G. Slide Gates and Electric Actuators in Basin 1 & 4 Floc Zones				
1. 24"x24" Slide Gates & Electric Actuators	4	EA	\$ 18,750.00	\$ 75,000.00
			Subtotal	\$ 6,807,000.00
			Bonds & Insurance (2%)	\$ 136,000.00
			Contractor Overhead & Profit (8%)	\$ 545,000.00
			Subtotal	\$ 7,488,000.00
			Contingency (10%)	\$ 749,000.00
			Total Construction Costs	\$ 8,237,000.00
			Engineering Fees	\$ 220,000.00
TOTAL ESTIMATED PROJECT COSTS				\$ 8,457,000.00

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

Plans titled “Fort Thomas Treatment Plant Basin Improvements – Phase 2” dated November 2020, sealed by a P.E.

(Included as separate file)

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

Specifications titled “Fort Thomas Treatment Plant Basin Improvements – Phase 2” dated November 2020”, sealed by a P.E.

SPECIFICATIONS

FOR

NORTHERN KENTUCKY WATER DISTRICT

Fort Thomas Water Treatment Plant Basin Improvements – Phase 2 (Phase 2 of WX21117210)

November 2020

BID SET

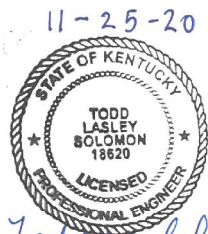
COMPILED BY:

Northern Kentucky Water District (Owner)
2835 Crescent Springs Road
Erlanger, Kentucky 41018

IN ASSOCIATION WITH:



engineering | architecture | geospatial



Todd L. Solomon



11/25/20



S P E C I F I C A T I O N S

FOR

NORTHERN KENTUCKY WATER DISTRICT

Fort Thomas Water Treatment Plant **Basin Improvements – Phase 2** **(Phase 2 of WX21117210)**

November 2020

GOVERNING BODY

COMMISSIONERS:

DOUGLAS C. WAGNER, CDT – CHAIR
JOSEPH J. KOESTER – VICE CHAIR
FRED A. MACKE, JR. - SECRETARY
JODY R. LANGE, CPA, CGMA - TREASURER
CLYDE CUNNINGHAM - COMMISSIONER
DR. PATRICIA SOMMERKAMP, PhD – COMMISSIONER

C. RONALD LOVAN, P.E., PRESIDENT/CEO

COMPILED BY:

Northern Kentucky Water District (Owner)
2835 Crescent Springs Road
Erlanger, Kentucky 41018

IN ASSOCIATION WITH:



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DIVISION 00

**PROCUREMENT AND
CONTRACTING REQUIREMENTS**

Section 00020

INVITATION TO BID

Date: November 25, 2020, December 10, 2020, and December 31, 2020

**PROJECT: Fort Thomas Treatment Plant Basin Improvements – Phase 2
(Phase 2 of WX21117210)
City of Fort Thomas, Campbell County, Kentucky**

SEALED BIDS WILL BE RECEIVED AT:

Northern Kentucky Water District (Owner)
2835 Crescent Springs Road
P.O. Box 18640
Erlanger, Kentucky 41018

UNTIL: Date: January 13, 2021
Time: 2:00 PM (Local Time)

At said place and time, and promptly thereafter, all Bids that have been duly received will be publicly opened and read aloud. Entities on the registered list of plan holders will be sent a link to attend a virtual bid opening. The public may request an invitation to the virtual bid opening by contacting Todd Solomon, P.E., GRW Engineers (tsolomon@grwinc.com) or Joan Drozd, Administrative Assistant, GRW Engineers (jdrozdz@grwinc.com).

The proposed Work is generally described as follows: demolish existing mixer in Rapid Mix No. 2 and install new mixer; demolish existing horizontal flocculators and associated concrete columns and redwood baffles in Basins 1 & 4 and install new vertical hyperbolic flocculators, concrete columns, and fiberglass baffles; install new bridges/walkways in Basins 1 & 4 to support new flocculators and to provide access to new flocculators; demolish existing clarifier mechanisms and drives in Basins 1 & 4 and install new clarifier mechanisms and drives; remove, refurbish, and re-install existing clarifier bridges/walkways in Basins 1 & 4; demolish existing tube settlers in Basins 1,2 3 and 4 and install new inclined plate settlers; demolish existing 8-inch sludge valves and electric actuators in Basins 1 & 4 and install new 8-inch sludge valves and electric actuators; complete concrete repairs in Basins 1 & 4; demolish and replace existing sodium hypochlorite metering pump discharge piping; remove and replace damaged floor coating under sodium hypochlorite metering pump discharge pipe rack; and complete associated electrical, mechanical, and structural work, together with all related work as specified and shown on the Drawings. The Bidder awarded the contract shall complete this project within 730 calendar days. Liquidated damages will be assessed at \$500 per calendar day.

All Bids must be in accordance with the Instructions to Bidders and Bidding Documents on file. Copies of the Bidding Documents must be obtained from GRW Engineers Inc. through their digital Plan Room at <https://www.grwplanroom.com>. Access to digital copies the Bidding Documents will be provided at no cost.

This project is funded with funds provided by the Kentucky Drinking Water State Revolving Fund (SRF) with federal funds provided by the Environmental Protection Agency. SRF requirements (including American Iron and Steel and Davis Bacon) and provisions must be met by the Bidder and all subcontractors. SRF requires federal prevailing wage rates to be paid to all employees of the Bidder and all employees of any subcontractor.

This project is in compliance with the President's Executive Order No. 11246 (Equal Employment Opportunity) as amended. All Bidders must comply with the President's Executive Order No. 11246 as amended, which prohibits discrimination in employment regarding race, creed, color, sex, or national origin.

All Bidders must comply with Title VI of the Civil Rights Act of 1964, the Anti-Kickback Act, and the Contract Work Hours Standard Act.

All Bidders, Contractors and Subcontractors must comply with 41 CFR 60-4, in regard to Affirmative Action, to ensure equal opportunity to females and minorities and will apply the timetables and goals set forth in 41 CFR 60-4 as applicable to the area of the project.

All Bidders must comply with OSHA (P.L. 91-596) and the Contract Work Hours and Safety Standards Act (P.L. 91-54).

The Successful Bidder and all Subcontractors will be required to conform to the labor standards set forth in the Contract Documents. This procurement is subject to Kentucky Division of Water Procurement Guidance including the Davis-Bacon Act.

Bidders must make positive efforts to use small, minority, women-owned and disadvantaged businesses.

A non-mandatory virtual pre-bid meeting will be held for plan holders and prospective Bidders on December 9, 2020 at 10:00 a.m. (local time) via Microsoft Teams. To obtain an invitation to this virtual pre-bid meeting, please email a request to Todd Solomon, P.E., GRW Engineers (tsolomon@grwinc.com) and Joan Drozd, Administrative Assistant, GRW Engineers (jdrozd@grwinc.com). There will be no site visit as part of this pre-bid meeting. Site visits are permitted by appointment only. Site visit requests must be made 72 hours in advance (minimum). Owner will provide each bidder access to the site to conduct such investigation and tests as each Bidder deems necessary for submission of a Bid. Bidders shall provide and utilize faces masks and gloves while on site. Arrangement for site visits shall be made by calling Kyle Ryan, P.E., with the Northern Kentucky Water District at (859) 426-2713.

Bids will be received on a lump sum basis as described in the Contract Documents.

Bid security, in the form of a certified check or a Bid Bond (insuring/bonding company shall be rated "A" by AM Best) in the amount of ten percent (10%) of the maximum total bid price, must accompany each Bid.

The Successful Bidder will be required to furnish a Construction Payment Bond and a Construction Performance Bond (insuring/bonding company shall be rated "A" by AM Best) as security for the faithful performance of the contract and the payment of all bills and obligations arising from the performance of the Contract.

Evaluation of Bids and the awarding of a final contract are subject to the reciprocal preference for Kentucky resident bidders pursuant to KRS 45A.490 to 45A.494 and (KAR 200 5:400).

Owner reserves the right to reject any or all Bids, including without limitation the right to reject any or all nonconforming, non-responsive, incomplete, unbalanced, or conditional Bids, to waive informalities, and to reject the Bid of any Bidder if Owner believes that it would not be in the best interest of Owner to make an award to that Bidder. Owner also reserves the right to negotiate with the apparent successful Bidder to such an extent as may be determined by Owner.

Small, Minority, and Disadvantaged Business Enterprises are encouraged to bid.

Bids shall remain subject to acceptance for 90 days after the day of bid opening or for such longer period of time to which a Bidder may agree in writing upon request of the Owner. If a Contract is to be awarded, the Owner will give the successful Bidder a Notice of Award during the period of time during which the successful Bidder's bid remains subject to acceptance.

Award of the Contract will be made to the lowest, responsive, responsible bidder in accordance with Article 19, Award of Contract, specified in the Instructions to Bidders.

The Northern Kentucky Water District is an Equal Opportunity Employer.

Amy Kramer, Vice President of Engineering, Production & Distribution
Northern Kentucky Water District

End of Section

Section 00100

INSTRUCTIONS TO BIDDERS

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

- A. *Bidder* - The individual or entity who submits a Bid directly to Owner.
- B. *Successful Bidder* - The lowest responsible Bidder submitting a responsive Bid to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.

2. COPIES OF CONTRACT DOCUMENTS. Complete sets of Contract Documents must be used in preparing Bids; Bidder shall have sole responsibility for errors or misrepresentations resulting from the use of incomplete sets of Bidding Documents.

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

3. QUALIFICATIONS OF BIDDERS. To demonstrate Bidder's qualifications to perform the Work, within five days of Owner's request Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data as may be requested by Owner. Bidders who have not, in the Owner's opinion, had sufficient experience in the size and type of work involved may not be considered.

Each Bid must contain evidence of Bidder's qualifications to transact business in the State of Kentucky or covenant to obtain such qualifications prior to award of the Contract. The Bidder's Organization Number from the Kentucky's Secretary of State and principal place of business as filed with Kentucky's Secretary of State must be included where applicable.

Each Bidder must be registered as a plan holder with the Issuing Office or Engineer on record in the advertised "Invitation to Bid". There shall be no substitution of bidders without proper registration with the Issuing Office or Engineer on record in the advertised "Invitation to Bid"

4. EXAMINATION OF CONTRACT DOCUMENTS AND SITE. It is the responsibility of each Bidder, before submitting a Bid, to:

- a. thoroughly examine and study the Instructions to Bidders and the Contract Documents, including any Addenda;
- b. visit the Site and become familiar with and satisfy Bidder as to the general, local, and site conditions that may affect cost, progress, performance, or furnishing of the Work;

- c. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, performance, or furnishing of the Work;
- d. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times and in accordance with the other terms and conditions of the Contract Documents;
- e. correlate the information known to Bidder, information and observations obtained from visits to the Site, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents;
- f. promptly give Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Contract Documents and confirm that the written resolution thereof by Owner is acceptable to Bidder; and
- g. determine that the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

4.01. Underground Facilities. Information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner or others, and Owner and Engineer disclaim responsibility for the accuracy or completeness thereof, unless it is expressly provided otherwise in the Supplementary Conditions.

4.02. Additional Information. Before submitting a Bid, each Bidder may, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests, and studies and obtain any additional information and data which pertain to subsurface or physical conditions at or contiguous to the Site or otherwise, which may affect cost, progress, performance, or furnishing of the Work and which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of the Contract Documents. Each Bidder shall be responsible for any claims for personal injury, death or damage to property caused by Bidder's entry on public or private property and shall defend and indemnify Owner and all other parties against any such claims.

4.03. Bidder's Representation. The submission of a Bid will constitute an incontrovertible representation and covenant by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Contract Documents, that Bidder has given Owner written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Contract Documents and the written resolutions thereof are acceptable to Bidder, and that the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

5. SITE AND OTHER AREAS. The Site is identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities,

construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Contract Documents.

6. INTERPRETATIONS AND ADDENDA. All questions about the meaning or intent of the Bidding Documents are to be submitted to Owner in writing. Any interpretations or clarifications that are considered necessary by Owner in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Owner as having received the Bidding Documents. Questions received less than 72 hours prior to the date for opening of Bids may not be answered. The person submitting questions shall be responsible for their prompt delivery. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.

Owner will not be responsible for explanations or interpretations of the Bidding Documents or Contract Documents except as issued in accordance herewith.

7. BID SECURITY. Each Bid must be accompanied by Bid security made payable to Owner in an amount of ten (10) percent of Bidder's maximum Bid price and in the form of a Bid Bond (on the form attached) issued by a surety meeting the requirements of paragraphs 5.01 and 5.02 of the General Conditions and shall be rated "A" by AM BEST.

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

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

9. LIQUIDATED DAMAGES. Provisions for liquidated damages, if any, are set forth in the Agreement.

10. SUBSTITUTE OR "OR-EQUAL" ITEMS. The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. Whenever it is specified or described in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Owner, application for such acceptance will not be considered by Owner until after the Effective Date of the

Agreement. The procedure for submission of any such application by Contractor and consideration by Owner is set forth in the General Conditions and may be supplemented in the General Requirements.

11. PREPARATION OF BID. The Bid form is included with the Bidding Documents. Additional copies may be obtained from Owner.

All blanks on the Bid form shall be completed by printing in ink or by typewriter and the Bid signed. A Bid price shall be indicated for each lump sum bid item and/or unit price item listed therein, or the words "No Bid", "No Change", or "Not Applicable" entered.

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

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

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

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

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

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

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

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

The Bid shall identify whether the Bidder is a resident or nonresident bidder for purposes of Kentucky's reciprocal preference statute (KRS 45A.490 to 45A.494 and 200 KAR 5:400). If the Bidder is claiming a "resident bidder" status as defined in KRS 45A.494(2), the Bid shall include a properly executed and notarized affidavit affirming that it meets the criteria to be considered such a resident bidder. If requested by Owner, Bidder shall also provide documentation proving such resident bidder status; failure to do so shall result in disqualification of the Bidder or contract termination.

While the Bidder should consult the applicable statutes and regulation, generally speaking, a "resident bidder" is an individual or business entity that, on the date the contract is first advertised or announced as available for bidding: (a) is authorized to transact business in the Commonwealth; AND (b) has for one (1) year prior to and through the date of the

advertisement, (i) filed Kentucky corporate income taxes, (ii) made payments to the Kentucky unemployment insurance fund established in KRS 341.490, and (iii) maintained a Kentucky workers' compensation policy in effect. A "nonresident bidder" is any other individual or business entity.

12. BASIS OF BID. Bidders shall submit a Lump Sum Bid for the Work based on the Base Bid Equipment Manufacturers. Discrepancies between words and figures will be resolved in favor of the words.

13. SUBMITTAL OF BID. Due to the COVID-19 situation, the Northern Kentucky Water District (NKWD) has implemented temporary changes that will impact the bidding of projects, goods, and services. The lobby is closed to the public at the District's Erlanger office. All hand delivered bids to this location must be turned in via the drive-thru window. Additionally, the District will not be hosting group meetings or gatherings including public bid openings. Bid openings will be conducted by NKWD staff only and broadcast via a virtual meeting. Entities on the registered list of plan holders will be sent a link to attend the virtual bid opening. The public may request an invitation to the virtual bid opening by contacting Todd Solomon, P.E., GRW Engineers (tsolomon@grwinc.com) or Joan Drozd, Administrative Assistant, GRW Engineers (jdrozdz@grwinc.com). These changes will remain in place until further notice.

A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the advertisement or invitation to Bid and shall be enclosed in an opaque sealed envelope plainly marked with the Project title, the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "Bid Enclosed – Fort Thomas Treatment Plant Basin Improvements – Phase 2".

Bids shall be addressed to Owner at:

Northern Kentucky Water District (Owner)
2835 Crescent Springs Road
P.O. Box 18640
Erlanger, Kentucky 41018

The unbound copy of the bid booklet that includes the Bid Form and Supplements to Bid Form are to be completed and submitted with the Bid Security and the following data:

1. Certification Regarding Debarment, Suspension and Other Responsibility Matters (EPA Form 5700-49).
2. Certification Regarding Lobbying, Certification for Contracts, Grants, Loans and Cooperative Agreements.
3. Statement of Bidder's Qualifications
4. Bidder's Experience Record

5. Proposed Subcontractors
6. Bid Security
7. Non-Collusion Affidavit
8. Required Notarized Affidavit for Bidders, Offerors, and Contractors Claiming Kentucky Resident Bidder Status

Two complete and executed Bid Form along with "Non-Collusion Affidavit" and Bid Bond shall be submitted. Bids shall be typed or in ink. Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids. Bids received after the time and date for receipt of Bids may be returned unopened. Oral, telephone, facsimile, or telegraph Bids are invalid and will not receive consideration.

14. MODIFICATION AND WITHDRAWAL OF BIDS. A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. For a period ending 72 hours after Bids are opened, any Bidder may request the withdrawal of its Bid by filing with Owner a duly signed written notice and otherwise demonstrating by clear and convincing evidence to the reasonable satisfaction of Owner that the Bid was submitted in good faith but there was a material and/or substantial mistake in the preparation of its Bid. If the withdrawal of the Bid is approved by the Owner in its sole discretion, the Bid security will be returned. Without the advanced full disclosure by the withdrawing Bidder to and written consent of the Owner, (a) no Bid shall be withdrawn under this section when the result would be the awarding of the contract on another Bid of the same Bidder or of another Bidder in which the withdrawing Bidder has a direct or indirect equitable interest and (b) no Bidder who is permitted to withdraw a Bid shall, for compensation, supply any material or labor to or perform any subcontract or other work agreement for the Bidder to whom the contract is awarded or otherwise benefit, directly or indirectly, from the performance of the Project.

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

16. BIDS TO REMAIN SUBJECT TO ACCEPTANCE. All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

17. AWARD OF CONTRACT. The Owner will award the contract to the lowest responsive, responsible bidder according to 40 CFR 31.36(d) and will not reject bids without proper justification. Owner will award the Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, non-responsive, incomplete, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder which it finds, after reasonable inquiry and evaluation, to be non-responsive. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Owner to make an award to that Bidder. Owner also reserves the right to waive all and to negotiate with the

apparent Successful Bidder to such an extent as may be determined by Owner. The Owner also reserves the right to increase or decrease the quantities of work per the General Conditions.

In the case of Bids for equipment and materials only, Owner may award the Contract to a responsible Bidder other than the lowest in the interest of standardization or ultimate economy, as determined by Owner.

In evaluating Bids, Owner will consider, among other lawful considerations, the following:

- a. Whether or not the Bid complies with the prescribed requirements and provides such information or data as may be requested in the Bid Form or prior to the Notice of Award.
- b. The qualifications of the Bidder.
- c. If the Bidder maintains a permanent place of business.
- d. If the Bidder has adequate personnel, plant and equipment to perform the Work properly and expeditiously.
- e. Bidder's financial status to meet all obligations and incidentals to the Work.
- f. Whether the Bidder has appropriate technical expertise and experience.
- g. Bidder's performance record.
- h. The amount of the TOTAL BASE BID, exclusive of any deductive alternates. Any deductive alternates will be considered after selection of the lowest Total Base Bid. Each deductive alternate will be considered and selected or not selected individually, at Owner's discretion, for inclusion in the work.

In addition, the evaluation of Bids will be subject to the reciprocal preference for Kentucky resident bidders pursuant to KRS 45A.490 to 45A.494 and KAR 200 5:400. These statutes and regulation provide in part as follows: (a) a resident bidder of the Commonwealth shall be given a preference against a nonresident bidder registered in any state that gives or requires a preference to bidders from that state; (b) the preference shall be equal to the preference given or required by the state of the nonresident bidder; (c) this preference shall not be applied against nonresident bidders residing in states that do not give preference against Kentucky bidders; (d) if a procurement determination results in a tie between a resident bidder and a nonresident bidder, preference shall be given to the resident bidder; and (e) the preference shall not result in a nonresident bidder receiving a preference over another nonresident bidder.

Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders to perform the Work in accordance with the Contract Documents, including, without limitation, a Bidder's claim that it is a resident bidder for purposes of Kentucky's preference statute.

18. CONTRACT SECURITY AND INSURANCE. Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to

performance and payment Bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by such Bonds.

19. SIGNING OF AGREEMENT. When Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents identified in the Agreement as attached thereto. Within **15 days** thereafter, the Successful Bidder shall sign, leaving the dates blank, and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within **15 days** thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

20. RETAINAGE. Provisions concerning retainage are set forth on the Agreement.

21. DRINKING WATER STATE REVOLVING FUND LOAN. A portion of the funding for this project comes from a Drinking Water State Revolving Fund (DWSRF) loan. This loan originates with the United States Environmental Protection (USEPA) and has several provisions that directly impact the Bidder. These include:

1. A certificate that the Bidder, and any subcontractors used by the Bidder, are not on the Federal List of Debarred Contractors. (CERTIFICATION REGARDING DEBARMENT, SUSPENSION AND OTHER MATTERS – EPA Form 5700-49) addresses this item and must be executed and included with the bid
2. A certification from the Bidder that no appropriate funds were or will be used for the purposes of lobbying the legislative or executive branches of the Federal government. (CERTIFICATION REGARDING LOBBYING) addresses this item and must be submitted with the Bid.

The DWSRF loan creates additional documentation requirements on both the Contractor and the Owner. These are set forth in the Supplemental General Conditions for Drinking Water State Revolving Fund Loans (DWSRF Supplemental General Conditions). The items identified, but not limited to, in this section must be submitted with the Bid. The remaining items identified in the DWSRF Supplemental General Conditions Section will be submitted by the low bidder within 21 days of the Bid opening. The project will not be awarded until this information is received.

DWSRF funding requires a recipient to utilize minority or women owned businesses as subcontractors where possible. Certain information and documentation is required by the funding agencies and other governing bodies prior to awarding a necessary approval for this project. The BIDDER acknowledges, through the act of submitting a Bid, a commitment to submit the following documentation or information within 7 days of bid Opening or within 5 days of the formal request to do so, whichever is greater. Failure to produce any of this documentation or information within the prescribed period will serve as grounds for rejection of the Bid. If the information is required from a subcontractor or vendor and is not produced within the prescribed time, it will serve as grounds to replace the subcontractor or vendor with another company or product.

Specific items to be submitted within 7 days of the Bid opening include:

- A. Disadvantage Enterprise Participation Policy (Attachment 11-Section 00810).
- B. List of DBE Bidders of Subcontractors (Attachment 11-Section 00810).

End of Section

Section 00300

BID FORM

PROJECT IDENTIFICATION: **Fort Thomas Treatment Plant Basin Improvements – Phase 2 (Phase 2 of WX21117210)**

THIS BID IS SUBMITTED TO:

Northern Kentucky Water District (Owner)
P.O. Box 18640
2835 Crescent Springs Road
Erlanger, Kentucky 41018

THIS BID IS SUBMITTED BY: _____
(Bidder's Company Name)

1. 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 all Work as specified or indicated in the Contract Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.
2. Bidder accepts all of the terms and conditions of the Invitation to Bid and the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 calendar days after the Bid opening, or for such longer period of time to which the Bidder may agree in writing upon request of Owner. Bidder understands that certain extensions to the time for acceptance of this Bid may require the consent of the surety for the Bid Bond.
3. In submitting this Bid, Bidder represents and covenants, as set forth in the Agreement, that:
 - a. Bidder has examined and carefully studied the Contract Documents, the other related data identified in the Contract Documents, and the following Addenda, receipt of all of which is hereby acknowledged:

No. _____	Dated _____
No. _____	Dated _____
No. _____	Dated _____
 - b. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - c. Bidder is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

- d. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary explorations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.
- e. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- f. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- 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 Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Owner is acceptable to Bidder.
- i. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
- j. **[Check the one that applies]**

_____ Bidder is a “resident bidder” as defined in KRS 45A.494(2) of Kentucky’s resident bidder reciprocal preference statute AND submits with this Bid a properly executed and notarized Affidavit that affirms that Bidder meets the resident bidder criteria, which Affidavit is hereby incorporated herein and made a part of this Bid.

OR

_____ Bidder is a “nonresident bidder” as defined in KRS 45A.494(3) of Kentucky’s resident bidder reciprocal preference statute AND its principal place of business as identified its Certificate of Authority to transact business in Kentucky as filed with Kentucky’s Secretary of State or, if Bidder hereby represents and covenants that it is not required to obtain a Certificate of Authority to transact business in Kentucky, its mailing address, is:

- k. Bidder's Organization Number from Kentucky's Secretary of State is # _____ [if applicable] and Bidder is qualified to transact business in the State of Kentucky or hereby covenants to obtain such qualifications prior to award of the Contract.
4. Bidder further represents that this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.
5. The Bidder understands and agrees that during the performance of the Contract, it shall maintain a presence within such proximity of the Site which will allow it to respond to an emergency at the Site within one hour of receiving notice of an emergency, including emergencies occurring during non-working hours. The Bidder shall provide a list of emergency phone numbers for such purposes. If the Bidder does not have such a presence, it may satisfy this requirement by sub-contracting with a sub-contractor that does have such a presence, provided that any such sub-contractor must be approved by the Owner, in its sole discretion, prior to the project pre-construction meeting.
6. Bidder will complete all the Work described in the specifications and drawings for the following price:
- Notes:
1. Bids shall include sales tax, where required, and all other applicable taxes and fees.
 2. A Contract award will be based on the lowest responsive, responsible bidder based on the Base Bid Equipment Manufacturers, unless all bids are rejected. All bids shall not be rejected without proper justification. The Owner reserves the right to select any, all, or none of the alternates. Alternates will not be used to determine the lowest responsive, responsible bidder.

Total Lump Sum Bid (Based on Base Bid Equipment Manufacturers) of:

\$ _____ in numbers

and _____ in words.

Alternative Equipment Information			
Equipment Item	Base Bid Equipment Manufacturer	Alternate Bid Equipment Manufacturer	Lump Sum Add / Deduct
1. Vertical Hyperbolic Flocculators	Invent Environmental Technologies, Inc.	a.	a.
		b.	b.
		b.	b.
2. Flow-through Clarifier Mechanism / Drive	ClearStream Environmental, Inc. / DBS Manufacturing	a.	a.
		b.	b.
		b.	b.

- Notes:
- a. The design has been completed using listed Base Bid equipment manufacturers. Should the Owner select other Alternate Bid equipment, the Bidder, at no additional cost to the Owner, shall make any changes to structures, bridges/walkways, baffle walls, concrete walls/columns, piping, controls, electrical, instrumentation, mechanical, architectural, preliminary & final evaluations, engineering design, etc. that may be necessary to accommodate this equipment and provide Computational Fluid Dynamic (CFD) modeling in the case of alternate equipment to the vertical hyperbolic flocculators.
 - b. Space is provided within the above table for BIDDERS to offer lump sum additions or deductions for alternate equipment not listed under the Base Bid equipment manufacturer. BIDDERS are not required to offer alternate equipment. If the BIDDER chooses to offer alternate equipment, Bidder shall enter an amount for each alternate for furnishing and installing the equipment and also must indicate whether the alternate is an add or deduct by circling the word which does apply and crossing out the word which does not apply. If no amount is entered, Bidder agrees to furnish and install any listed alternate equipment at no change in cost. If neither add nor deduct is identified as stated herein, the Bidder agrees to furnish and install the alternate equipment as a deduct. Should the Bidder choose to offer for consideration to the Owner, any alternate manufacturers to those listed above, the Bidder shall provide a detailed submittal of applicable items such as catalog cut sheets, pump curves, hydraulic calculations, specifications, wiring diagrams, technical literature, dimensional drawings, etc., or any other information requested by the Owner. This submittal information shall be provided to the Owner within 72 hours of request for proper evaluation. These submittal items shall be in addition

to the submittal requirements listed in the respective technical specifications section of the equipment item or product hereinafter. Alternates will not be evaluated or pre-qualified prior to Bid opening.

- c. The best, lowest Bidder will be determined based on the equipment being provided by the Base Bid Equipment Manufacturers.

Total Lump Sum Deduct (for removing the Basin 2 & 3 Plate Settlers from the project) of:

\$ _____ in numbers

and _____ in words.

The lump sum deduct for removing the Basin 2 & 3 plate settles from the project will not be used to determine the best, lowest bidder.

- 7. Bidder agrees that the Work will be substantially complete within 660 calendar days after the date when the Contract Times commence to run as provided in paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.07.B of the General Conditions within 730 calendar days after the date when the Contract Times commence to run.

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

8. References

Contact Person	Company Name	Phone No.	Project Name
1. _____			
2. _____			
3. _____			
4. _____			

SUBMITTED on _____, 2021.

- 9. Communications concerning this Bid shall be sent to Bidder at the following address:

- 10. The terms in this Bid, which are defined in the General Conditions included as part of the Contract Documents, have the meanings assigned to them in the General Conditions.

SIGNATURE OF BIDDER

If an Individual

Name (typed or printed): _____

By _____ (SEAL)
(Individual's signature)

doing business as _____

Business address _____

Phone No.: _____ Fax No.: _____

Date _____

If a Partnership

Partnership Name: _____ (SEAL)

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

Name (typed or printed): _____

Business address _____

Phone No. _____ Fax No.: _____

Date _____

If a Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____

Type (General, Professional Service): _____

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

Name (typed or printed): _____

Title: _____ (CORPORATE SEAL)

Attest _____

Business address _____

Phone No. _____ Fax No.: _____

Date _____

If a Limited Liability Company

Company Name: _____ (SEAL)

State of Organization: _____

Type (General, Professional): _____

By _____
Signature of Member or Manager (as applicable) - attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____ (COMPANY SEAL)

Attest _____

Business address _____

Phone No. _____ Fax No.: _____

Date _____

If a Joint Venture

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

Joint Venturer Name: _____ (SEAL)

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

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ Fax No.: _____

Date _____

Joint Venturer Name: _____ (SEAL)

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

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ Fax No.: _____

Date _____

Section 00301

SUPPLEMENTS TO BID FORM

1. FORMS TO BE SUBMITTED WITH BID

- A. Certification Regarding Debarment, Suspension and Other Responsibility Matters - EPA Form 5700-49 (Attachment No. 9 – Section 00810)
- B. Certification Regarding Lobbying (Attachment No. 10 – Section 00810)
- C. Statement of Bidder's Qualifications (Attachment No. 1)
- D. Bidder's Experience Record (Attachment No. 2)
- E. Proposed Subcontractors (Attachment No. 3)
- F. Bid Security (Specification Section 00410)
- G. Non-Collusion Affidavit (Specification Section 00460)
- H. Required Notarized Affidavit for Bidders, Offerors, and Contractors Claiming Kentucky Resident Bidder Status (Specification Section 00470)

2. FORMS TO BE SUBMITTED WITHIN 7 DAYS OF BID OPENING

Certain information and documentation is required by the funding agencies and other governing bodies prior to awarding a necessary approval for this project. The BIDDER acknowledges, through the act of submitting a Bid, a commitment to submit the following documentation or information within 7 days of Bid Opening or within 5 days of the formal request to do so, whichever is greater. Failure to produce any of this documentation or information within the prescribed period will serve as ground for rejection of the Bid. If the information is required from a subcontractor or vendor and is not produced within the prescribed time, it will serve as grounds to replace the subcontractor or vendor with another company or product.

Specific items to be submitted within 7 days of the Bid opening include:

- A. Disadvantage Enterprise Participation Policy (Attachment 11 – Section 00810)
- B. List of DBE Bidders of Subcontracts (Attachment 11 – Section 00810)

STATEMENT OF BIDDER'S QUALIFICATIONS

All questions shall be answered or the bid document will be incomplete. All data given shall be clear and comprehensive. This statement shall be notarized. If necessary, questions may be answered on separate sheets. The Bidder may submit any additional information it desires. If the Bidder is a joint venture, submit pervious joint venture projects. If joint venture has not completed prior projects of this magnitude then submit projects completed by joint venture partners.

1. Name of Bidder:
2. Permanent main office address:
3. When organized:
4. If a corporation, where incorporated:
5. How many years have you been engaged in operation of your business under your present firm or trade name:
6. Contracts on hand. (Schedule these, showing amount of each contract and the appropriate anticipated dates of completion.):
7. General character of work performed by your company:
8. Have you ever failed to complete any job awarded to you? If so, where and why?
9. Have you ever defaulted on a contract? If so, where and why?
10. List the more important projects completed by your firm, stating the approximate cost for each, and the month and year completed on attached sheet.
11. List your major equipment available for this work.
12. Experience in work similar in complexity, size and/or dollar value to this project. List and describe at least four on the table "Project References".
13. Background and experience of the principal members of your organization, including the officers in this type of work. (Attach)
14. Credit available: \$_____
15. Give bank reference: \$_____
16. Will you, upon request, fill out a detailed financial statement and furnish any other information that may be required by the Owner? Yes No

17. The undersigned hereby authorizes and requests any person, firm or corporation to furnish any information required by the Owner in verification of the statements made comprising this Statement of Bidder's Qualifications:

Dated at _____ this _____ day of _____

NAME OF BIDDER

BY _____

TITLE _____

STATE OF _____

COUNTY OF _____

_____ being duly sworn deposes and says that he or she is

_____ of

(NAME OF ORGANIZATION)

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

Subscribed and sworn to before me this _____ day of _____, of this year _____.

(NOTARY PUBLIC)

My commission expires _____

BIDDER'S EXPERIENCE RECORD
(Projects need to be of similar size and nature)

Change Order Value				
Contract Value				
Size of Project (Length, Contract Duration)				
Project Type, Year of Completion				
Engineer Contact Name, Telephone #				
Project Name, Owner, Address, Telephone #				

PROPOSED SUBCONTRACTORS

The BIDDER’s proposed subcontractors shall be listed below for the various branches of work included in the proposed contract. All subcontractors are subject to the approval of the OWNER.

Unless rejected or otherwise permitted by the OWNER, no substitutions or changes to the listing of the entities proposed to perform that branch of the work will be allowed following opening of the Bids.

Where the BIDDER proposes to perform the work with its own forces, the phrase “Prime Contractor” shall be entered in the box provided

Failure to submit a completed list shall be cause for rejection of the Bid.

Branch of Work	Name of Subcontractor
1.	
2.	
3.	
4.	
5.	

BID BOND

BIDDER (Name and Address)

SURETY (Name and Address of Principal Place of Business)

OWNER (Name and Address)

BID

BID DUE DATE _____

PROJECT (Brief Description Including Location)

BOND

BOND NUMBER _____

DATE (Not later than Bid due date) _____

PENAL SUM _____ (Words) _____ (Figures)

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

BIDDER

SURETY

_____(Seal)
Bidder's Name and Corporate Seal

_____(Seal)
Surety's Name and Corporate Seal

By _____
Signature and Title

By _____
Signature and Title
(Attach Power of Attorney)

Attest _____
Signature and Title

Attest _____
Signature and Title

- Note (1) Above addresses are to be used for giving required notice
(2) Any singular reference to Bidder Surety OWNER or other party shall be considered plural where applicable

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

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

3 This obligation shall be null and void if

3 1 OWNER accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents or

3 2 All Bids are rejected by OWNER or

3 3 OWNER fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and if applicable consented to by Surety when required by paragraph 5 hereof)

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

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

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

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

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

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

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

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

Section 00460

NON-COLLUSION AFFIDAVIT

STATE OF: _____)

COUNTY OF: _____) SS

_____, being first duly sworn, deposes

and says that he/she is the _____ of
(sole owner, a partner, president, secretary, etc.)

_____, the party making the foregoing bid; that such bid is genuine and not collusive or sham; that said bidder is not financially interested in, or otherwise affiliated in a business way with any other bidder on the same contract; that said bidder has not colluded, conspired, connived, or agreed, directly or indirectly, with any bidder or person, to put in a sham bid, or that such other person shall refrain from bidding, and has not in any manner directly or indirectly sought by agreement or collusion, or communication or conference, with any person, to fix the price or affidavit of any other bidder, or that of any other bidder, or to secure any advantage against Owner, or any person or persons interested in the proposed Contract; and that all statements contained in said bid are true; and further, that such bidder has not, directly or indirectly submitted this bid, or the contents thereof, or divulged information of data relative thereto to any association or to any member or agent thereof.

AFFIANT

Sworn to and subscribed before me, a Notary Public in and for the above named

State and County, this _____ day of _____, 20 _____.

NOTARY PUBLIC

End of Section

(Note: The following standard form will be used for preparation of the agreement, after award of contract.)

Section 00500

AGREEMENT

**Fort Thomas Treatment Plant Basin Improvements – Phase 2
(Phase 2 of WX21117210)
184-4006**

THIS AGREEMENT is by and between the Northern Kentucky Water District (herein called Owner) and _____ (herein called Contractor).

Owner and Contractor, in consideration of the mutual covenants herein set forth, agree as follows:

Article 1. WORK.

Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: demolish existing mixer in Rapid Mix No. 2 and install new mixer; demolish existing horizontal flocculators and associated concrete columns and redwood baffles in Basins 1 & 4 and install new vertical hyperbolic flocculators, concrete columns, and fiberglass baffles; install new bridges/walkways in Basins 1 & 4 to support new flocculators and to provide access to new flocculators; demolish existing clarifier mechanisms and drives in Basins 1 & 4 and install new clarifier mechanisms and drives; remove, refurbish, and re-install existing clarifier bridges/walkways in Basins 1 & 4; demolish existing tube settlers in Basins 1, 2, 3 & 4 and install new inclined plate settlers; demolish existing 8-inch sludge valves and electric actuators in Basins 1 & 4 and install new 8-inch sludge valves and electric actuators; complete concrete repairs in Basins 1 & 4; demolish and replace existing sodium hypochlorite metering pump discharge piping; remove and replace damaged floor coating under sodium hypochlorite metering pump discharge pipe rack; and complete associated electrical, mechanical, and structural work, together with all related work as specified and shown on the Drawings.

Article 2. ENGINEER.

The Project has been designed by **GRW Engineers, Inc.**, who is referred to in the Contract Documents as Engineer.

Article 3. CONTRACT TIMES, LIQUIDATED DAMAGES, DELAYS, AND DAMAGES.

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

3.1. Contract Times. The Work will be substantially completed within **660** days after the date when the Contract Times commence to run as provided in paragraph 2.03.A of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.07 of the General

Conditions within **730** days after the date when the Contract Times commence to run.

3.2. Liquidated Damages. Owner and Contractor recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expenses, and difficulties involved in proving in a legal proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner \$ 500.00 for each day that expires after the time specified in paragraph 3.1 for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times or any proper extension thereof granted by Owner, Contractor shall pay Owner as liquidated damages (but not as a penalty) \$ 500.00 for each day that expires after the time specified in paragraph 3.1 for completion and readiness for final payment until the Work is completed and ready for final payment.

Owner shall have the right to deduct the liquidated damages from any money in its hands, otherwise due, or to become due, to Contractor, or to initiate action to recover liquidated damages for nonperformance of this Contract within the time stipulated.

3.3. Delays and Damages. In the event Contractor is delayed in the prosecution and completion of the Work because of any delays caused by Owner or Engineer, Contractor shall have no claim against Owner or Engineer for damages (including but not limited to acceleration costs or damages) or contract adjustment other than an extension of the Contract Times and the waiving of liquidated damages during the period occasioned by the delay.

Contractor shall provide advance written notice to Owner and Engineer of Contractor's intention to accelerate the Work prior to commencing any acceleration. Such written notice shall include a detailed explanation of the nature and scope of the acceleration, the reason for the acceleration, the anticipated duration of the acceleration, and the estimated additional costs to Contractor, if any, related to the acceleration. This requirement shall not in any way affect or alter the agreement of Owner and Contractor with respect to delays and damages as set forth above and in Article 7 of the General Conditions.

Article 4. CONTRACT PRICE.

Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the lump sum bid price of:

(words)	(figures)
---------	-----------

The above lump sum amount reflects Owner's adoption of the following alternates:

Alternative Equipment Item 1 – Add or Deduct Alternative Vertical Hyperbolic Flocculators in lieu of Invent Environmental Technologies, Inc (Base Bid Manufacturer)

Check one: Adopted _____ : Not Adopted _____

Alternative Equipment Item 2 – Add or Deduct Alternative Flow-through Clarifier Mechanism / Drive in lieu of ClearStream Environmental, Inc. / DBS Manufacturing (Base Bid Manufacturer)

Check one: Adopted _____ : Not Adopted _____

Deduct Alternative - Removal of Basin 2 & 3 Plate Settlers from the project

Check one: Adopted _____ : Not Adopted _____

Article 5. PAYMENT PROCEDURES.

Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Owner as provided in the General Conditions and as modified by the Supplementary Conditions.

5.1. Progress Payments. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 25th day of each month during performance of the Work. All such payments will be measured by the schedule of values established in paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.

5.2. Retainage. In addition to any amounts withheld from payment in accordance with Paragraph 14.02 of the General Conditions, Owner shall retain from progress payments amounts equal to the following percentages:

- a. Ten percent (10%) of the amount of the Work completed. This amount may be reduced by the Owner in its sole and absolute discretion, if the project is substantially completed; and
- b. Ten percent (10%) of the value of materials and equipment that are not incorporated in the Work but are delivered, suitably stored, and accompanied by documentation satisfactory to Owner as provided in paragraph 14.02 of the General Conditions. Retainage for stored materials and equipment will be released when the materials and equipment are incorporated in the Work.

All retainage will be paid to Contractor when the Work is completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions. Consent of the Surety shall be obtained before retainage is paid by Owner. Consent of the Surety, signed by an agent, must be accompanied by a certified copy of such agent's authority to act for the Surety.

5.3. Final Payment. Upon final completion and acceptance of the Work in accordance with paragraphs 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as provided in said paragraph 14.07.

Article 6. CONTRACTOR'S REPRESENTATION

In order to induce Owner to enter into this Agreement Contractor makes the following representations:

- a. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents
- b. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- c. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
- d. Contractor has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary explorations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including applying the specific means, methods, techniques, sequences, and procedures of construction, if any, expressly required by the Contract Documents to be employed by Contractor, and safety precautions and programs incident thereto.
- e. Contractor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.
- f. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- g. Contractor has correlated the information known to Contractor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.
- h. Contractor has given Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Owner is acceptable to Contractor.

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

Article 7. CONTRACT DOCUMENTS.

The Contract Documents, which are incorporated as part of the Agreement, consist of the following:

- A. This Agreement;
- B. Performance Bond;
- C. Payment Bond;
- D. General Conditions;
- E. Supplementary Conditions;
- F. Specifications as listed in the table of contents of the Project Manual;
- G. Drawings consisting of 39 sheets including cover sheet and sheets numbered G-00-01 through M-06-102 inclusive, with each sheet bearing the following title: Fort Thomas Water Treatment Plant Basin Improvements – Phase 2.
- H. Addenda (numbers ___ to ___, inclusive);
- I. Exhibits to this Agreement (enumerated as follows):
 - 1. Notice to Proceed;
 - 2. Contractor's Bid;
 - 3. Documentation submitted by Contractor prior to Notice of Award;
- J. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - 1. Written Amendments;
 - 2. Work Change Directives;
 - 3. Change Orders.

There are no Contract Documents other than those listed above in this Article 7. The Contract Documents may only be amended, modified, or supplemented as provided in paragraphs 3.05 of the General Conditions.

Article 8. COMPLIANCE WITH KENTUCKY LAW

Contractor represents and warrants that it has revealed to Owner any and all final determinations of a violation of KRS Chapters 136, 139, 141, 337, 338, 341, and 342 by Contractor or any subcontractor within the past five years. Contractor further represents and warrants that it and each of its subcontractors will remain in continuous compliance with the provisions of KRS Chapters 136, 139, 141, 337, 338, 341 and 342 for the duration of this Agreement. Contractor understands that its failure to reveal a final determination of a violation or to comply with the above statutory requirements constitutes grounds for cancellation of the Agreement and for disqualification of Contractor from eligibility for any contracts for a period of two years.

Article 9. EQUAL OPPORTUNITY

Unless exempted under KRS 45.590, during the performance of the Agreement, the Contractor agrees as follows:

- a. Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age forty (40) and over, disability, veteran status, or national origin;
- b. Contractor will take affirmative action in regard to employment, upgrading, demotion, transfer, recruitment, recruitment advertising, layoff, termination, rates of pay or other forms of compensation, and selection for training, so as to ensure that applicants are employed and that employees during employment are treated without regard to their race, color, religion, sex, age forty (40) and over, disability, veteran status, or national origin;
- c. Contractor will state in all solicitations or advertisements for employees placed by or on behalf of Contractor that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, age forty (40) or over, disability, veteran status, or national origin;
- d. Contractor will post notices in conspicuous places, available to employees and applicants for employment, setting forth the provisions of the nondiscrimination clauses required by this section; and
- e. Contractor will send a notice to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding advising the labor union or workers' representative of Contractor's commitments under the nondiscrimination clauses.

Article 10. MISCELLANEOUS.

- a. Terms used in this Agreement will have the meanings indicated in the General Conditions.
- b. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.
- c. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect of all covenants, agreements, and obligations contained in the Contract Documents.

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

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. One counterpart each has been delivered to Owner, Contractor, Surety, and Engineer.

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

OWNER: **Northern Kentucky Water District**

Amy Kramer
Vice President of Engineering, Production and Distribution

Address for giving notices

2835 Crescent Springs Road
PO Box 18640
Erlanger, Kentucky 41018

CONTRACTOR: _____

By: _____
Signature

Printed Name

Title

(Corporate Seal)

Address for giving notices

Joint Venture

CONTRACTOR: _____

By: _____

(Corporate Seal)

Address for giving notices

Performance Bond

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

CONTRACTOR (Name and Address)

SURETY (Name and Address of Principal Place
of Business)

OWNER (Name and Address)

CONTRACT

Date
Amount
Description (Name and Location)

BOND

Date (Not earlier than Contract Date)
Amount
Modifications to this Bond Form

Surety and Contractor intending to be legally bound hereby subject to the terms printed on the reverse side hereof do each cause this Performance Bond to be duly executed on its behalf by its authorized officer agent or representative

CONTRACTOR AS PRINCIPAL
Company _____ (Corp Seal)

Signature _____
Name and Title

SURETY
Company _____ (Corp Seal)

Signature _____
Name and Title
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties if required)

CONTRACTOR AS PRINCIPAL
Company _____ (Corp Seal)

Signature _____
Name and Title

SURETY
Company _____ (Corp Seal)

Signature _____
Name and Title

EJCDC No 1910 28 A (1996 Edition)

Originally prepared through the joint efforts of the Surety Association of America Engineers Joint Contract Documents Committee the Associated General Contractors of America and the American Institute of Architects

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

2 If the CONTRACTOR performs the Contract, the Surety and the CONTRACTOR have no obligation under this Bond except to participate in conferences as provided in paragraph 3.1

3 If there is no OWNER Default, the Surety's obligation under this Bond shall arise after

3.1 The OWNER has notified the CONTRACTOR and the Surety at the addresses described in paragraph 10 below that the OWNER is considering declaring a CONTRACTOR Default and has requested and attempted to arrange a conference with the CONTRACTOR and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Contract. If the OWNER, the CONTRACTOR and the Surety agree, the CONTRACTOR shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive the OWNER's right if any subsequently to declare a CONTRACTOR Default and

3.2 The OWNER has declared a CONTRACTOR Default and formally terminated the CONTRACTOR's right to complete the Contract. Such CONTRACTOR Default shall not be declared earlier than twenty days after the CONTRACTOR and the Surety have received notice as provided in paragraph 3.1 and

3.3 The OWNER has agreed to pay the Balance of the Contract Price to

3.3.1 The Surety in accordance with the terms of the Contract,

3.3.2 Another contractor selected pursuant to paragraph 4.3 to perform the Contract

4 When the OWNER has satisfied the conditions of paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions

4.1 Arrange for the CONTRACTOR, with consent of the OWNER to perform and complete the Contract, or

4.2 Undertake to perform and complete the Contract itself through its agents or through independent contractors or

4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the OWNER for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by the OWNER and the contractor selected with the OWNER's concurrence to be secured with performance and payment bonds executed by a qualified surety equivalent to the Bonds issued on the Contract, and pay to the OWNER the amount of damages as described in paragraph 6 in excess of the Balance of the Contract Price incurred by the OWNER resulting from the CONTRACTOR Default or

4.4 Waive its right to perform and complete, arrange for completion or obtain a new contractor and with reasonable promptness under the circumstances

4.4.1 After investigation, determine the amount for which it may be liable to the OWNER and as soon as practicable after the amount is determined tender payment therefor to the OWNER, or

4.4.2 Deny liability in whole or in part and notify the OWNER citing reasons therefor

5 If the Surety does not proceed as provided in paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the OWNER to the Surety demanding that the Surety perform its obligations under this Bond and the OWNER shall be entitled to enforce any remedy available to the OWNER. If the Surety proceeds as provided in paragraph 4.4 and the OWNER refuses the payment tendered or the Surety has denied

liability in whole or in part without further notice the OWNER shall be entitled to enforce any remedy available to the OWNER

6 After the OWNER has terminated the CONTRACTOR's right to complete the Contract, and if the Surety elects to act under paragraph 4.1, 4.2 or 4.3 above then the responsibilities of the Surety to the OWNER shall not be greater than those of the CONTRACTOR under the Contract, and the responsibilities of the OWNER to the Surety shall not be greater than those of the OWNER under the Contract. To a limit of the amount of this Bond but subject to commitment by the OWNER of the Balance of the Contract Price to mitigation of costs and damages on the Contract, the Surety is obligated without duplication for

6.1 The responsibilities of the CONTRACTOR for correction of defective Work and completion of the Contract

6.2 Additional legal, design, professional and delay costs resulting from the CONTRACTOR's Default and resulting from the actions or failure to act of the Surety under paragraph 4 and

6.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non performance of the CONTRACTOR

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

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

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

10 Notice to the Surety, the OWNER or the CONTRACTOR shall be mailed or delivered to the address shown on the signature page

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

12 Definitions

12.1 Balance of the Contract Price. The total amount payable by the OWNER to the CONTRACTOR under the Contract after all proper adjustments have been made including allowance to the CONTRACTOR of any amounts received or to be received by the OWNER in settlement of insurance or other Claims for damages to which the CONTRACTOR is entitled reduced by all valid and proper payments made to or on behalf of the CONTRACTOR under the Contract

12.2 Contract. The agreement between the OWNER and the CONTRACTOR identified on the signature page including all Contract Documents and changes thereto

12.3 CONTRACTOR Default. Failure of the CONTRACTOR, which has neither been remedied nor waived to perform or otherwise to comply with the terms of the Contract

12.4 OWNER Default. Failure of the OWNER, which has neither been remedied nor waived to pay the CONTRACTOR as required by the Contract or to perform and complete or comply with the other terms thereof

(FOR INFORMATION ONLY Name Address and Telephone)

AGENT or BROKER OWNER'S REPRESENTATIVE (Engineer or other party)

4789

Payment Bond

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

CONTRACTOR (Name and Address)

SURETY (Name and Address of Principal Place
of Business)

OWNER (Name and Address)

CONTRACT

Date

Amount

Description (Name and Location)

BOND

Date (Not earlier than Contract Date)

Amount

Modifications to this Bond Form

Surety and Contractor intending to be legally bound hereby subject to the terms printed on the reverse side hereof do each cause this Payment Bond to be duly executed on its behalf by its authorized officer agent or representative

CONTRACTOR AS PRINCIPAL

Company _____ (Corp Seal)

Signature _____
Name and Title

SURETY

Company _____ (Corp Seal)

Signature _____
Name and Title
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties if required)

CONTRACTOR AS PRINCIPAL

Company _____ (Corp Seal)

Signature _____
Name and Title

SURETY

Company _____ (Corp Seal)

Signature _____
Name and Title

EJCDC No 1910 28 B (1996 Edition)

Originally prepared through the joint efforts of the Surety Association of America Engineers Joint Contract Documents Committee the Associated General Contractors of America the American Institute of Architects the American Subcontractors Association, and the Associated Specialty Contractors

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

2 With respect to the OWNER this obligation shall be null and void if the CONTRACTOR

2 1 Promptly makes payment directly or indirectly for all sums due Claimants and

2 2 Defends indemnifies and holds harmless the OWNER from all claims demands liens or suits by any person or entity who furnished labor materials or equipment for use in the performance of the Contract provided the OWNER has promptly notified the CONTRACTOR and the Surety (at the addresses described in paragraph 12) of any claims demands liens or suits and tendered defense of such claims demands liens or suits to the CONTRACTOR and the Surety and provided there is no OWNER Default

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

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

4 1 Claimants who are employed by or have a direct contract with the CONTRACTOR have given notice to the Surety (at the addresses described in paragraph 12) and sent a copy or notice thereof to the OWNER stating that a claim is being made under this Bond and with substantial accuracy the amount of the claim

4 2 Claimants who do not have a direct contract with the CONTRACTOR.

1 Have furnished written notice to the CONTRACTOR and sent a copy or notice thereof to the OWNER, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating with substantial accuracy the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed and

2 Have either received a rejection in whole or in part from the CONTRACTOR or not received within 30 days of furnishing the above notice any communication from the CONTRACTOR by which the CONTRACTOR had indicated the claim will be paid directly or indirectly and

3 Not having been paid within the above 30 days have sent a written notice to the Surety and sent a copy or notice thereof to the OWNER stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the CONTRACTOR

5 If a notice required by paragraph 4 is given by the OWNER to the CONTRACTOR or to the Surety that is sufficient compliance

6 When the Claimant has satisfied the conditions of paragraph 4 the Surety shall promptly and at the Surety's expense take the following actions

6 1 Send an answer to the Claimant with a copy to the OWNER within 45 days after receipt of the claim stating the amounts that are undisputed and the basis for challenging any amounts that are disputed

6 2 Pay or arrange for payment of any undisputed amounts

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

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

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

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

11 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by paragraph 4 1 or paragraph 4 2 3 or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs If the provisions of this paragraph are void or prohibited by law the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable

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

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

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

15 DEFINITIONS

15 1 Claimant An individual or entity having a direct contract with the CONTRACTOR or with a Subcontractor of the CONTRACTOR to furnish labor materials or equipment for use in the performance of the Contract The intent of this Bond shall be to include without limitation in the terms labor materials or equipment that part of water gas power light, heat, oil gasoline telephone service or rental equipment used in the Contract architectural and engineering services required for performance of the Work of the CONTRACTOR and the CONTRACTOR's Subcontractors and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor materials or equipment were furnished

15 2 Contract. The agreement between the OWNER and the CONTRACTOR identified on the signature page including all Contract Documents and changes thereto

15 3 OWNER Default. Failure of the OWNER which has neither been remedied nor waived to pay the CONTRACTOR as required by the Contract or to perform and complete or comply with the other terms thereof

(FOR INFORMATION ONLY--Name Address and Telephone)
AGENCY or BROKER OWNER'S REPRESENTATIVE (Engineer or other party)

CERTIFICATE OF INSURANCE						Issue Date:	
PRODUCER:		THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.					
Code		COMPANIES AFFORDING COVERAGE					
Sub-Code		COMPANY LETTER A					
INSURED:		COMPANY LETTER B					
		COMPANY LETTER C					
		COMPANY LETTER D					
		COMPANY LETTER E					
COVERAGES							
THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES.							
CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE	POLICY EXPIRATION DATE	ALL LIMITS IN THOUSANDS		
	GENERAL LIABILITY				GENERAL AGGREGATE	\$1,000,	
	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY	(Completed Operations & Products Liability remains in force for 2 years after final payment)			PRODUCTS-COMP/OPS AGGREGATE	\$1,000,	
	<input checked="" type="checkbox"/> OCCURRENCE				PERSONAL & ADVERTISING INJURY	\$1,000,	
	<input checked="" type="checkbox"/> BLANKET CONTRACTUAL				EACH OCCURRENCE	\$1,000,	
	AUTOMOBILE LIABILITY				COMBINED SINGLE LIMIT EACH OCCURRENCE Bodily Injury & Property Damage	\$1,000,	
	<input checked="" type="checkbox"/> ANY AUTO						
	<input checked="" type="checkbox"/> HIRED AUTOS						
	<input checked="" type="checkbox"/> NON-OWNED AUTOS						
	EXCESS LIABILITY				EACH OCCURRENCE	\$4,000,	
	<input checked="" type="checkbox"/> UMBRELLA FORM	(Follows Form of the Primary)			AGGREGATE	\$4,000,	
	WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY				STATUTORY		
		(Includes US Longshoremen and Harbor Workers Act and Maritime Coverage Where Applicable and All States Endorsement)			EACH ACCIDENT	\$1,000,	
					DISEASE-POLICY LIMIT	\$1,000,	
					DISEASE-EACH EMPLOYEE	\$1,000,	
	OTHER				EACH OCCURRENCE		
					AGGREGATE		
DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS:							
<ol style="list-style-type: none"> Certificate Holder(s) & their Officers, Directors, Partners, Employees, & Agents Named as Additional Insured (all policies except WC). The coverage afforded the Additional Insured under these policies shall be primary insurance. If the Additional Insured has other insurance which is applicable to the loss, such other insurance shall be on an excess or contingent basis. (Copy of Additional Insured Endorsement attached.) Blanket Coverage for XCU Hazards (General Liability & Excess Liability). Waiver of Subrogation Against Certificate Holder(s), Their Officers, Directors, Partners, Employees, & Agents (all policies). Contractual Coverage covers liability assumed in the Indemnification Clause of the Contract between Certificate Holder and Insured (General Liability & Excess Liability). General and Products/Completed Operations aggregates apply for each Certificate Holder contract(s) or amendments (General Liability & Excess Liability). Contractual Liability Limitation Endorsement CG2139 or its equivalent is not included in either General or Excess Liability policies. Severability of Interest or Cross Liability clause or endorsement included (General Liability & Excess Liability). 							
CERTIFICATE HOLDERS				CANCELLATION			
1.		SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELED, TERMINATED, OR MATERIALLY CHANGED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDERS NAMED TO THE LEFT. ANY IMPAIRMENT OR EXHAUSTION OF AGGREGATES WILL BE THE SUBJECT OF IMMEDIATE NOTICE TO THE CERTIFICATE HOLDERS.					
2.		AUTHORIZED REPRESENTATIVE					

CERTIFICATE OF PROPERTY INSURANCE		ISSUE DATE _____ (mm/dd/yy)
THIS IS EVIDENCE THAT INSURANCE AS IDENTIFIED BELOW HAS BEEN ISSUED IS IN FORCE AND CONVEYS ALL THE RIGHTS AND PRIVILEGES AFFORDED UNDER THE POLICY		
PRODUCER Code Sub-Code	COMPANY	
INSURED	POLICY NUMBER	
	EFFECTIVE DATE (mm/dd/yy)	EXPIRATION DATE (mm/dd/yy)
PROPERTY INFORMATION		
LOCATION/DESCRIPTION		
COVERAGE INFORMATION		
COVERAGES/PERILS/FORMS	AMOUNT OF INSURANCE	DEDUCTIBLE
BUILDERS RISK/INSTALLATION FLOATER All Risk of Physical Damage or Loss to Equipment and Materials at or incidental to the Jobsite on Completed Value Form	Insurable value of completed work. _	
REMARKS (including Special Conditions)		
1 Certificate Holder and others identified in the property insurance paragraph of the Contract Documents are Named Insureds 2 Waiver of Subrogation against Named Insureds 3 Any similar insurance carried by Named Insureds is excess of coverage described hereon 4 Losses are payable to Owner as fiduciary for the Named Insureds		
CANCELLATION		
THIS POLICY IS SUBJECT TO THE PREMIUMS FORMS AND RULES IN EFFECT FOR EACH POLICY PERIOD SHOULD THE POLICY BE TERMINATED OR MATERIALLY CHANGED THE COMPANY WILL GIVE THE CERTIFICATE HOLDERS IDENTIFIED BELOW 30 DAYS' WRITTEN NOTICE, AND WILL SEND NOTIFICATION OF ANY CHANGES TO THE POLICY THAT WOULD AFFECT THAT INTEREST IN ACCORDANCE WITH THE POLICY PROVISIONS OR AS REQUIRED BY LAW		
CERTIFICATE HOLDERS		
Name and Address 1 2	Nature of Interest <input checked="" type="checkbox"/> Additional Named Insured	
		SIGNATURE OF AUTHORIZED AGENT OF THE COMPANY

120296

00652 1

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BID SET

**Engineers Joint Documents Committee
Design and Construction Related Documents
Instructions and License Agreement**

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This Agreement shall be governed by the laws of the State of Virginia. Should you have any questions concerning this Agreement, you may contact EJCDC by writing to:

Arthur Schwartz, Esq.
General Counsel
National Society of Professional Engineers
1420 King Street
Alexandria, VA 22314

Phone: (703) 684-2845
Fax: (703) 836-4875
e-mail: aschwartz@nspe.org

You acknowledge that you have read this agreement, understand it and agree to be bound by its terms and conditions. You further agree that it is the complete and exclusive statement of the agreement between us which supersedes any proposal or prior agreement, oral or written, and any other communications between us relating to the subject matter of this agreement.

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by

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Professional Engineers
Professional Engineers in Private Practice

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These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such

construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

- A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

- c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the

Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to

complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

- A. Standards, Specifications, Codes, Laws, and Regulations
 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners,

employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
1. A Field Order;
 2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or
 3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
 2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner’s furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner’s interest therein as necessary for giving notice of or filing a mechanic’s or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the “technical data” contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such “technical data” is identified in the Supplementary Conditions. Except for such reliance on such “technical data,” Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 - 1. the completeness of such reports and drawings for Contractor’s purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any “technical data” or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

1. is of such a nature as to establish that any “technical data” on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
2. is of such a nature as to require a change in the Contract Documents; or
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer’s Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner’s obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer’s findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor’s cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and

contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the

consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.
- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is

responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 Performance, Payment, and Other Bonds

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 Licensed Sureties and Insurers

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly

licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

- a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
 2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
 3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
 4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
 5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
 6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
 2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors,

members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.
- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds

and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
 - 1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements

for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

- a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
 - 3) it has a proven record of performance and availability of responsive service.
- b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items:*

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;

- 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
- 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and
- 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of

Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

- F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.
- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the

Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full

responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
 3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall

take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;
 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Submit number of copies specified in the General Requirements.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples:*

- a. Submit number of Samples specified in the Specifications.
 - b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of

each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or
7. any correction of defective Work by Owner.

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
 - 1. written notice thereof will be given to Contractor prior to starting any such other work; and
 - 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be

affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
 - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 - 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 - 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

- A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

- A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
1. deny the Claim in whole or in part;
 2. approve the Claim; or
 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 Cost of the Work

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of

property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances:*

1. Contractor agrees that:

- a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
- b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

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

11.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 2. there is no corresponding adjustment with respect to any other item of Work; and
 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 Change of Contract Price

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

- c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
- d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
- e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
- f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 Notice of Defects

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 Access to Work

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 Tests and Inspections

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
 - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
 3. as otherwise specifically provided in the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the

parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. repair such defective land or areas; or
 - 2. correct such defective Work; or
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.

- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 Schedule of Values

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 Progress Payments

A. Applications for Payments:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other

arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. Review of Applications:

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. Reduction in Payment:

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

- b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. there are other items entitling Owner to a set-off against the amount recommended; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

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

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive

certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
 - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

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

14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for

Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 3. Contractor's repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or

remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 - 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 - 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may,

upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 Methods and Procedures

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
 2. agrees with the other party to submit the Claim to another dispute resolution process; or
 3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 Giving Notice

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

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

17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

Section 00800

SUPPLEMENTARY CONDITIONS

SCOPE. These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (No. C-700, 2007 Edition) and other provisions of the Contract Documents as indicated herein. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions will have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated herein, which are applicable to both the singular and plural thereof.

SC-1. DEFINITIONS AND TERMINOLOGY. Amend the following defined terms as indicated:

Add the following new definitions to paragraph 1.01:

- “52. Final Completion – The time when all work is complete, including all punch list items, and all documents required for occupancy of the facility are completed and submitted to the Owner. These documents include, but are not limited to, Certificate of Occupancy, Letters of Approval from various regulatory agencies, inspection certificates, and all other items as required in paragraph 14.07.”
- “53. General Contractor – The person, firm, or corporation with whom Owner has entered into an Agreement for work, general trades, or complete work less a part of the work.”
- “54. Without exception – The term “without exception”, when used in the Contract Documents following the name of a Supplier or a proprietary item of equipment, product, or material, shall mean that the sources of the product are limited to the listed Suppliers or products and that no like, equivalent, or “or-equal” item and no substitution will be considered.”
- “55. Written Notice – Notice to any party which is in writing and which shall be considered delivered and the service thereof completed once posted by certified or registered mail to the party to whom the notice is sent at its last given address or delivered in person to said party or its authorized representative on the work.”

Delete 1.02.E in its entirety and replace with the following:

- “SC-1.02.E The words "furnish", "furnish and install", "install", and "provide" or words with similar meaning shall be interpreted, unless otherwise specifically stated, to mean "furnish and install complete in place and ready for service".”

Add the following paragraphs G and H:

"G. Imperative Mood. These specifications are written to the Bidder before the award of the Contract and to the Contractor after award of the Contract. The sentences that direct the Contractor to perform work are mostly written as commands. For example, a requirement to provide cold-weather protection would be expressed as, 'Provide cold-weather protection for concrete,' rather than 'The Contractor shall provide cold-weather protection for concrete.' In the imperative mood, the subject "the Bidder" or "the Contractor" is understood."

"H. The terms used in these Supplementary Conditions which are defined in the Standard General Conditions of the Construction Contract (EJCDC C-700, 2007 Edition) have the meanings assigned to them in the General Conditions."

SC-2. PRELIMINARY MATTERS.

Add the following:

"SC-2.00. Execution of Agreement.

- A. At least four counterparts of the Agreement will be executed and delivered by the Contractor to the Owner within fifteen (15) days of the Notice of Award and receipt of Contract Documents by the Contractor for execution; and Owner will execute and deliver one counterpart to Contractor within fifteen (15) days of receipt of the executed Agreement from Contractor."

Replaced SC-2.01.B in its entirety and replace with:

- "B. Replace "Before any Work at the Site is started, Contractor and Owner shall each deliver to the other" with "When Contractor delivers the executed counterparts of the Agreement to the Owner, Contractor shall deliver to the Owner", and replace "and Owner respectively are" with "is"."

SC-2.02. Copies of Documents. Delete paragraph 2.02.A and insert the following in its place:

"Two (2) sets of contract drawings and specifications will be furnished the Contractor without charge. Additional sets will be furnished upon request at the cost of reproduction. The Contractor shall keep one (1) set of approved plans and specifications on the site of the work. This set shall be kept current by addition of all approved changes, addenda and amendments thereto. One set of as-built plans shall be returned to the Owner after the project is complete.

The plans and specifications are intended to be complementary; but should any discrepancy appear or any misunderstanding arise as to the import of anything contained in either, the decision of the District shall be final and binding on the Contractor. The District may make any corrections of errors or omissions in the

drawings and specifications when such corrections are necessary for the proper fulfillment of their intention as construed by the District.

All work or materials shown on the plans and not mentioned in the specifications or any work specified and not shown on the plans, shall be furnished, performed and done by the Contractor as if the same were both mentioned in the specifications and shown on the plans.

Should the Contractor in preparing its bid find anything necessary for the work that is not mentioned in the specifications or shown on the plans, or any discrepancy, it shall notify the District so that such items may be included. Should the Contractor fail to notify the District of such items, it will be assumed that its bid included everything necessary for the complete construction in the spirit and intent of the designs shown.

In case of discrepancy, figure dimensions shall govern over scale dimensions, large-scale details shall govern over small-scale drawings, plans shall govern over specifications, detailed technical specifications shall govern over general specifications, and the more restrictive specifications shall prevail.”

SC-2.03. Commencement of Contract Times; Notice to Proceed. Delete the paragraph and insert in its place:

"A. The Contract Times will commence to run on the day indicated in the Notice to Proceed. The date for the Contract Times may be extended by mutual agreement between the Owner and the Contractor."

SC-2.06. Preconstruction Conference; Designation of Authorized Representatives. Delete paragraph 2.06.A in its entirety and insert the following new paragraph in its place:

"If requested by Owner, within 20 days after the Contract Times start to run, but before any work at the Site is started, a conference attended by Contractor, Owner, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in paragraph 2.05.A procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records."

SC-3. CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE.

SC-3.01. Intent. Add the following new paragraph:

"D. The Contract Drawings may be supplemented from time to time with additional Drawings by the Engineer as may be required to illustrate the work or, as the work progresses, with additional Drawings, by the Contractor, subject to the approval of the Engineer. Supplementary Drawings, when issued by the Engineer or by the Contractor, after approval by the Engineer, shall be furnished in sufficient quantity to all those who, in the opinion of the Engineer, are affected by such Drawings."

SC-4. AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS.

SC-4.03. Differing Subsurface or Physical Conditions.

Replace paragraph 4.03.A with the following:

"A. Notice: If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. Is of such nature as to require a change in the Contract Documents; or
2. Differs materially from that shown or indicated in the Contract Documents; or
3. Is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent on work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any work in connection therewith (except in an emergency as required by paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any work in connection therewith (except as aforesaid) until receipt of written order to do so."

SC-4.04. Underground Facilities.

Add the following new paragraph 4.04.A.3 through 4.04.A.7 immediately after paragraph 4.04.A.2:

"3. Location of Subsurface Utilities.

a. The location of subsurface utilities is shown on the plans from information furnished by the utility Owners.

b. The Contractor shall, no later than 2 working days, excluding Saturdays, Sundays, and legal holidays, prior to construction in the area of the subsurface utility, notify the subsurface utility Owner and Engineer in writing, by telephone, or in person. The marking or locating shall be coordinated to stay approximately 2 days ahead of the planned construction.

c. The Contractor shall alert immediately the occupants of nearby premises as to any emergency that it may create or discover at or near such premises.

d. The Contractor shall have full responsibility for coordination of the work with Owners of such underground facilities during construction, for the safety and protection thereof as provided in paragraph 6.13 and repairing any damage thereto resulting from the work, the cost of

all of which will be considered as having been included in the Contract Price.

4. Where existing utilities and structures are indicated as being in the line of the proposed improvement, the Contractor shall expose them sufficiently in advance of the construction operations to permit adjustments in line or grade, if required, to eliminate interferences.

5. Existing pipes or conduits crossing a trench, or otherwise exposed, shall be adequately braced and supported to prevent movement during construction.

6. Broken Utility Services.

- a. Utility services broken or damaged shall be repaired at once to avoid inconvenience to customers and utility Owners.
- b. Temporary arrangements, as approved by the Engineer, may be used until any damaged items can be permanently repaired.
- c. All items damaged or destroyed by construction and subsequently repaired must be properly maintained by the Contractor.
- d. Contractor must work 24 hours a day until service is restored to a damaged utility.

7. Existing Utility Relocation.

- a. Where it is necessary to relocate an existing utility or structure, the work shall be done in such manner as is necessary to restore it to a condition equal to that of the original utility or structure.
- b. No such relocation shall be done until approval is received from the authority responsible for the utility or structure being changed."

Add the following:

"4.04.B.3 The Owner, Engineer, and Engineer's Consultants shall not be liable to Contractor for any claims, costs, losses or damages incurred or sustained by Contractor on or in connection with any other work or anticipated work."

SC-4.06 Hazardous Environmental Conditions at Site.

Delete paragraph 4.06.A. in its entirety and substitute the following paragraph therefore:

"A. The following reports and drawings related to Hazardous Environmental Conditions identified at the Site are known to Owner: (None)."

Amend paragraph 4.06.B second sentence by deleting “Supplementary Conditions” and substituting “Specifications and Contract Drawings” in its place.

Amend paragraph 4.06.C by adding the words “that is created by, or” immediately after the words “a Hazardous Environmental Condition” in the fourth line.

Amend paragraph 4.06.G by deleting all words following the words “Hazardous Environmental Condition” in the seventh line and substituting therefore the following words: “was created by Owner or by anyone for whom Owner is responsible, other than Contractor and all persons, subcontractors and entities for which Contractor is responsible.”

SC-5. BONDS AND INSURANCE.

SC-5.02. Licensed Sureties and Insurers. Add the following new sentence at the end of paragraph 5.02.A:

“The surety company shall be rated “A” by AM BEST.”

SC-5.03. Certificates of Insurance. Add the following new sentence at the end of paragraph 5.03.A:

“Contractor shall deliver to Owner properly completed certificates of insurance prior to the start of any Work at the Site, on the forms included in the Contract Documents.”

SC-5.04. Contractor’s Insurance.

Add the following new paragraphs immediately after paragraph 5.04.A.6:

- “7. Claims arising out of pollution and excluded from the Contractor’s general liability and comprehensive automobile liability policies. This insurance shall be coordinated with the Contractor’s general liability policy and shall provide bodily injury and property damage coverage similar to the Contractor’s general liability policy. Coverage shall include contractual liability.”

Add the following new paragraphs immediately after paragraph 5.04.B.6:

- “7. contain a cross liability or severability of interest clause or endorsement. Insurance covering the specified additional insureds shall be primary insurance, and all other insurance carried by the additional insureds shall be excess insurance;
8. with respect to workers’ compensation and employers’ liability, comprehensive automobile liability, commercial general liability, and umbrella liability insurance, and all other liability insurance specified herein to be provided by Contractor, Contractor shall require its insurance carriers to waive all rights of subrogation against Owner, Engineer, and their respective officers, directors, partners, employees, and agents.”

Add the following new paragraphs immediately after paragraph 5.04.B:

- “C. The insurance required by paragraph 5.04 shall include coverage as necessary for the benefits provided under the United States Longshoremen’s and Harbor Workers’ Act and the Jones Act. This policy shall include an “all states” endorsement.

- D. The limits of liability for the insurance required by paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts but shall provide coverage in greater amounts where required by Laws and Regulations. This coverage may be primary or a combination of primary and umbrella excess liability.
 - 1. Workers’ Compensation, and related coverage under paragraphs 5.04.A.1 and 5.04.A.2 of the General Conditions:
 - a. State Statutory
 - b. Applicable Federal (e.g., Longshoreman’s) Statutory
 - b. Employer’s Liability \$1,000,000 each occurrence

 - 2. Commercial General Liability under paragraphs 5.04.A.3 through 5.04.A.6 of the General Conditions shall be occurrence type, written in comprehensive form, and shall protect Contractor, Owner, and Engineer as additional insureds, against claims arising from injuries, sickness, disease, or death of any person or damage to property arising out of performance of the Work. The policy shall also include a per work aggregate limit endorsement, personal injury liability coverage, contractual liability coverage for blasting, explosion, collapse of buildings, and damage to underground property.
 - a. General Aggregate \$1,000,000
 - b. Products – Completed Operations Aggregate \$1,000,000
 - c. Personal and Advertising Injury \$1,000,000
 - d. Each Occurrence (Bodily Injury and Property Damage) \$1,000,000
 - e. Property Damage liability insurance will provide Explosion, Collapse and Underground coverage’s where applicable.

 - 3. Automobile Liability under paragraph 5.04.A.6 of the General Conditions shall be occurrence type, written in comprehensive form, and shall protect Contractor, Owner, and Engineer as additional insureds, against all claims for

injuries to members of the public and damage to property of others arising from the use of motor vehicles, either on or off the work site whether they are owned, nonowned, or hired. The liability limit shall be not less than:

- a. Bodily Injury
 - Each Person \$1,000,000
 - Each Accident \$1,000,000
 - b. Property Damage
 - Each Accident \$1,000,000
 - c. Combined Single Limit \$1,000,000
4. Umbrella Liability Insurance shall protect Contractor, Owner, and Engineer as additional insureds, against claims in excess of the limits provided under workers' compensation and employers' liability, comprehensive automobile liability, and commercial general liability policies. The umbrella policy shall follow the forms of the primary insurance, including the application of the primary limits. The liability limits shall be not less than:
- Bodily injury and Property damage \$4,000,000 combined single limit for each occurrence
 - \$4,000,000 general aggregate"

SC-5.05. Owner's Liability Insurance. Delete paragraph 5.05 in its entirety and insert the following new paragraph in its place:

"5.05. *Owner's Liability Insurance*. This insurance shall be obtained by Contractor and issued in the name of Owner, and shall protect and defend Owner against claims arising as a result of the operations of Contractor or Contractor's Subcontractors. The liability limits shall be not less than:

- a. Bodily Injury
 - Each Occurrence \$1,000,000
 - General Aggregate \$1,000,000
- b. Property Damage
 - Each Occurrence \$1,000,000
 - General Aggregate \$1,000,000"

SC-5.06. Property Insurance. Delete paragraph 5.06 in its entirety and insert the following new paragraphs in their place:

"5.06. *Property Insurance*

- A. Contractor shall purchase and maintain property insurance coverage upon the Work at the Site in the amount of the full replacement cost thereof. This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, Engineer, Engineer's Consultants, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an additional insured;
2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, flood, damage caused by frost and freezing, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;
3. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment accepted by Owner;
4. include expenses incurred in the repair or replacement of any insured property (including, but not limited to, fees and charges of engineers and architects);
5. allow for partial utilization of the Work by Owner;
6. include testing and startup; and
7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer, with 30 days' written notice to each other additional insured to whom a certificate of insurance has been issued.

B. Contractor shall be responsible for any deductible or self-insured retention.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with paragraph 5.06 shall contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 5.07.

D. If Owner requests in writing that other special insurance be included in the property insurance policies provided under paragraph 5.06, Contractor shall, if possible, include such insurance, and the cost thereof will be charged to Owner by appropriate Change

Order or Written Amendment. Prior to commencement of the Work at the Site, Contractor shall in writing advise Owner whether or not Contractor has procured such other special insurance.”

SC-6. CONTRACTOR’S RESPONSIBILITIES.

SC-6.02. Labor; Working Hours. Delete the last sentence of paragraph 6.02.B and replace with the following:

“Contractor will not permit the performance of Work on a Sunday or any legal holiday without Owner’s written consent (which will not be unreasonably withheld) given after prior written notice to Engineer and Owner. Work may be performed on Saturdays from 9:00 a.m. through 3:00 p.m. as a regular procedure with the permission of Owner; such permission, however, may be revoked at any time by Owner if Contractor fails to maintain adequate equipment and supervision for the proper prosecution and control of the weekend Work.”

Add the following new paragraphs immediately after paragraph 6.02.B:

“C. No Work shall be done between 6:00 p.m. and 7:00 a.m. Monday through Friday without permission of Owner. However, emergency work including weekends may be done without prior permission.”

SC-6.05. Substitutes and “Or-Equals”. Add the following new paragraph after paragraph 6.05.A.2.d:

“e. If a proposed substitute item is accepted, all incidental costs associated with the use of the substitute including, but not limited to, redesign, claims of other Contractors, changes to electrical supply equipment, additional equipment or material required for the installation, etc., shall be at the expense of the Contractor proposing the substitute unless otherwise agreed to by the Owner.”

SC-6.06. Concerning Subcontractors, Suppliers, and Others. Delete paragraph 6.06.B in its entirety and insert the following new paragraph in its place:

“B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner’s acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity without an increase in the Contract Price. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.”

SC-6.07 Patent Fees and Royalties:

Delete 6.07.A, 6.07.B, and 6.07.C in their entirety and substitute the following:

“A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work of any invention, design, process, products or device which is the subject of patent rights or copyrights held by others. Contractor shall indemnify and hold harmless Owner and Engineer and anyone directly or indirectly employed by either of them from and against all claims, damages, losses and expenses, including attorney's fees, arising out of any infringement of patent rights or copyrights incident to the use in the performance of the Work or furnished by him in fulfillment of the requirements of this Contract. In the event of any claim or action by law on account of such patents or fees, it is agreed that the Owner may retain out of the monies which are or which may become due the Contractor under this Contract, a sum of money sufficient to protect itself against loss, and to retain the same until said claims are paid or are satisfactorily adjusted.”

SC-6.09. Laws and Regulations. Delete 6.09.B in its entirety and substitute the following:

“B. If Contractor observes that the Specifications or Drawings are at variance with any Laws or Regulations, Contractor shall give Engineer prompt written notice thereof. If Contractor performs any Work knowing it to be contrary to such Laws or Regulations, and without such notice to Engineer, Contractor shall bear all costs arising therefrom. The Contractor shall, at all times, observe and comply with and shall cause all agents and employees and all Subcontractors to observe and comply with all such existing Laws or Regulations, and shall protect and indemnify the Owner and the Engineer and the municipalities in which work is being performed, and their officers and agents against any claim, civil penalty, fine or liability arising from or based on the violation of any such Law or Regulation, whether by the Contractor or any Subcontractors.”

SC-6.10. Taxes. Add the following new paragraph immediately after Paragraph 6.10.A of the General Conditions:

“B. Portions of this project may be exempt from taxes. It is the Contractor's responsibility to determine the exemptions for this.”

SC-6.16. Emergencies. Add the following new paragraph immediately after paragraph 6.16.A:

“B. The Contractor understands and agrees that during the performance of the Contract, it shall maintain a presence within such proximity of the Work Site which will allow it to respond to an emergency at the Work Site within one hour of receiving notice of an emergency, including emergencies occurring during non-working hours. The Contractor shall provide a list of emergency phone numbers for such purposes. If the Contractor does not have such a presence, it may satisfy this requirement by sub-contracting with a sub-contractor that does have such a presence, provided that any such sub-contractor must be approved by the Owner, in its sole discretion, prior to the pre-construction meeting.”

SC-6.19. Contractor's General Warranty and Guarantee. Delete paragraph 6.19.C.7 and insert the following new paragraph in its place:

- “8. any correction of defective Work by Owner; or
- 9. any expiration of a correction period.”

SC-6.20 Indemnification:

- A. Third sentence, after "...claims, costs" add the following: ", civil penalties, fines,"
- C. Add the following:
 - “3. Nothing in the Contract Documents shall create or give to third parties any claim or right of action against the Contractor, the Owner or the Engineer beyond such as may legally exist irrespective of the Contract.”

SC-7. OTHER WORK AT THE SITE. No Modifications.

SC-8. OWNER'S RESPONSIBILITIES.

SC-8.06 Insurance.

- A. Delete in its entirety.

SC-8.11 Evidence of Financial Arrangements.

- A. Delete in its entirety.

SC-9. ENGINEER'S STATUS DURING CONSTRUCTION.

SC-9.02. Visits to Site. Delete paragraph 9.02.A in its entirety and insert the following new paragraph in its place:

“A. Engineer may make visits to the Site as Owner deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, at the request and benefit of Owner, may determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will advise Owner of the progress of the Work and will endeavor to guard Owner against defective Work.”

SC-10. CHANGES IN THE WORK; CLAIMS. No Modifications.

SC-11. COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK.

11.01.A.4. Delete in its entirety.

11.01.A.5.a. Delete in its entirety.

11.01.A.5.c. Add the following before last sentence of paragraph:

"These rates shall include all fuel, lubricants, insurance, etc. Equipment rental charges shall not exceed the prorated monthly rental rates listed in the current edition of the 'Compilation' of Rental Rates for Construction Equipment" as published by the Associated Equipment Distributors. Charges per hour shall be determined by dividing the monthly rates by 176."

11.01.A.5.f. Delete in its entirety.

11.01.A.5.g. Delete in its entirety.

11.01.A.5.h. Delete in its entirety.

SC-12. CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES.

SC-12.01. Change of Contract Price. Delete paragraph 12.01.A in its entirety and insert the following new paragraph in its place:

"A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by Contractor to Owner in accordance with the provisions of paragraph 10.05."

SC-12.02. Change of Contract Times. Delete paragraph 12.02.A in its entirety and insert the following new paragraph in its place:

"A. The Contract Times (or Milestones) may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times (or Milestones) shall be based on written notice submitted by Contractor to owner in accordance with the provisions of paragraph 10.05."

SC-12.03. Delays. Insert the following new sentence following the first sentence of paragraph 12.03.A:

"This extension shall be Contractor's sole and exclusive remedy for such delay."

Delete paragraph 12.03.C in its entirety and replace with the following:

"C. The Contractor shall not be entitled to an equitable adjustment in Contract Times even if the Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of the Owner, or other causes not the fault of and beyond control of Owner and Contractor. Since the North Reservoir will need to be ready to place back into service no later than the date specified in the

Contract Documents, the Contractor shall not have any expectations from the Owner to authorize time extensions beyond the Substantial Completion Date indicated in the Contract Documents, particularly those associated with weather conditions impacting the Work.”

Insert the following new paragraph 12.03.F immediately after paragraph 12.03.E:

“F. In no event shall Owner be liable to Contractor, any Subcontractor, any Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages (including acceleration costs) arising out of or resulting from any delay.”

SC-13. TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK.

SC-13.02. Access to Work. Add the following new paragraph immediately after paragraph 13.02.A:

“B. Authorized representatives of the U.S. Environmental Protection Agency and the Kentucky Division of Water shall have access to the Work wherever it is in preparation or progress. Contractor shall provide proper facilities for such access and inspection.”

SC-13.07. Correction Period. Add the following new paragraph after paragraph 13.07.D:

“Nothing in Article 13 concerning the correction period shall establish a period of limitation with respect to any other obligation which Contractor has under the Contract Documents. The establishment of time periods relates only to the specific obligations of Contractor to correct the Work, and has no relationship to the time within which Contractor's obligations under the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish Contractor's liability with respect to Contractor's obligations other than to specifically correct the Work.

SC-14. PAYMENTS TO CONTRACTOR AND COMPLETION.

SC-14.02. Progress Payments. Add the following new paragraphs immediately after paragraph 14.02.A.3:

“4. Contractor's Applications for Payment shall be accompanied by the documentation specified herein.

5. Payments for stored materials and equipment shall be based only upon the actual cost to Contractor of the materials and equipment and shall not include any overhead or profit to Contractor. Partial payments will not be made for undelivered materials or equipment.

6. During the progress of the Work, each Application for Payment shall be accompanied by Contractor's updated schedule of operations, or progress report, with such shop drawings schedules, procurement schedules, value of material on hand

included in application, and other data specified in Division 1 or reasonably required by Owner.”

Delete paragraphs 14.02.C in its entirety and insert the following new paragraphs in its place:

“C. *Payment Becomes Due*

1. Twenty-five days after presentation of the Application for Payment to Owner with Engineer’s recommendation, the amount recommended will (subject to the provisions of paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.”

Add the following:

“SC-14.02.D.

4. Nothing shall prevent the Owner from withholding payment to the Contractor in addition to the amounts identified herein for unsatisfactory job progress, defective construction not remedied, disputed work, or third-party claims filed against the Owner or reasonable evidence that a third-party claim will be filed.”

SC-14.04. Substantial Completion. Add the following new paragraphs following paragraph 14.04.A:

“Substantial Completion shall be the removal of the estimated volume for the reservoir and the reservoir being able to be placed back into service. Portions of the Work not essential to operation, which can be completed without interruption of the Owner’s operation, may be completed after the Work is accepted as substantially complete, and may include the following items: seeding and sodding.”

SC-14.07. Final Application for Payment. Add the following new sentence immediately after the last sentence of paragraph 14.07.A.2:

“Consent of the surety, signed by an agent, must be accompanied by a certified copy of such agent's authority to act for the surety. The Contractor shall be responsible for providing all of the documents identified in this paragraph.”

SC-15. SUSPENSION OF WORK AND TERMINATION.

SC-15.02. Owner May Terminate for Cause. Amend paragraph 15.02.B by deleting the fifth sentence of the paragraph, in its entirety, which begins: “Such Claims, costs, losses, and damages incurred...”.

A.2. Add the following to the end of first sentence after "jurisdiction": "(including those governing employee safety)"

D. Delete in its entirety.

Add the following:

“SC-15.05 Assignment of Contract:

- A. Contractor shall not assign, transfer, convey or otherwise dispose of the Contract, or of its legal right, title, or interest in or to the same or to any part thereof, without the prior written consent of the Owner. Contractor shall not assign by power of attorney or otherwise any monies due him and payable under this Contract without the prior written consent of the Owner. Such consent, if given, will in no way relieve the Contractor from any of the obligations of this Contract. Owner shall not be bound to abide by or observe the requirements of any such assignment.”

SC-16. DISPUTE RESOLUTION.

Delete Article 16 in its entirety and insert the following new article in its place:

“ARTICLE 16 - DISPUTES.

Arbitration will not be acceptable as a means for settling claims, disputes, and other matters.”

SC-17. MISCELLANEOUS.

17.01 Giving Notice:

Add the following:

- “B. No oral statement of any person whomsoever shall in any manner or degree modify or otherwise affect the terms of this Contract. Any notice to the Contractor, from Owner and Engineer, relative to any part of this Contract shall be in writing.”

SC-17.04. Survival of Obligations. Add the following new paragraph immediately after paragraph 17.04.A:

“B. Contractor shall obtain from all Suppliers and manufacturers any and all warranties and guarantees of such Suppliers and manufacturers, whether or not specifically require by the Specifications, and shall assign such warranties and guarantees to Owner. With respect thereto, Contractor shall render reasonable assistance to Owner when requested, in order to enable Owner to enforce such warranties and guarantees. The assignment of any warranties or guarantees shall not affect the Correction Period or any other provisions of these Contract Documents.”

End of Section

SUPPLEMENTAL GENERAL CONDITIONS

FOR

CLEAN WATER STATE REVOLVING FUND

DRINKING WATER STATE REVOLVING FUND

(Drinking Water and Wastewater)

Project Name: Fort Thomas Treatment Plant Basin Improvements - Phase 2

Project Number: Phase 2 of WX21117210

The attached instructions and regulations as listed below shall be incorporated into the Specifications and comprise Special Conditions.

	<u>Attachment No.</u>
SRF Special Provisions	1
KRS Chapter 45A Kentucky Model Procurement Code	2
Equal Employment Opportunity (EEO) Documents:	
Notice of Requirement for Affirmative Action	3
Construction Contract Specifications	4
EEO Goals for Region 4 Economic Areas	5
Check List of EEO Documentation for Bidders	6
Employer Information Report EEO-1 (SF 100)	7
Labor Standards Provisions for Federally Assisted Construction	8
Certifications:	
Debarment, Suspension and Other Responsibility Matters	9
Anti-lobbying	10
Disadvantaged Business Enterprise (DBE) Program	11
Bonds and Insurance	12
Storm Water General Permit	13
Davis-Bacon Wage Rate Requirements	14
American Iron and Steel Requirement	15

SRF SPECIAL PROVISIONS

- (a) Line crossings of all roads and streets shall be done in accordance with the Kentucky Transportation Cabinet requirements as may be set forth in the Special Conditions.
- (b) Construction is to be carried out so as to prevent by-passing of flows during construction unless a schedule has been approved by the State or EPA, whichever is applicable. Siltation and soil erosion must be minimized during construction. All construction projects with surface disturbance of more than 1 acre during the period of construction must have a KPDES Storm Water General Permit. The permit can be found at this [webpage](#).

If you have any questions regarding the completion of this form call the Surface Water Permits Branch at (502) 564-3410.
- (c) Restore disturbed areas to original or better condition.
- (d) Use of Chemicals: All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of either DOW or EPA. Use of all such chemicals and disposal of residues shall be in conformance with instructions on the manufacturer's label.
- (e) The construction of the project, including the letting of contracts in connection therewith, shall conform to the applicable requirements of state, territorial, and local laws and ordinances to the extent that such requirements do not conflict with Federal laws and this subchapter.
- (f) The owner shall provide and maintain competent and adequate supervision and inspection.
- (g) The Kentucky Infrastructure Authority and Kentucky Division of Water shall have access to the site and the project work at all times.
- (h) In the event Archaeological materials (arrowheads, stone tools, stone axes, prehistoric and historic pottery, bottles, foundations, Civil War artifacts, and other types of artifacts) are uncovered during the construction of this project, work is to immediately cease at the location and the Kentucky Heritage Council shall be contacted. The telephone number is (502) 564-7005. Construction shall commence at this location until a written release is received from the Kentucky Heritage Council. Failure to report a find could result in legal action.
- (i) This procurement will be subject to DOW Procurement Guidance including the Davis-Bacon Act.
- (j) Reasonable care shall be taken during construction to avoid damage to vegetation. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Trees which receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. Tree trunks receiving damage from equipment shall be treated with a tree dressing.
- (k) No wastewater bypassing will occur during construction unless a schedule has been approved by the Kentucky Division of Water.
- (l) Change orders to the construction contract (if required) must be negotiated pursuant to DOW/KIA Procurement Guidance for Construction and Equipment Contracts.

KRS CHAPTER 45A
KENTUCKY MODEL PROCUREMENT CODE

45A.075 Methods of awarding state contracts.

Except as otherwise authorized by law, all state contracts shall be awarded by:

- (1) Competitive sealed bidding, pursuant to KRS 45A.080; or
- (2) Competitive negotiation, pursuant to KRS 45A.085 and 45A.090 or 45A.180; or
- (3) Noncompetitive negotiation, pursuant to KRS 45A.095; or
- (4) Small purchase procedures, pursuant to KRS 45A.100.

Effective: June 24, 2003

History: Amended 2003 Ky. Acts ch. 98, sec. 4, effective June 24, 2003. -- Created 1978 Ky. Acts ch. 110, sec. 16, effective January 1, 1979.

45A.080 Competitive sealed bidding.

(1) Contracts exceeding the amount provided by KRS 45A.100 shall be awarded by competitive sealed bidding, which may include the use of a reverse auction, unless it is determined in writing that this method is not practicable. Factors to be considered in determining whether competitive sealed bidding is not practicable shall include:

- (a) Whether specifications can be prepared that permit award on the basis of best value; and
- (b) The available sources, the time and place of performance, and other relevant circumstances as are appropriate for the use of competitive sealed bidding.

(2) The invitation for bids shall state that awards shall be made on the basis of best value. In any contract which is awarded under an invitation to bid which requires delivery by a specified date and imposes a penalty for late delivery, if the delivery is late, the contractor shall be given the opportunity to present evidence that the cause of the delay was beyond his control. If it is the opinion of the purchasing officer that there is sufficient justification for delayed delivery, the purchasing officer may adjust or waive any penalty that is provided for in the contract.

(3) Adequate public notice of the invitation for bids and any reverse auction shall be given a sufficient time prior to the date set forth for the opening of bids or beginning of the reverse auction. The notice may include posting on the Internet or publication in a newspaper or newspapers of general circulation in the state as determined by the secretary of the Finance and Administration Cabinet not less than seven (7) days before the date set for the opening of the bids and any reverse auction. The provisions of this subsection shall also apply to price contracts and purchase contracts of state institutions of higher education.

(4) Bids shall be opened publicly or entered through a reverse auction at the time and place designated in the invitation for bids. At the time the bids are opened, or the reverse auction has ended, the purchasing agency shall announce the agency's engineer's estimate, if applicable, and make it a part of the agency records pertaining to the letting of any contract for which bids were received. Each written or reverse auction bid, together with the name of the bidder and the agency's engineer's estimate, shall be recorded and be open to public inspection. Electronic bid opening and posting of the required information for public viewing shall satisfy the requirements of this subsection.

(5) The contract shall be awarded by written notice to the responsive and responsible bidder whose bid offers the best value.

(6) Correction or withdrawal of written or reverse auction bids shall be allowed only to the extent permitted by regulations issued by the secretary.

Effective: July 15, 2010

History: Amended 2010 Ky. Acts ch. 63, sec. 3, effective July 15, 2010. -- Amended 2000 Ky. Acts ch. 509, sec. 1, effective July 14, 2000. -- Amended 1998 Ky. Acts ch. 120, sec. 10, effective July 15, 1998. -- Amended 1997 (1st Extra. Sess.) Ky. Acts ch. 4, sec. 27, effective May 30, 1997. -- Amended 1996 Ky. Acts ch. 60, sec. 2, effective July 15, 1996. -- Amended 1994 Ky. Acts ch. 278, sec. 1, effective July 15, 1994. -- Amended 1982 Ky. Acts ch. 282, sec. 1, effective July 15, 1982. -- Amended 1979 (1st Extra. Sess.) Ky. Acts ch. 9, sec. 1, effective February 10, 1979. -- Created 1978 Ky. Acts ch. 110, sec. 17, effective January 1, 1979.

45A.085 Competitive negotiation.

(1) When, under administrative regulations promulgated by the secretary or under KRS 45A.180, the purchasing officer determines in writing that the use of competitive sealed bidding is not practicable, and except as provided in KRS 45A.095 and 45A.100, a contract may be awarded by competitive negotiation, which may include the use of a reverse auction.

(2) Adequate public notice of the request for proposals and any reverse auction shall be given in the same manner and circumstances as provided in KRS 45A.080(3).

(3) Contracts other than contracts for projects utilizing an alternative project delivery method under KRS 45A.180 may be competitively negotiated when it is determined in writing by the purchasing officer that the bids received by competitive sealed bidding either are unreasonable as to all or part of the requirements, or were not independently reached in open competition, and for which each competitive bidder has been notified of the intention to negotiate and is given reasonable opportunity to negotiate.

(4) Contracts for projects utilizing an alternative project delivery method shall be processed in accordance with KRS 45A.180.

(5) The request for proposals shall indicate the relative importance of price and other evaluation factors, and any reverse auction procedures.

(6) Award shall be made to the responsible and responsive offeror whose proposal is determined in writing to be the most advantageous to the Commonwealth, taking into consideration price and the evaluation factors set forth in the request for proposals and the reciprocal preference for resident bidders required under KRS 45A.494.

(7) Written or oral discussions shall be conducted with all responsible offerors who submit proposals determined in writing to be reasonably susceptible of being selected for award. Discussions shall not disclose any information derived from proposals submitted by competing offerors. Discussions need not be conducted:

(a) With respect to prices, where the prices are fixed by law, reverse auction, or administrative regulation, except that consideration shall be given to competitive terms and conditions;

(b) Where time of delivery or performance will not permit discussions; or

(c) Where it can be clearly demonstrated and documented from the existence of adequate competition or prior experience with the particular supply, service, or construction item, that acceptance of an initial offer without discussion would result in fair and reasonable best value procurement, and the request for proposals notifies all offerors of the possibility that award may be made on the basis of the initial offers.

Effective: July 15, 2010

History: Amended 2010 Ky. Acts ch. 63, sec. 4, effective July 15, 2010; and ch. 162, sec. 8, effective July 15, 2010. -- Amended 2003 Ky. Acts ch. 98, sec. 5, effective June 24, 2003. -- Amended 1997 (1st Extra. Sess.) Ky. Acts ch. 4, sec. 28, effective May 30, 1997. -- Amended 1979 (1st Extra. Sess.) Ky. Acts ch. 9, sec. 2, effective February 10, 1979. -- Created 1978 Ky. Acts ch. 110, sec. 18, effective January 1, 1979.

45A.090 Negotiation after competitive sealed bidding when all bids exceed available funds.

(1) In the event that all bids submitted pursuant to competitive sealed bidding under KRS 45A.080 result in bid prices in excess of the funds available for the purchase, and the chief purchasing officer determines in writing:

(a) That there are no additional funds available from any source so as to permit an award to the responsive and responsible bidder whose bid offers the best value; and

(b) The best interest of the state will not permit the delay attendant to a resolicitation under revised specifications, or for revised quantities, under competitive sealed bidding as provided in KRS 45A.080, then a negotiated award may be made as set forth in subsections (2) or (3) of this section.

(2) Where there is more than one (1) bidder, competitive negotiations pursuant to KRS 45A.085(3) shall be conducted with the three (3) (two (2) if there are only two (2)) bidders determined in writing to be the most responsive and responsible bidders, based on criteria contained in the bid invitation and the reciprocal preference for resident bidders under KRS 45A.494. Such competitive negotiations shall be conducted under the following restrictions:

(a) If discussions pertaining to the revision of the specifications or quantities are held with any potential offeror, all other potential offerors shall be afforded an opportunity to take part in such discussions; and

(b) A request for proposals, based upon revised specifications or quantities, shall be issued as promptly as possible, shall provide for an expeditious response to the revised requirements, and shall be awarded upon the basis of best value.

(3) Where, after competitive sealed bidding, it is determined in writing that there is only one (1) responsive and responsible bidder, a noncompetitive negotiated award may be made with such bidder in accordance with KRS 45A.095.

Effective: July 15, 2010

History: Amended 2010 Ky. Acts ch. 162, sec. 9, effective July 15, 2010. -- Amended 2003 Ky. Acts ch. 98, sec. 6, effective June 24, 2003. -- Amended 1997 (1st Extra. Sess.) Ky. Acts ch. 4, sec. 29, effective May 30, 1997. -- Created 1978 Ky. Acts ch. 110, sec. 19, effective January 1, 1979.

45A.095 Noncompetitive negotiation.

(1) A contract may be made by noncompetitive negotiation only for sole source purchases, or when competition is not feasible, as determined by the purchasing officer in writing prior to award, under administrative regulations promulgated by the secretary of the Finance and Administration Cabinet or the governing boards of universities operating under KRS Chapter 164A, or when emergency conditions exist. Sole source is a situation in which there is only one (1) known capable supplier of a commodity or service, occasioned by the unique nature of the requirement, the supplier, or market conditions. Insofar as it is practical, no less than three (3) suppliers shall be solicited to submit written or oral quotations whenever it is determined that competitive sealed bidding is not feasible. Award shall be made to the supplier offering the best value. The names of the suppliers submitting quotations and the date and amount of each quotation shall be placed in the procurement file and maintained as a public record. Competitive bids may not be required:

(a) For contractual services where no competition exists, such as telephone service, electrical energy, and other public utility services;

(b) Where rates are fixed by law or ordinance;

(c) For library books;

(d) For commercial items that are purchased for resale;

(e) For interests in real property;

(f) For visiting speakers, professors, expert witnesses, and performing artists;

(g) For personal service contracts executed pursuant to KRS 45A.690 to 45A.725; and

(h) For agricultural products in accordance with KRS 45A.645.

(2) The chief procurement officer, the head of a using agency, or a person authorized in writing as the designee of either officer may make or authorize others to make emergency procurements when an emergency condition exists.

(3) An emergency condition is a situation which creates a threat or impending threat to public health, welfare, or safety such as may arise by reason of fires, floods, tornadoes, other natural or man-caused disasters, epidemics, riots, enemy attack, sabotage, explosion, power failure, energy shortages, transportation emergencies, equipment failures, state or federal legislative mandates, or similar events. The existence of the emergency condition creates an immediate and serious need for services, construction, or items of tangible personal property that cannot be met through normal procurement methods and the lack of which would seriously threaten the functioning of government, the preservation or protection of property, or the health or safety of any person.

(4) The Finance and Administration Cabinet may negotiate directly for the purchase of contractual services, supplies, materials, or equipment in bona fide emergencies regardless of estimated costs. The existence of the emergency shall be fully explained, in writing, by the head of the agency for which the purchase is to be made. The explanation shall be approved by the secretary of the Finance and Administration Cabinet and shall include the name of the vendor receiving the contract along with any other price quotations and a written determination for selection of the vendor receiving the contract. This information shall be filed with the record of all such purchases and made available to the public. Where practical, standard specifications shall be followed in making emergency purchases. In any event, every effort should be made to effect a competitively established price for purchases made by the state.

Effective: July 15, 2002

History: Amended 2002 Ky. Acts ch. 344, sec. 9, effective July 15, 2002. -- Amended 1997 (1st Extra. Sess.) Ky. Acts ch. 4, sec. 30, effective May 30, 1997. -- Amended 1990 Ky. Acts ch. 496, sec. 4, effective July 13, 1990. -- Created 1978 Ky. Acts ch. 110, sec. 20, effective January 1, 1979

45A.100 Small purchases by state governmental bodies.

(1) Procurements may be made in accordance with small purchase administrative regulations promulgated by the secretary of the Finance and Administration Cabinet, pursuant to KRS Chapter 13A, as follows:

(a) Up to ten thousand dollars (\$10,000) per project for construction and one thousand dollars (\$1,000) for purchases by any state governmental body, except for those state administrative bodies specified in paragraph (b) of this subsection; and

(b) Up to forty thousand dollars (\$40,000) per project for construction or purchases by the Finance and Administration Cabinet, state institutions of higher education, and the legislative branch of government.

(2) Procurement requirements shall not be artificially divided so as to constitute a small purchase under this section. Reverse auctions may be used for small purchase procurements. At least every two (2) years, the secretary shall review the prevailing costs of labor and materials and may make recommendations to the next regular session of the General Assembly for the revision of the then current maximum small purchase amount as justified by intervening changes in the cost of labor and materials.

(3) The secretary of the Finance and Administration Cabinet may grant to any state agency with a justifiable need a delegation of small purchasing authority which exceeds the agency's small purchase limit provided in subsection (1) of this section. Delegations of small purchasing authority shall be granted or revoked by the secretary of the Finance and Administration Cabinet, in accordance with administrative regulations promulgated by the cabinet pursuant to KRS Chapter 13A. These administrative regulations shall establish, at a minimum, the criteria for granting and revoking delegations of small purchasing authority, including the requesting agency's past compliance with purchasing regulations, the level of training of the agency's purchasing staff, and the extent to which the agency utilizes the Kentucky Automated Purchasing System. The administrative regulations may permit the secretary of the Finance and Administration Cabinet to delegate small purchase procurements up to the maximum amount specified in subsection (1)(b) of this section.

Effective: July 15, 2010

History: Amended 2010 Ky. Acts ch. 63, sec. 5, effective July 15, 2010. -- Amended 2002 Ky. Acts ch. 320, sec. 2, effective July 15, 2002. -- Amended 2000 Ky. Acts ch. 225, sec. 1, effective July 14, 2000. -- Amended 1996 Ky. Acts ch. 60, sec. 1, effective July 15, 1996. -- Amended 1994 Ky. Acts ch. 323, sec. 1, effective July 15, 1994. -- Amended 1990 Ky. Acts ch. 496, sec. 5, effective July 13, 1990. -- Amended 1986 Ky. Acts ch. 384, sec. 1, effective July 15, 1986. -- Amended 1984 Ky. Acts ch. 384, sec. 1, effective July 13, 1984. -- Amended 1982 Ky. Acts ch. 282, sec. 2, effective July 15, 1982. -- Amended 1980 Ky. Acts ch. 242, sec. 1, effective July 15, 1980; and ch. 250, sec. 19, effective April 9, 1980. -- Created 1978 Ky. Acts ch. 110, sec. 21, effective January 1, 1979.

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

The following excerpts are from 45 FR 65984 (October 3, 1980):

The minority and female goals apply to Federal and federally assisted construction contractors and subcontractors which have covered contracts. The goals are expressed as a percentage of the total hours worked by such a covered or subcontractor’s entire onsite construction workforce, which is working on any construction site within a relevant area. The goal applies to each construction craft and trade in the contractor’s entire workforce in the relevant area including those employees working on private non-federally involved projects.

Until further notice, the following goals for minority utilization in each construction craft and trade shall be included in all Federal or federally assisted construction contracts and subcontracts in excess of \$10,000 to be performed in the respective geographic area. The goals are applicable to each nonexempt contractor’s total onsite construction workforce, regardless of whether or not part of that workforce is performing work on a Federal, federally assisted or non-federally related project, contract or subcontract.

Construction contractors which are participating in an approved Hometown Plan (see 41 CFR 60-4.5) are required to comply with the goals of the Hometown Plan with regard to construction work they perform in the area covered by the Hometown Plan. With regard to all their other covered construction work, such contractors are required to comply as follows:

- Goals for female participation in each trade.....6.9%
- Goals for minority participation in each trade.....Insert goals for each year
(see Attachment Number 5)

These goals are applicable to all the Contractor’s construction work (whether or not it is Federal or Federally assisted) performed in the covered area.

The following excerpts are from 45 FR 65977 (October 3, 1980):

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

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

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

**STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY
CONSTRUCTION CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246)**

EEO Specifications

Following is the standard language, which must be incorporated into all solicitations for offers and bids on all Federal and Federally assisted construction contracts or subcontracts in excess of \$10,000 to be performed in designated geographical areas:

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 Program, United States Department of Labor, or any person to whom the Director delegates authority;
 - (c) Employer identification number means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
 - (d) Minority includes:
 - (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
 - (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the Contractor or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take a good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7-a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress 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 action to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensively as the following:
 - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
 - b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations responses.
 - c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the contractor may have taken.
 - d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligation.
 - e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources complied under 7-b above.

- f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, lay-off, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foreman, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
- h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.
- i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
- j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's workforce.
- 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 EEO policy and the Contractor's obligations under these specifications are being carried out.
- n. Ensure that all facilities and company activities are nonsegregated 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 supervisor's 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 actions obligations (7 a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant may be asserted as fulfilling any one or more of its obligations under 7 a through p of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be defense for the Contractor's noncompliance.
9. A single goal for minorities and a separate single goal for women have been established. The contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example: even though the Contractor has achieved its goal for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).
10. The Contractor shall not use the goals and timetables for affirmative action standards to discriminate against any person because of race, color, religion, sex or national origin.
11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and executive Order 11246, as amended.
13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.
14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation, if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.
15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

**EEO GOALS FOR ECONOMIC AREAS IN REGION 4
SOURCE: APPENDIX B-80 IN 45 FR 65984 (OCTOBER 3, 1980)**

Kentucky:

053 Knoxville, TN
 SMSA Counties:
 3840 Knoxville, TN..... 6.6
 TN Anderson; TN Blount; TN Knox; TN Union.
 Non-SMSA Counties 4.5
 KY Bell; KY Harlan; KY Knox; KY Laurel; KY McCreary; KY Wayne; KY
 Whitley; TN Campbell; TN Claiborne; TN Cocke; TN Cumberland; TN Fentress;
 TN Grainger, TN Hamblen; TN Jefferson; TN Loudon; TN Morgan; TN Roane;
 TN Scott; TN Sevier.

054 Nashville, TN:
 SMSA Counties:
 1660 Clarksville - Hopkinsville, TN - KY 18.2
 KY Christian; TN Montgomery.
 5360 Nashville - Davidson, TN..... 15.8
 TN Cheatham, TN Davidson; TN Dickson; TN Robertson; TN Rutherford; TN
 Sumner; TN Williamson; TN Wilson.
 Non-SMSA Counties 12.0
 KY Allen; KY Barren; KY Butler; KY Clinton; KY Cumberland; KY Edmonson;
 KY Logan; KY Metcalfe; KY Monroe; KY Simpson; KY Todd; KY Trigg; KY
 Warren; TN Bedford; TN Cannon; TN Clay; TN Coffee; TN DeKalb; TN Franklin;
 TN Giles; TN Hickman; TN Houston; TN Humphreys; TN Jackson; TN Lawrence;
 TN Lewis; TN Macon; TN Marshall; TN Maury; TN Moore; TN Overton; TN
 Perry; TN Pickett; TN Putnam; TN Smith; TN Stewart; TN Trousdale; TN Van
 Buren; TN Warren; TN Wayne; TN White.

056 Paducah, KY:
 Non-SMSA Counties 5.2
 IL Hardin; IL Massac; IL Pope; KY Ballard; KY Caldwell; KY Calloway. KY
 Carlisle; KY Crittenden; KY Fulton; KY Graves; KY Hickman; KY Livingston;
 KY Lyon. KY McCracken; KY Marshall.

057 Louisville, KY:
 SMSA Counties:
 4520 Louisville, KY-IN 11.2
 IN Clark; IN Floyd; KY Bullitt; KY Jefferson; KY Oldham.
 Non-SMSA Counties 9.6
 IN Crawford; IN Harrison; IN Jefferson; IN Orange; IN Scott; IN Washington; KY
 Breckinridge; KY Grayson; KY Hardin; KY Hart; KY Henry; KY Larue; KY
 Marion; KY Meade; KY Nelson; KY Shelby; KY Spencer; KY Trimble; KY
 Washington.

058 Lexington, KY	
SMSA Counties	
4280 Lexington-Fayette, KY	10.8
KY Bourbon; KY Clark; KY Fayette; KY Jessamine; KY Scott; KY Woodford.	
Non-SMSA Counties	7.0
KY Adair KY Anderson; KY Bath; KY Boyle; KY Breathitt; KY Casey; KY Clay;	
KY Estill; KY Franklin; KY Garrard; KY Green; KY Harrison; KY Jackson; KY	
Knott; KY Lee; KY Leslie; KY Letcher; KY Lincoln; KY Madison; KY Magoffin;	
KY Menifee; KY Mercer; KY Montgomery; KY Morgan. KY Nicholas; KY	
Owsley; KY Perry; KY Powell; KY Pulaski; KY Rockcastle; KY Russell; KY	
Taylor; KY Wolfe.	
059 Huntington, WV:	
SMSA Counties:	
3400 Huntington - Ashland, WV-KY-OH	2.9
KY Boyd; KY Greenup; OH Lawrence; WV Cabell; WV Wayne.	
Non-SMSA Counties	2.5
KY Carter; KY Elliott; KY Floyd; KY Johnson; KY Lawrence; KY Martin; KY	
Pike; KY Rowan; OH Gallia; WV Lincoln; WV Logan; WV Mason; WV Mingo.	
067 Cincinnati, OH:	
SMSA Counties:	
1640 Cincinnati, OH-KY-IN	11.0
IN Dearborn; KY Boone; KY Campbell; KY Kenton; OH Clermont; OH Hamilton;	
OH Warren.	
3200 Hamilton - Middletown, OH	5.0
OH Butler.	
Non-SMSA Counties	9.2
IN Franklin; IN Ohio; IN Ripley; IN Switzerland; KY Bracken; KY Carroll; KY	
Fleming; KY Gallatin; KY Grant; KY Lewis; KY Mason; KY Owen; KY	
Pendleton; KY Robertson; OH Adams; OH Brown; OH Clinton; OH Highland.	
080 Evansville, IN:	
SMSA Counties	
2440 Evansville, IN-KY	4.8
IN Gibson; IN Posey; IN Vanderburgh; IN Warrick; KY Henderson.	
5990 Owensboro, KY	4.7
KY Daviess.	
Non-SMSA Counties	3.5
IL Edwards; IL Gallatin; IL Hamilton; IL Lawrence; IL Saline; IL Wabash; IL	
White; IN Dubois; IN Knox; IN Perry; IN Pike; IN Spencer; KY Hancock; KY	
Hopkins; KY McLean; KY Muhlenberg; KY Ohio; KY Union; KY Webster.	

**CHECK LIST OF EEO DOCUMENTATION FOR BIDDERS ON
GRANT/LOAN CONSTRUCTION (EXECUTIVE ORDER 11246 AS AMENDED)**

The low, responsive responsible bidder must forward the following items, in duplicate, to the owner no later than ten (10) days after bid opening. The owner shall have one (1) copy available for inspection by the Office of Federal Contracts Compliance (OFCC) within 14 days after the bid opening. More information can be found on the [OFCC](#) webpage.

1. Project Number. Project Location. Type of Construction.
2. Proof of registration with the Joint Reporting Commission. (See Attachment Number 7.)
3. Copy of Affirmative Action Plan of contractor. Indicate company official responsible for EEO.
4. List of current construction contracts, with dollar amount. List contracting Federal Agency, if applicable.
5. Statistics concerning company percent workforce, permanent and temporary, by sex, race, trade, handicapped, and age. 40 CFR Part 7.
6. List of employment sources for project in question. If union sources are utilized, indicate percentage of minority membership within the union crafts.
7. Anticipated employment needs for this project, by sex, race and trade, with estimate of minority participation in specific trades.
8. List of subcontractors (name, address and telephone) with dollar amount and duration of subcontract. Subcontractor contracts over \$10,000 must submit items 1- 7. The following information must be provided for all supplier contracts regardless of contract size: name of company, contact person, address, telephone number, dollar value of the contract, and a list of the materials to be supplied to the prime contractor.
9. List of any subcontract work yet to be committed with estimate of dollar amount and duration of contract.
10. Contract Price. Duration of prime contract.
11. DBE Documents - See special instructions regarding use of Minority, and Women Owned, and Small Businesses.

EMPLOYER INFORMATION REPORT EEO-1

Under the direction of the US Equal Employment Opportunity Commission, the Joint Reporting Committee is responsible for the full-length, multi-phase processing of employment statistics collected on the Employer Information Report EEO-1. This report, also termed Standard Form 100, details the sex and race/ethnic composition of an employer's work force by job category.

The Employer Information EEO-1 survey is conducted annually under the authority of Public Law 88-352, Title VII of the Civil Rights Act of 1964, as amended by the Equal Employment Opportunity Act of 1972. All employers with 15 or more employees are covered by Public Law 88-352 and are required to keep employment records as specified by Commission regulations. Based on the number of employees and federal contract activities, certain large employers are required to file an EEO-1 Report on an annual basis.

The EEO-1 Report must be filed by:

- (A) All private employers who are: (1) subject to Title VII of the Civil Rights Act of 1964 (as amended by the Equal Employment Opportunity Act of 1972) with 100 or more employees EXCLUDING State and local governments, primary and secondary school systems, institutions of higher education, Indian tribes and tax-exempt private memberships clubs other than labor organizations; OR (2) subject to Title VII who have fewer than 100 employees if the company is owned or affiliated with another company, or there is centralized ownership, control or management (such as central control of personnel policies and labor relations) so that the group legally constitutes a single enterprise and the entire enterprise employs a total of 100 or more employees.
- (B) All federal contractors (private employers), who: (1) are not exempt as provided for by 41 CFR 60-1.5, (2) have 50 or more employees, and (a) are prime contractors or first-tier subcontractors, and have a contract, subcontract, or purchase order amounting to \$50,000 or more; or (b) serve as depository of Government funds in any amount, or (c) is a financial institution which is an issuing an paying agent for U.S. Savings Bonds and Notes.

Only those establishments located in the District of Columbia and the 50 states are required to submit the EEO-1 Report. No Reports should be filed for establishments in Puerto Rico, the Virgin Islands or other American Protectorates.

When filing for the EEO-1 Report for the first time, go to the [U.S. Equal Employment Opportunity Commission](#) webpage and select "First Time Filers". Fill out the electronic questionnaire to enter your company into Joint Reporting Committee (JRC) system. Once you have completed the registration process, you will be contacted on how to proceed with the EEO-1 Report. If you have previously registered with the JRC, follow their instructions to update your information.

**LABOR STANDARDS PROVISIONS FOR
FEDERALLY ASSISTED CONSTRUCTION**

Labor standards provisions applicable to contracts covering federally financed and assisted construction (29 CFR 5.5, Contract Provisions and Related Matters) that apply to EPA State Revolving Fund loans are:

(a)(4)(iii) *Equal employment opportunity.* The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

(a)(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.

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

(a)(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.

(b) *Contractor Work Hours and Safety Standards Act.* The Administrator, EPA, shall cause or require the contracting officer to insert the following clauses set forth in paragraphs (b)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by §5.5(a) or §4.6 of part 4 of this title. As used in this paragraph, the terms *laborers* and *mechanics* include watchmen and guards.

(b)(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 in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(b)(2) *Violation; liability for unpaid wages; liquidated damages.* In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefore shall be liable 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 unliquidated 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 paragraph (b)(1) of this section, in the sum of \$27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) *Withholding for unpaid wages and liquidated damages.* The U.S. Environmental Protection Agency 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

contractor, 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 paragraph (b)(2) of this section.

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

(c) In addition to the clauses contained in paragraph (b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in section §5.1, the Administrator of EPA shall cause or require the contracting officer to insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Administrator of EPA shall cause or require the contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the U.S. Environmental Protection Agency and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job. (Approved by the Office of Management and Budget under OMB control numbers 1215-0140 and 1215-0017.)

CERTIFICATIONS

Debarred Firms

All prime Construction Contractors shall certify that Subcontractors have not and will not be awarded to any firm that is currently on the EPA Master List of Debarred, Suspended and Voluntarily Excluded Persons in accordance with the provisions of 40 CFR 32.500(c). Debarment action is taken against a firm for noncompliance with Federal Law.

All bidders shall complete the attached certification (Attachment Number 9) and submit to the owner with the bid proposal.

Anti-lobbying Certification

All prime Construction Contractors must certify (Attachment Number 10) that no appropriated funds were or will be expended for the purpose of lobbying the Executive or Legislative Branches of the Federal Government or Federal Agency concerning this contract (contract in excess of \$100,000). If the Contractor has made or agreed to make payment to influence any member of Congress in regard to award of this contract, a Disclosure Form must be completed and submitted to the owner with the bid proposal.

All prime Contractors must require all Subcontractors to submit the certification, which must also be submitted to the owner.

**CERTIFICATION REGARDING DEBARMENT,
SUSPENSION AND OTHER RESPONSIBILITY MATTERS**

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

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or Local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

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

Typed Name & Title of Authorized Representative

Signature of Authorized Representative

Date

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

**CERTIFICATION REGARDING LOBBYING
CERTIFICATION FOR CONTRACTS,
GRANTS, LOANS, AND COOPERATIVE AGREEMENTS**

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

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

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, 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 undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

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

Typed Name & Title of Authorized Representative

Signature of Authorized Representative

Date

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

EPA DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

EPA's Disadvantaged Business Enterprise Program rule applies to contract procurement actions funded in part by EPA assistance agreements awarded after May 27, 2008. The rule is found at Federal regulation Title 40, Part 33. Specific responsibilities are highlighted below.

Loan recipient responsibilities:

- Include in each contract with a primary contractor the following term and condition:

“The contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor shall carry out applicable requirements of 40 CFR part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract.” (*Appendix A to Part 33—Term and Condition*)
- Employ the six Good Faith Efforts during prime contractor procurement (§33.301).
- Require the prime contractor to comply with the following prime contractor requirements of Title 40 Part 33:
 - To pay its subcontractor for satisfactory performance no more than 30 days from the prime contractor's receipt of payment from the recipient (§33.302(a)).
 - To notify recipient in writing prior to any termination of a DBE subcontractor for convenience by the prime contractor (§33.302(b)).
 - To employ the six Good Faith Efforts described in §33.301 if soliciting a replacement subcontractor after a DBE subcontractor fails to complete work under the subcontract for any reason (§33.302(c)).
 - To employ the six Good Faith Efforts described in §33.301 even if the prime contractor has achieved its fair share objectives under subpart D of Part 33 (§33.302(d)).
 - To provide EPA Form 6100-2 – *DBE Program Subcontractor Participation Form* to all DBE subcontractors (§33.302(e)). **NOTE: this requirement has been suspended.**
 - To submit EPA Forms 6100-3 – *DBE Program Subcontractor Performance Form* and 6100-4 *DBE Program Subcontractor Utilization Form* as part of the bid package or proposal (§33.302(f) and (g)). **NOTE: this requirement has been suspended.**
 - To employ the six Good Faith Efforts steps in paragraphs (a) through (f) of §33.301 while procuring any subcontracts (§33.302(i)).
- Conduct an Availability Analysis and negotiate fair share objectives with EPA (§33.401), or adopt the fair share objectives of the oversight state agency revolving loan fund for comparable infrastructure (§33.405(b)(3)).
- Maintain all records documenting its compliance with the requirements of Title 40 Part 33, including documentation of its, and its prime contractors', good faith efforts (§33.501(a)).

- Create and maintain a bidders list and require the prime contractor to create and maintain a bidders list (§33.501(b)). This list must include all firms that bid or quote on prime contracts, or bid or quote subcontracts, including both MBE/WBEs and non-MBE/WBEs. This list must be kept until the project period for the identified loan has ended. The following information must be obtained from all prime and subcontractors:
 - (a) Entity's name with point of contact,
 - (b) Entity's mailing address, telephone number, and email address,
 - (c) The procurement on which the entity bid or quoted, and when, and,
 - (d) Entity's status as an MBE/WBE or non-MBE/WBE.

Prime Contractor Responsibilities:

- Include in each contract with a subcontractor the following term and condition:

“The contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor shall carry out applicable requirements of 40 CFR part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract.” (*Appendix A to Part 33—Term and Condition*)
- Employ the six Good Faith Efforts during subcontractor procurement (§33.301).
- Pay subcontractors for satisfactory performance no more than 30 days from receipt of payment from the recipient (§33.302(a)).
- Notify recipient in writing prior to termination of a DBE subcontractor for convenience (§33.302(b)).
- Employ the six Good Faith Efforts described in §33.301 if soliciting a replacement subcontractor after a DBE subcontractor fails to complete work under the subcontract for any reason. (§33.302(c)).
- Employ the six Good Faith Efforts described in §33.301 even if the fair share objectives have been achieved under subpart D of Part 33 (§33.302(d)).
- Provide EPA Forms 6100-2 – *DBE Program Subcontractor Participation Form* and 6100-3 – *DBE Program Subcontractor Performance Form* to each DBE subcontractor prior to opening of the subcontractor's bid or proposal (§33.302(e) and (f)). **NOTE: this requirement has been suspended.**
- Complete EPA Form 6100-4 – *DBE Program Subcontractor Utilization Form* (§33.302(g)). **NOTE: this requirement has been suspended.**
- Submit to recipient with the bid package or proposal the completed EPA Form 6100-4, plus an EPA Form 6100-3 for each DBE subcontractor used in the bid or proposal (§33.302(f) and (g)). **NOTE: this requirement has been suspended.**
- Maintain all records documenting its compliance with the requirements of Title 40 Part 33, including documentation of its, and its subcontractors', good faith efforts (§33.501(a)).
- Create and maintain a bidders list and require the subcontractor to create and maintain a bidders list (§33.501(b)). This list must include all firms that bid or quote on subcontracts, including both

MBE/WBEs and non-MBE/WBEs. This list must be kept until the project period for the identified loan has ended. The following information must be obtained from all subcontractors:

- (a) Entity's name with point of contact,
- (b) Entity's mailing address, telephone number, and email address,
- (c) The procurement on which the entity bid or quoted, and when, and,
- (d) Entity's status as an MBE/WBE or non-MBE/WBE.

Subcontractor Responsibilities:

- May submit EPA Form 6100-2 – *DBE Program Subcontractor Participation Form* directly to DOW Project Manager (§33.302(e)). **NOTE: this requirement has been suspended.**
- Must complete EPA Form 6100-3 – *DBE Program Subcontractor Performance Form* and submit it to the prime contractor soliciting services prior to the prime contractor opening bids or quotes. **NOTE: this requirement has been suspended.**

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION POLICY

PROJECT NAME: _____ **BID DATE:** _____

1. Name, address and telephone number of contact person on all DBE matters:

Prime Contractor's Name: _____
Contact Person: _____
Address: _____
Phone: _____
Cell Phone: _____
Email: _____
Total Contract Amount: _____

2. Total dollar amount/percent of contract of MBE participation: _____

3. Total dollar amount/percent of contract of WBE participation: _____

4. Are certifications* for each MBE/WBE/DBE subcontractor enclosed; if no, please explain: Yes No _____

5. Are MBE/WBE/DBE subcontracts or letters of intent signed by both parties enclosed; if no, please explain: Yes No _____

6. List of MBE Subcontractors:

Name: _____
Contact Person: _____
Address: _____
Phone: _____
Cell Phone: _____
Email: _____
Type of Contract: _____
Work to be Done: _____
Amount: _____

7. List of WBE Subcontractors:

Name: _____
Contact Person: _____
Address: _____
Phone: _____
Cell Phone: _____
Email: _____
Type of Contract: _____
Work to be Done: _____
Amount: _____

Attach Additional Sheets, If Necessary

*Self-certification: Self certification of MBE/WBE/DBE firms will NOT be accepted as a valid form of certification of MBE/WBE/DBE status.

8. Information and documentation concerning efforts taken to comply with EPA’s “six good faith efforts”

(i). Ensure DBE construction firms or material suppliers are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities; including placing DBEs on solicitation lists and soliciting them whenever they are potential sources. A good source for a list of DBEs is the Kentucky Transportation’s [Certified DBE Directory](#) webpage.

The prime contractor certifies that a solicitation list of qualified DBE vendors was developed for current and future solicitations. *Submit a copy of the list as documentation.*

(ii). Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process; including, whenever possible, posting solicitation for bids or proposals for a sufficient amount of time as to receive a competitive bid or proposal pool.

The prime contractor certifies that every opportunity was provided to a number of DBEs to encourage their participation in the competitive process and that an adequate amount of time was provided for response. Must do at least one of the below.

a. List each DBE construction firm or material supplier to which a solicitation was attempted. *Submit copies of letters, emails, faxes, telecommunication logs, certified mail receipts, returned envelopes, certified mail return receipts, etc. as documentation.*

Company name and phone number: _____

Area of work expertise: _____

Date of any follow-ups and person spoke to: _____

b. Advertisements, if applicable: List each publication in which an announcement or notification was placed. *Submit original advertisement or a copy of the advertisement with an affidavit of publication for each announcement as documentation.*

Name of publication: _____

Date(s) of advertisement: _____

Specific subcontract areas announced: _____

c. Other, if applicable: List each notification method in which an announcement or outreach was used; list serve, public meeting, etc. *Submit applicable information to document effort.*

Method of notification: _____

Date(s) of notification: _____

(iii). Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs; including dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.

The prime contractor certifies that the project was broken into its basic elements (i.e., dirt hauling, landscaping, painting, pipe installation, material supplies, etc.) and that a determination was made whether it’s economically feasible to bid the elements separately and that the analysis of this effort was documented with a short memo to the project file.

- (iv). Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority business, and women’s business enterprises.
 - The prime contractor certifies that they established delivery schedules which would allow DBEs to participate in the project and the effort was documented with a short memo to the project file.

- (v). Use the services and assistance of the Small Business Administration (SBA). The easiest way to utilize their services is to visit the [SBA](#) webpage and use the electronic tools available there or you may send the nearest SBA office a certified letter that generally describes the solicitation, the dates it will be open, the types of vendors you are seeking and applicable Standard Industrial Classification (SIC) or North American Industry Classification System (NAIC) codes if known. Or, you may use the services and assistance of the Kentucky Procurement Technical Assistance Center (PTAC) **and** the Kentucky Department of Transportation (KDOT). The easiest way to utilize the services of Kentucky PTAC and KDOT is to send an email to kyptacinfo@kstc.com and Melvin.Bynes2@ky.gov and generally describe the solicitation, the dates it will be open, the types of vendors you are seeking and applicable SIC or NAIC codes if known.
 - The prime contractor certifies that the assistance of the SBA or PTAC **and** KDOT was utilized. *Submit pages printed off the SBA websites which evidence efforts to register a solicitation on the site or submit copies of the letter sent and certified mail receipt as documentation; or submit copies of emails sent to PTAC and DOT as documentation.*

- (vi). If a Prime contractor awards any subcontracts, require the subcontractor to take the steps in numbers (i) through (v) above.
 - The prime contractor certifies that subcontractors used for this project will be required to follow the steps of the “six good faith efforts” as listed above.

9. Signature and date:

To the best of my knowledge and belief, all “six good faith efforts” have been met and the information contained in this document is true and correct; the document has been duly authorized by the legal representative.

Signature

Print name and title

Date

BONDS AND INSURANCE

The minimum requirements shall be as follows:

Bonding requirements for contracts of \$100,000 or less are contained in 40 CFR 31.36(h).

Bond requirements for contracts in excess of \$100,000 are:

- Bid guarantee equivalent to five percent of the bid price. The bid guarantee shall consist of a firm commitment such as a certified check or bid bond submitted with the bid;
- Performance bond equal to 100 percent of the contract price, and
- Payment bond equal to 100 percent of the contract price. Bonds must be obtained from companies holding Certificates of Authority as acceptable sureties, issued by the U.S. Treasury.

Insurance requirements are contained in the General Conditions of the contract. In addition to the other required insurance, the owner or the contractor, as appropriate, must acquire any flood insurance made available by the Federal Emergency Management Agency as required by 44 CFR Parts 59-79, if construction will take place in a flood hazard area identified by the Federal Emergency Management Agency. The owner's requirements on Flood Insurance are contained in the Special Conditions Section of the Contracts Documents.

STORM WATER GENERAL PERMIT

All construction projects with surface disturbance of more than 1 acre during the period of construction must have a KPDES Storm Water General Permit. The permit can be found at this [webpage](#).

If you have any questions regarding the completion of this form call the Surface Water Permits Branch, at (502) 564-3410.

DAVIS-BACON WAGE RATE REQUIREMENTS

CWSRF: The recipient agrees to include in all agreements to provide assistance for the construction of treatment works carried out in whole or in part with such assistance made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.), or with such assistance made available under section 205(m) of that Act (33 U.S.C. 1285(m)), or both, a term and condition requiring compliance with the requirements of section 513 of that Act (33 U.S.C. 1372) in all procurement contracts and sub-grants, and require that loan recipients, procurement contractors and sub-grantees include such a term and condition in subcontracts and other lower tiered transactions. All contracts and subcontracts for the construction of treatment works carried out in whole or in part with assistance made available as stated herein shall insert in full in any contract in excess of \$2,000 the contract clauses as set forth below titled “Wage Rate Requirements Under The Consolidated and Further Continuing Appropriations Act, 2013 (P.L. 113-6)”. This term and condition applies to all agreements to provide assistance under the authorities referenced herein, whether in the form of a loan, bond purchase, grant, or any other vehicle to provide financing for a project, where such agreements are executed on or after October 30, 2009.

DWSRF: The recipient agrees to include in all agreements to provide assistance for any construction project carried out in whole or in part with such assistance made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12), a term and condition requiring compliance with the requirements of section 1450(e) of the Safe Drinking Water Act (42 U.S.C.300j-9(e)) in all procurement contracts and sub-grants, and require that loan recipients, procurement contractors and sub-grantees include such a term and condition in subcontracts and other lower tiered transactions. All contracts and subcontracts for any construction project carried out in whole or in part with assistance made available as stated herein shall insert in full in any contract in excess of \$2,000 the contract clauses as set forth below entitled “Wage Rate Requirements Under The Consolidated and Further Continuing Appropriations Act, 2013 (P.L. 113-6)”. This term and condition applies to all agreements to provide assistance under the authorities referenced herein, whether in the form of a loan, bond purchase, grant, or any other vehicle to provide financing for a project, where such agreements are executed on or after October 30, 2009.

Wage Rate Requirements under the Consolidated and Further Continuing Appropriations Act, 2013 (P.L. 113-6)

Preamble

With respect to the Clean Water and Safe Drinking Water State Revolving Funds, EPA provides capitalization grants to each State which in turn provides subgrants or loans to eligible entities within the State. Typically, the subrecipients are municipal or other local governmental entities that manage the funds. For these types of recipients, the provisions set forth under Roman Numeral I, below, shall apply. Although EPA and the State remain responsible for ensuring subrecipients’ compliance with the wage rate requirements set forth herein, those subrecipients shall have the primary responsibility to maintain payroll records as described in Section 3(ii)(A), below and for compliance as described in Section I-5.

Occasionally, the subrecipient may be a private for profit or not for profit entity. For these types of recipients, the provisions set forth in Roman Numeral II, below, shall apply. Although EPA and the State remain responsible for ensuring subrecipients’ compliance with the wage rate requirements set forth herein, those subrecipients shall have the primary responsibility to maintain payroll records as described in Section II-3(ii)(A), below and for compliance as described in Section II-5.

I. Requirements under the Consolidated and Further Continuing Appropriations Act, 2013 (P.L. 113-6) for Subrecipients that are Governmental Entities:

The following terms and conditions specify how recipients will assist EPA in meeting its Davis-Bacon (DB) responsibilities when DB applies to EPA awards of financial assistance under the FY 2013 Continuing Resolution with respect to State recipients and subrecipients that are governmental entities. If a subrecipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient. The recipient or subrecipient may also obtain additional guidance from [Department of Labor's](#) webpage.

1. Applicability of the Davis- Bacon (DB) prevailing wage requirements.

Under the FY 2013 Continuing Resolution, DB prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the recipient State before authorizing work on that site.

2. Obtaining Wage Determinations.

(a) Subrecipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a provision requiring that subcontractors follow the wage determination incorporated into the prime contract.

(i) While the solicitation remains open, the subrecipient shall monitor the [General Services Administration](#) website weekly to ensure that the wage determination contained in the solicitation remains current. The subrecipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the subrecipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the subrecipient.

(ii) If the subrecipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the subrecipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The subrecipient shall monitor the [General Services Administration](#) website on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(b) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subrecipient shall insert the appropriate DOL wage determination from the [General Services Administration](#) website into the ordering instrument.

(c) Subrecipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a subrecipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the subrecipient has failed to incorporate a wage determination or has used a wage

determination that clearly does not apply to the contract or ordering instrument. If this occurs, the subrecipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The subrecipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

3. Contract and Subcontract provisions.

(a) The Recipient shall insure that the subrecipient(s) shall insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project under the DWSRF financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or the FY 2013 Continuing Resolution, the following clauses:

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less 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 § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Subrecipients may obtain wage determinations from the U.S. Department of Labor's [General Services Administration](#) website.

(ii)(A) The subrecipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

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

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

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

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the subrecipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the subrecipient (s) to the State award official. The State award official will transmit the request, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

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

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

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

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

(2) Withholding. The subrecipient(s), shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

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

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

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

(1) That the payroll for the payroll period contains the information required to be provided under §5.5(a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5(a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer 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 Regulations, 29 CFR part 3;

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

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

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

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State 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 classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

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

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

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

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

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

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

(10) Certification of eligibility.

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

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

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

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

(a) Contract Work Hours and Safety Standards Act. The subrecipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

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

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

(3) Withholding for unpaid wages and liquidated damages. The subrecipient, upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall 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 contractor, 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 paragraph (b)(2) of this section.

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

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

5. Compliance Verification.

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

(b) The subrecipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. Subrecipients must conduct more frequent interviews if the initial interviews or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

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

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

(e) Subrecipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour [District Office](#).

II. Requirements under the Consolidated and Further Continuing Appropriations Act, 2013 (P.L. 113-6) for Subrecipients that are not Governmental Agencies

The following terms and conditions specify how recipients will assist EPA in meeting its DB responsibilities when DB applies to EPA awards of financial assistance under the FY2013 Continuing Resolution with respect to subrecipients that are not governmental entities. If a subrecipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient for guidance. The recipient or subrecipient may also obtain additional guidance from [DOL's](#) webpage.

Under these terms and conditions, the subrecipient must submit its proposed DB wage determinations to the State recipient for approval prior to including the wage determination in any solicitation, contract task orders, work assignments, or similar instruments to existing contractors.

1. Applicability of the Davis- Bacon (DB) prevailing wage requirements.

Under the FY 2013 Continuing Resolution, Davis-Bacon prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the recipient State before authorizing work on that site.

2. Obtaining Wage Determinations.

(a) Subrecipients must obtain proposed wage determinations for specific localities from the U.S. Department of Labor's [General Services Administration](#) website. After the Subrecipient obtains its proposed wage determination, it must submit the wage determination to (insert contact information for State recipient DB point of contact for wage determination) for approval prior to inserting the wage determination into a solicitation, contract or issuing task orders, work assignments or similar instruments to existing contractors (ordering instruments unless subsequently directed otherwise by the State recipient Award Official).

(b) Subrecipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a provision requiring that subcontractors follow the wage determination incorporated into the prime contract.

(i) While the solicitation remains open, the subrecipient shall monitor the U.S. Department of Labor's [General Services Administration](#) website on a weekly basis to ensure that the wage determination contained in the solicitation remains current. The subrecipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the subrecipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the subrecipient.

(ii) If the subrecipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the subrecipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The subrecipient shall monitor the U.S. Department of Labor's [General Services Administration](#) website on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(c) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subrecipient shall insert the appropriate DOL wage determination from the U.S. Department of Labor's [General Services Administration](#) website into the ordering instrument.

(c) Subrecipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a subrecipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the subrecipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the subrecipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract

or ordering instrument by change order. The subrecipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

3. Contract and Subcontract provisions.

(a) The Recipient shall insure that the subrecipient(s) shall insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project under the DWSRF financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or the FY 2013 Continuing Resolution, the following clauses:

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less 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 § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Subrecipients may obtain wage determinations from the U.S. Department of Labor's [General Services Administration](#) website.

(ii)(A) The subrecipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

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

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

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

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the subrecipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the subrecipient(s) to the State award official. The State award official will transmit the report, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

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

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

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

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

(2) Withholding. The subrecipient(s) shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

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

site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

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

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

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5(a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5(a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer 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 Regulations, 29 CFR part 3;

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

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

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

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State 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 classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

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

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

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

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

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

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

(10) Certification of eligibility.

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

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

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

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

(a) Contract Work Hours and Safety Standards Act. The subrecipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act.

These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

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

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

(3) Withholding for unpaid wages and liquidated damages. The subrecipient shall upon the request of the EPA Award Official or 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 contractor, 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 paragraph (a)(2) of this section.

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

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

5. Compliance Verification.

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

(b) The subrecipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. Subrecipients must conduct more frequent interviews if the initial interviews or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

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

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

(e) Subrecipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour [District Office](#) or its successor site.

AMERICAN IRON AND STEEL REQUIREMENT

The Contractor acknowledges to and for the benefit of the _____ (“Purchaser”) and the State of Kentucky (the “State”) that it understands the goods and services under this Agreement are being funded with monies made available by the Clean Water State Revolving Fund and/or Drinking Water State Revolving Fund that have statutory requirements commonly known as “American Iron and Steel;” that requires all of the iron and steel products used in the project to be produced in the United States (“American Iron and Steel Requirement”) including iron and steel products provided by the Contactor pursuant to this Agreement.

The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Purchaser or the State. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney’s fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser).

While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.

Sample Certification

The following information is provided as a sample letter of step certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name
Company Address
City, State Zip

Subject: American Iron and Steel Step Certification for Project (XXXXXXXXXX)

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. XXXX
2. XXXX
3. XXXX

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

EMPLOYMENT REQUIREMENTS AND WAGE RATES

R-1. GENERAL. The successful bidder will be required to conform to all provisions of the federal Davis-Bacon and Related Acts (The Act) which requires that all laborers and mechanics employed by contractors and subcontractors performing on federal contracts (and contractors and subcontractors performing on federally assisted contracts under the related ACTS) in excess of \$2,000 pay their laborers and mechanics not less than the prevailing wage rates and fringe benefits, as determined by the Department of Labor, for corresponding classes of laborers and mechanics employed on similar projects in the area.

This Contract shall be based upon payment by the Contractor and his Subcontractors of wage rates not less than the prevailing hourly wage rate for each craft or type of workman engaged on the Work as determined by the Department of Labor.

The Contractor and each Subcontractor shall keep accurate records indicating the hours worked each day by each employee in each classification of work and the amount paid each employee for his work in each classification. Such records shall be open to the inspection and transcript of the Commissioner of Labor or his duly authorized representatives at any reasonable time. These payroll records shall not be destroyed or removed from the state for one year following completion of the improvement.

The Contractor and each Subcontractor shall post and keep posted in a conspicuous place or places at the construction site a copy or copies of prevailing rates of wages and working hours as prescribed in these Contract Documents.

If, during the life of this Contract, the prevailing hourly rate of wages is changed by the Department of Labor, such change shall not be the basis of any claim by the Contractor against the Owner, nor will deductions be made by the Owner against sums due the Contractor by reason of any such change.

The prevailing wage law does not prohibit payment of more than the prevailing rate of wages.

R-2. PREVAILING WAGES.

The Contractor shall note that where a contract is not awarded within 90 days from the date of establishment of the prevailing wages, there shall be a redetermination of the prevailing rate of wage before the contract is awarded.

Davis Bacon wages can be obtained from the Wage Determinations Online website. Use this link to find the Davis Bacon wages:

<https://beta.sam.gov/search?index=wd&keywords=&sort=-modifiedDate&wdType=dbra&page=1> .

"General Decision Number: KY20200065 10/30/2020

Superseded General Decision Number: KY20190065

State: Kentucky

Construction Type: Heavy

County: Campbell County in Kentucky.

HEAVY CONSTRUCTION PROJECTS (including sewer/water construction).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 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 \$10.80 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 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). 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	01/03/2020
1	08/14/2020
2	08/28/2020
3	09/25/2020
4	10/23/2020
5	10/30/2020

* ASBE0008-007 03/01/2020

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR.....	\$ 30.07	18.75

ELEC0369-008 05/28/2019

	Rates	Fringes
ELECTRICIAN.....	\$ 32.44	17.22

ENGI0018-016 05/01/2019

	Rates	Fringes
POWER EQUIPMENT OPERATOR (Backhoe/Excavator/Trackhoe).....	\$ 37.39	14.95

ENGI0181-016 07/01/2020

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
GROUP 1.....	\$ 35.14	17.25
OPERATING ENGINEER CLASSIFICATIONS		
GROUP 1 - Crane; Forklift		
<p>Operators on cranes with boom 150 feet and over, including jib, shall receive \$0.75 above Group 1. All cranes with piling leads will receive \$0.50 above Group 1 rate regardless of boom length. Combination rate shall mean \$0.50 per hour above the basic hourly rate of pay.</p> <p>Employees assigned to work below ground level are to be paid 10% above basic wage rate. This does not apply to open cut work.</p>		

ENGI0181-019 07/01/2020

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
GROUP 1.....	\$ 33.95	17.25
GROUP 2.....	\$ 31.09	17.25
GROUP 3.....	\$ 31.54	17.25
GROUP 4.....	\$ 30.77	17.25
OPERATING ENGINEER CLASSIFICATIONS		
GROUP 1 - Drill; Pumpcrete; Roller (Bituminous)		
GROUP 2 - Bobcat/Skid Steer/Skid Loader; Concrete Pump;		

Roller (Rock)

GROUP 3 - Articulating Truck Operator

GROUP 4 - Pump; Roller (Earth)

Operators on cranes with booms 150 feet and over (including jib) shall receive \$1.00 above Group 1 rate; 250 feet and over including jib shall receive \$1.50 above Class 1 rate. Combination Rate: All crane operators operating cranes, where the length of the boom in combination with the length of the piling leads equal or exceeds 150 feet, shall receive \$1.00 above the Group 1 rate.

Employees assigned to work below ground level are to be paid 10% above basic wage rate. This does not apply to open cut work.

IRON0044-005 06/01/2020

	Rates	Fringes
IRONWORKER (STRUCTURAL AND REINFORCING)	\$ 30.47	21.20

IRON0070-011 06/01/2020

	Rates	Fringes
IRONWORKER, ORNAMENTAL.....	\$ 30.42	23.15

LABO0189-016 07/01/2020

Rates Fringes

LABORER

Concrete Worker & Grade Checker.....	\$ 23.26	15.62
Tamper (Hand Held/Walk Behind).....	\$ 23.51	15.62

LABO0265-005 05/01/2015

Rates Fringes

LABORER

Concrete Saw (Hand Held/Walk Behind) & Pipelayer.....	\$ 28.89	9.85
Flagger & Landscape.....	\$ 28.72	9.85

SUKY2011-021 06/25/2014

Rates Fringes

CARPENTER (Form Work Only).....	\$ 24.80	8.76
LABORER: Common or General.....	\$ 22.24	9.63
LABORER: Concrete Finishing.....	\$ 25.75	8.60
OPERATOR: Bulldozer.....	\$ 28.04	13.00
OPERATOR: Loader.....	\$ 26.68	13.00
OPERATOR: Mechanic.....	\$ 28.60	11.83
OPERATOR: Oiler.....	\$ 24.34	13.00

OPERATOR: Trencher.....\$ 26.27 12.37

TRUCK DRIVER: Dump Truck.....\$ 17.82 3.26

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

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.

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END OF GENERAL DECISION"



NOTICE OF AWARD

Fort Thomas Water Treatment Plant Basin Improvements – Phase 2

To: Contractor Name
Street Address
City, State, Zip

Description of Work: The proposed work is generally described, but not limited to the following: demolish existing mixer in Rapid Mix No. 2 and install new mixer; demolish existing horizontal flocculators and associated concrete columns and redwood baffles in Basins 1 & 4 and install new vertical hyperbolic flocculators, concrete columns, and fiberglass baffles; install new bridges/walkways in Basins 1 & 4 to support new flocculators and to provide access to new flocculators; demolish existing clarifier mechanisms and drives in Basins 1 & 4 and install new clarifier mechanisms and drives; remove, refurbish, and re-install existing clarifier bridges/walkways in Basins 1 & 4; demolish existing tube settlers in Basins 1, 2, 3 & 4 and install new inclined plate settlers; demolish existing 8-inch sludge valves and electric actuators in Basins 1 & 4 and install new 8-inch sludge valves and electric actuators; complete concrete repairs in Basins 1 & 4; demolish and replace existing sodium hypochlorite metering pump discharge piping; remove and replace damaged floor coating under sodium hypochlorite metering pump discharge pipe rack; and complete associated electrical, mechanical, and structural work, together with all related work as specified and shown on the Drawings.

The Owner represented by the undersigned has considered the Bid submitted by you on _____ for the above described work in response to its Invitation to Bid and Instructions to Bidders.

It appearing that it is to the best interest of said Owner to accept your Bid in the amount of in words _____ (\$ _____ in figures), you are hereby notified that your Bid has been accepted for the above referenced project. You are required by the Notice and Instructions to Bidders to execute the formal Agreement with the undersigned Owner and to furnish the required Contractor's Performance and Payment Bond and proper Insurance Certificate within fifteen (15) days from the date of delivery of this Notice to you. **You are required to return an acknowledged copy of this Notice of Award and all copies of the signed Agreement (leave dates blank) to the Owner for execution.**

If you fail to execute said Agreement and to furnish said bonds and certificates within 15 days from the date of delivery of this Notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your Bid as abandoned and as a forfeiture of your Bid Security. The Owner will be entitled to such other rights as may be granted by law and to award the work covered by your Bid to another, or to re-advertise the work or otherwise dispose thereof as the Owner may see fit.

Dated this _____ day of _____, 2021.

Owner
Northern Kentucky Water District

By: _____
Amy Kramer, V.P. of Engineering, Production, & Distribution

2835 Crescent Springs Rd. PO Box 18640 Erlanger, KY 41018 (859) 578-9898 Fax (859) 578-7893
4789 005100-1

ACCEPTANCE OF NOTICE

Receipt of the above Notice of
Award is hereby acknowledged this
_____ day of _____, 2021.

_____ (contractor name)

By: _____

Title: _____



NOTICE TO PROCEED

Fort Thomas Water Treatment Plant Basin Improvements – Phase 2

To: Contractor Name
Address
City, State Zip
Attention:

Date: _____, 2021

Description of Work: The proposed work is generally described, but not limited to the following: demolish existing mixer in Rapid Mix No. 2 and install new mixer; demolish existing horizontal flocculators and associated concrete columns and redwood baffles in Basins 1 & 4 and install new vertical hyperbolic flocculators, concrete columns, and fiberglass baffles; install new bridges/walkways in Basins 1 & 4 to support new flocculators and to provide access to new flocculators; demolish existing clarifier mechanisms and drives in Basins 1 & 4 and install new clarifier mechanisms and drives; remove, refurbish, and re-install existing clarifier bridges/walkways in Basins 1 & 4; demolish existing tube settlers in Basins 1, 2, 3 & 4 and install new inclined plate settlers; demolish existing 8-inch sludge valves and electric actuators in Basins 1 & 4 and install new 8-inch sludge valves and electric actuators; complete concrete repairs in Basins 1 & 4; demolish and replace existing sodium hypochlorite metering pump discharge piping; remove and replace damaged floor coating under sodium hypochlorite metering pump discharge pipe rack; and complete associated electrical, mechanical, and structural work, together with all related work as specified and shown on the Drawings.

You are hereby notified to commence WORK in accordance with the agreement dated _____, 2021 on or before _____, 2021. The Work will need to be substantially completed within _____ calendar days after the date when the Contract Times commence to run as provided in paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.07.B of the General Conditions within _____ calendar days after the date when the Contract Times commence to run. Therefore, the date of Substantial Completion is _____, 202_, and the date of Final Completion is _____, 202_.

OWNER

Northern Kentucky Water District

By: _____
Amy Kramer

2835 Crescent Springs Road P.O. Box 18640 Erlanger, KY 41018 (859) 578-9898 Fax (859) 578-5456



V.P. Eng, Production & Distribution
ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO
PROCEED is hereby acknowledged
this the _____ day of
_____, 2021.

By: _____

Title

2835 Crescent Springs Road P.O. Box 18640 Erlanger, KY 41018 (859) 578-9898 Fax (859) 578-5456

4789

005500-2



APPLICATION FOR PAYMENT

Project No: _____
Project: _____

Application for Payment No.: _____
Period Beginning Date: _____
Period Ending Date: _____

Owner: _____

General Contractor: _____

CONTRACTOR AFFIDAVIT

The undersigned affiant states that he/she is the Authorized Signatory of the CONTRACTOR for the construction of the PROJECT. By his personal knowledge, he further states that the WORK covered by this APPLICATION FOR PAYMENT has been completed in accordance with the CONTRACT DOCUMENTS and executed amendments thereto; that for all previous APPLICATIONS FOR PAYMENT, except as noted hereinafter as exceptions, the CONTRACTOR has paid in full or has otherwise satisfied all obligations (1) for equipment and materials (whether incorporated into the WORK or acceptably stored on-site), (2) for all work, labor, and services performed, and (3) for all known indebtedness and claims against the CONTRACTOR for damages arising in any manner in connection with the performance of this CONTRACT for which the OWNER, the OWNER's property, or the CONTRACT funds might in any way be held responsible, including the applicable State Statute, and that the current payment on this APPLICATION FOR PAYMENT is now due and payable. This affidavit is directed to the OWNER by and through its ENGINEER.

EXCEPTIONS: _____ (If none, write "NONE". Attach additional sheets, if necessary.)
If required by the OWNER, the CONTRACTOR shall furnish a bond satisfactory to the OWNER for each exception)

CONTRACTOR

DATE

State of: _____

County of: _____

SUBSCRIBED and sworn to before me by _____ on this _____ day of _____, 20____.

My Commission expires: _____

NOTARY PUBLIC

STATEMENT BY ENGINEER

BASED upon on-site observation, and to the best of my knowledge, understanding, and belief, the WORK has progressed to the point indicated herein; and the quality of the WORK complies with the requirements of the CONTRACT DOCUMENTS.

ENGINEER

DATE

APPLICATION FOR PAYMENT SUMMARY

TOTAL WORK COMPLETED TO DATE	\$0.00	ORIGINAL CONTRACT PRICE	\$0.00
BALANCE OF STORED MATERIALS	0.00	CHANGE ORDER NO 1	
TOTAL ENTITLEMENT TO DATE	\$0.00	CHANGE ORDER NO 2	
AMOUNT RETAINED PER CONTRACT (10%)	0.00	CHANGE ORDER NO 3	
CLAIMS AGAINST THE CONTRACT FUNDS	0.00	CHANGE ORDER NO 4	
TOTAL DUE CONTRACTOR TO DATE	\$0.00	CHANGE ORDER NO 5	
AMOUNT OF PREVIOUS PAYMENTS		TOTAL CONTRACT PRICE TO DATE	\$0.00

AMOUNT DUE CONTRACTOR THIS PAYMENT \$0.00

Percent Complete (Excluding Stored Materials)

AUTHORIZATION BY OWNER

OWNER

DATE

Attachments: Cost Breakdown
Stored Material Breakdown (if applicable)



Change Order

GRW ENGINEERS, INC.

801 CORPORATE DRIVE

LEXINGTON, KENTUCKY 40503

Date:
Project:

Change Order No.:
Project No.:

Owner:

Contractor:

The Contractor is hereby directed to perform the **Work** described in the **Contract For Construction** as amended by the **Change Order**:

ADD

Attachments:	TOTAL:	\$0.00
--------------	---------------	---------------

Original Contract Amount.....	\$0.00
Net Change by Previous Change Orders.....	0.00
Contractor Amount Prior to This Change Order.....	0.00
Amount of This Change Order.....	0.00
New Contract Amount.....	\$0.00

The Substantial Completion Date:

This **Change Order** is intended to, and the **Contractor** agrees that it does, fairly and adequately compensate the **Contractor** for extra direct costs (labor, materials, etc.) as well as all expenses and damages which may result from any delays, suspensions, stretch-outs, scheduling, inefficiencies, and accelerations in the **Work** associated with this Change Order, and the Contractor releases the Owner and the Engineer from any claims for such expenses and damages, including but not limited to changes in sequence of work; delays; disruption; rescheduling; extended overhead; acceleration; wage; material; or other escalations; and all other impact costs.

This **Change Order** is intended to, and the **Contractor** agrees that it does, provide the **Contractor** a reasonable and adequate period of time in which to complete the **Work** in accordance with the **Contract For Construction**, as amended by this Change Order, and the Contractor releases the Owner and the Engineer from any claims for additional time to perform the **Work**.

All **Change Orders** to this **Contract For Construction**, if required, must be negotiated pursuant to 40 CFR 31.36(f)(1) and/or with DOW/KIA Procurement Guidance for Construction and Equipment Contracts.

OWNER	DATE	CONTRACTOR	DATE
-------	------	------------	------

cc:

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project:	Contract Name:

This [preliminary] [final] Certificate of Substantial Completion applies to:

All Work The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.]*

Amendments to Owner's responsibilities: None
 As follows

Amendments to Contractor's responsibilities: None
 As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

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

EXECUTED BY ENGINEER:		RECEIVED:		RECEIVED:	
By: _____	By: _____	By: _____	By: _____	By: _____	By: _____
(Authorized signature)	Owner (Authorized Signature)	Contractor	(Authorized		
Title: _____	Title: _____	Title: _____	Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____	Date: _____	Date: _____	Date: _____

**GRW SUPPLEMENTAL GENERAL
CONDITIONS TO EJCDC GENERAL
CONDITIONS**

GRW SUPPLEMENTAL GENERAL CONDITIONS TO EJCDC GENERAL CONDITIONS

These Supplemental General Conditions amend or supplement the General Conditions of the Construction Contract and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplemental General Conditions which are defined in the Standard General Conditions of the Construction Contract have the meanings assigned to them in the General Conditions.

SGC-3.01

Add the following new paragraph immediately after Paragraph 3.01C:

If there is any conflict between the provisions of the Contract Documents and any referenced provisions within the Contract Specifications, the language of the Contract Documents will take precedence over that of any standard specification, manual, or code.

SGC-4.04

Add the following new paragraphs immediately after Paragraph 4.04 B.2:

Special precautions shall be taken by the Contractor to avoid damage to existing overhead and underground utilities owned and operated by the Owner or by public or private utility companies.

The available information concerning the location of existing underground utilities is shown on the Drawings. While it is believed that the locations shown are reasonably correct, neither the Engineer nor the Owner can guarantee the accuracy or adequacy of this information.

Before proceeding with the work, the Contractor shall confer with all public or private companies, agencies or departments that own and operate utilities in the vicinity of the construction work. The purpose of the conference, or conferences, shall be to notify said companies, agencies or departments of the proposed construction schedule, verify the location of, and possible interference with, the existing utilities that are shown on the Drawings, arrange for necessary suspension of service, and make arrangements to locate and avoid interference with all utilities (including house connections) that are not shown on the Drawings. The Engineer and Owner have no objection to the Contractor arranging for the said utility companies, agencies, or departments to locate and uncover their own utilities; however, the Contractor shall bear the entire responsibility and cost of locating and avoiding, or repairing damage to said existing utilities.

The Contractor shall locate all unknown metallic hazards, namely buried pipe, metals, etc., by using a pipe locator. The pipe locator shall immediately precede the trench ditching and all hazards located shall be marked in such manner as to notify the machine operator of such hazard.

Where existing utilities or appurtenant structures either underground or above ground, are encountered, they shall not be displaced or molested unless necessary, and in such case shall be replaced in as good or better condition than found as quickly as possible. Relocation and/or replacement of all utilities and appurtenant structures to accommodate the construction work shall be at the Contractor's expense, unless such relocation and/or replacement is by statute agreement the responsibility of the owner of the utility.

SGC-5.01

Add the following new paragraph immediately after Paragraph 5.01C:

The Performance Bond shall remain in full force and effect throughout the Guaranty period referred to in SGC 6.03. All warranties and guarantees remaining in effect at and beyond the Guaranty expiration date shall be relinquished and transferred to the Owner. Copies of such warranty/guaranty shall be submitted to the Owner prior to date of the start of the Guaranty period.

SGC-6.02

Add the following new paragraphs immediately after Paragraph 6.02A:

The Contractor shall employ workmen skilled in their various duties and shall remove from the project, at the request of the Owner, any person employed in, about, or upon the work, who misconducts himself or is incompetent or negligent in the performance of the duties assigned to him.

No person under the age of eighteen (18) years and no convict labor shall be employed to perform any work under this Contract. No person whose age or physical condition is such as to make its employment dangerous to its health or safety or to the health or safety of others shall be employed to perform any work under this Contract, provided that this shall not operate against the employment of physically handicapped persons, otherwise employable, where such persons may be safely assigned to work which they can ably perform. There shall be no discrimination because of race, creed, color or political affiliation in the employment of persons for work under this Contract.

With respect to additional skilled, semi-skilled and unskilled workers employed to perform work on the project, preference in employment shall be given first to persons who reside in the city in which the work is to be performed, and second to persons residing in the county in which the work is to be performed.

SGC-6.03

Add the following new paragraph immediately after Paragraph 6.03B:

The Contractor agrees that it will obtain from the manufacturers of equipment and materials furnished under this Contract guarantees against defective materials and workmanship, and if those guarantees furnished by the manufacturer do not extend for the term of one (1) year from and after the date upon which the final estimate of the Engineer is formally approved by the Owner or other established date as set forth herein (such as the substantial completion date), it shall make the necessary arrangements and assume all cost for extending this guarantee for the required period.

SGC-6.17

Delete Paragraph 6.17 D.3 in its entirety and insert the following in its place.

OWNER's review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called OWNER's attention to each such variation at the time of each submittal as required by paragraph 6.17.D.3 and OWNER has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample approval, or has issued a Change Order that authorizes the deviation. CONTRACTOR shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the OWNER'S approval thereof.

Add the following new paragraph immediately after Paragraph 6.17 D.3:

OWNER'S review of submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment of systems, all of which remain the responsibility of the Contractor as required by the Contract Documents.

SGC-10.03

Add the following new paragraph immediately after Paragraph 10.03:

B. A sample Change Order form is included as Section 006363.

SGC-13.06

Add a new paragraph immediately after Paragraph 13.06 of the General Conditions which is to read as follows:

When the repairs or replacements involve one or more items of installed equipment, Contractor shall provide the services of qualified factory-trained servicemen in the employ of the equipment manufacturers to perform or supervise the repairs or replacements.

SGC-13.09

Add the following new paragraph immediately after Paragraph 13.09D:

When the Owner deems it necessary, and so orders, such replacements or repairs under this section shall be undertaken by the Contractor within twenty-four (24) hours after service of notice. If the Contractor unnecessarily delays or fails to make the ordered replacements or repairs within the time specified, or if any replacements or repairs within the time specified, or if any replacements or repairs are of such nature as not to admit of the delay incident to the service of a notice, then the Owner shall have the right to make such replacements or repairs and the expense thereof shall be paid by the Contractor or deducted from any moneys due to Contractor.

SGC-14.01

Add the following to Paragraph 14.01:

The Application for Payment form shall be exactly as shown in Section 006276.

DIVISION 01
GENERAL REQUIREMENTS

SECTION 011100 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY OF WORK PERFORMED UNDER THIS CONTRACT

Demolish existing mixer in Rapid Mix No. 2 and install new mixer; demolish existing horizontal flocculators and associated concrete columns and redwood baffles in Basins 1 & 4 and install new vertical hyperbolic flocculators, concrete columns, and fiberglass baffles; install new bridges/walkways in Basins 1 & 4 to support new flocculators and to provide access to new flocculators; demolish existing clarifier mechanisms and drives in Basins 1 & 4 and install new clarifier mechanisms and drives; remove, refurbish, and re-install existing clarifier bridges/walkways in Basins 1 & 4; demolish existing tube settlers in Basins 1, 2, 3 & 4 and install new inclined plate settlers; demolish existing 8-inch sludge valves and electric actuators in Basins 1 & 4 and install new 8-inch sludge valves and electric actuators; complete concrete repairs in Basins 1 & 4; demolish and replace existing sodium hypochlorite metering pump discharge piping; remove and replace damaged floor coating under sodium hypochlorite metering pump discharge pipe rack; and complete associated electrical, mechanical, and structural work, together with all related work as specified and shown on the Drawings.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 011100

SECTION 011400 - GENERAL PROVISIONS

PART 1 - GENERAL

1.1 DESIGNATION OF PARTIES

- A. All references in the Specifications, Contract Documents and Drawings to "Owner" shall mean Northern Kentucky Water District; all references to "Engineer" shall mean GRW Engineers, Inc., 801 Corporate Drive, Lexington, Kentucky 40503.

1.2 EXPERIENCE CLAUSE

- A. Wherever experience is required of equipment manufacturers in manufacturing or in records of satisfactory operation for a specified period of time, in lieu of the experience, the manufacturer may furnish a 100 percent (100%) performance guarantee bond or a cash deposit. The bond or cash deposit provided by the manufacturer shall guarantee replacement of the equipment process in the event of failure or unsatisfactory service. The period of time for which the bond or cash deposit is required shall be the same as the experience period of time specified.

1.3 ACCESS TO INSPECTION OF WORK

- A. Representatives of the State Department of Health, the State Department for Natural Resources and Environmental Protection, local public health agencies, Owner, and Engineer shall at all times have full access to the project site for inspection of the work accomplished under this Contract and for inspection of all materials intended for use under the Contract. The Contractor shall provide proper facilities for such access and inspection.

1.4 EQUIPMENT LUBRICATION

- A. The Contractor shall make suitable provision for the proper lubrication of all equipment furnished under this Contract. Accessible grease fittings shall be provided where required. A supply of oil, grease and other lubricants of proper quality, as recommended by the manufacturer of the equipment, shall be furnished. Lubricants shall be furnished in their original, unopened containers, in sufficient quantity for initial fillings and for at least one (1) year of operation.

1.5 PRE-CONSTRUCTION CONFERENCE

- A. The Contractor, Engineer and Owner, or their duly appointed representative, shall meet in a preconstruction conference prior to the initiation of construction to organize, schedule and determine responsibilities for the work as it pertains to each party of the Contract.

1.6 CONSTRUCTION SCHEDULE CHART

- A. Prior to start of any construction, the Contractor shall furnish a construction schedule or progress chart. The schedule or chart shall be subject to the approval of the Engineer, and be of sufficient detail to show the chronological relationship of all activities of the project, the order in which the Contractor proposes to carry on the work, estimated starting and completion dates of major features, procurement of materials, and scheduling of equipment. The schedule shall be in a form suitable for appropriately indicating the percentage of work scheduled for completion at any time. The schedule shall be kept current and shall reflect completion of all work under the Contract within the specified time and in accordance with these Specifications.

1.7 CONSTRUCTION PROGRESS MEETINGS

- A. Monthly construction progress meetings shall be held at the project site or at a designated location established by the Owner. The Contractor, appropriate Sub-Contractors, the Engineer and the Owner shall meet to review construction progress, equipment or material submittals, construction schedules, etc.

1.8 PRECONSTRUCTION PHOTOGRAPHS

- A. Prior to construction and mobilization of equipment, Contractor shall take record photographs of all areas of the project site.
- B. In lieu of photographs, a videographic record may be made of the project site.

1.9 SPARE PARTS

- A. Spare parts for routine maintenance and minor repairs shall be provided for specified equipment items in the respective technical sections of these Specifications. Required spare parts to be provided are listed in the particular equipment Specifications.
- B. Parts shall be coated to protect them from a moist atmosphere. All spare parts shall be plainly tagged, marked for identification and reordering, and shall be delivered properly boxed. Required identification includes (but is not limited to):
 - 1. Name of the manufacturer or supplier of equipment.
 - 2. Name of the unit for which the part is intended.
 - 3. Name of the spare part.
 - 4. Name of the supplier of the spare part.
 - 5. Manufacturer's catalogue part number.
 - 6. Precautionary information.
 - 7. Any other identifying information deemed appropriate.
- C. All spare parts for a single equipment item shall be crated together in containers suitable for handling with hoisting equipment and designed for prolonged storage and stenciled to identify contents.

- D. Where oil or grease lubricated equipment is concerned, sufficient oil or grease of types recommended by the equipment manufacturer shall be supplied for one year's operation.
- E. The Contractor shall furnish and deliver the spare parts to the Owner at such time as he (Owner) may direct but prior to Contract expiration date. Furnish to the Engineer for record purposes a list of spare parts delivered to the Owner.

1.10 CLEANING

- A. The Contractor shall at all times keep the construction site and the surrounding area presentable to the public, and clean of rubbish caused by the Contractor's operation. At completion of the work, the Contractor shall remove all the rubbish, all tools, equipment, temporary work and surplus materials, from and about the premises, and shall leave the site clean and ready for use.
- B. After completion of all work and before final acceptance of the work, the Contractor shall thoroughly clean all equipment and materials and shall remove all foreign matter such as grease, dirt, plaster, labels, stickers, etc., from the exterior of the piping, equipment and all associated fabrication.
- C. All waste and excess materials shall be disposed of off the project site and at no additional expense to the Owner. In no case shall waste materials (any removed concrete, piping, equipment, etc.) be buried on the site. Burning is not permitted.
- D. Upon completion of the project, the Contractor is responsible for leaving the project site in as good as or better condition than the original. This includes site grading, landscaping, replacement of sidewalks, driveways, curbs, mailboxes, clotheslines, fences, etc. and removal of all construction debris.

1.11 TAXES

- A. Proposals shall be made to include any applicable taxes on payrolls, materials, equipment, vehicles, utilities, etc., including State sales taxes and shall include compensation for such taxes on all work under this Contract.

1.12 LINES AND GRADES

- A. The Engineer will set a benchmark or marks near the site and furnish the Contractor with the elevation of same. The Engineer will assist the Contractor in laying out the axes of the structures. The Contractor shall be responsible for all other lines and grades required for the construction of structures. The Contractor shall set line and grade stakes for all gravity sewers, offset from the centerline of the trench or the axes of the pipelines.
- B. The Contractor shall use a laser beam instrument to set the grades on gravity sewer lines. In using such an instrument, the Contractor shall be responsible for maintaining grades and elevations as called for on the drawing profiles, and any variances found shall be corrected by the Contractor at his expense. The Contractor shall verify invert elevation at each manhole for a check. A blower shall be used with the laser beam instrument during warm or hot weather to assure accurate line and grade for the laser beam.

- C. When water lines, process piping and other such buried pressure pipelines are involved, the Engineer will assist the Contractor in the location of these lines; however, any detailed layout requiring surveying, or excavation including that required for establishing the grade of the pipeline, shall be accomplished by the Contractor.
- D. The Contractor shall furnish all materials, stakes and grade boards that are required for layout by the Contractor's forces. In addition, the Contractor shall furnish any necessary survey personnel to mark the location of the various facilities on the ground, establishing bench levels and determining as-built conditions after work is completed. The Contractor's personnel engaged in the layout work described herein and the aides furnished to the Engineer shall be fully capable of performing the duties set out herein and shall be fully qualified as required. Contractor shall be responsible for verifying all profiles and elevations prior to construction.

1.13 BLASTING

- A. All blasting operations shall be conducted in strict accordance with the Rules and Regulations of the State Department of Mine and Minerals, Division of Explosives and Blasting, which shall be deemed to be included in these Specifications the same as though herein written in full. The Contractor shall also comply with applicable municipal ordinances, Federal Safety Regulations and Section 9 of the Manual of Accident Prevention in Construction, published by the Associated General Contractor's of America, Inc. All explosives shall be stored in conformity with said ordinances, laws and safety regulations. No blasting shall be done within five feet of any water mains, or ten feet of any gas mains except with light charges of explosives. Any damage done by blasting is the responsibility of the Contractor and shall be promptly and satisfactorily repaired by him. All blast events shall be designed in accordance with state laws. These guidelines are established to limit peak particle velocities occurring as a result of blasting to protect structures from damage due to ground motions from blast events. The peak particle velocity is the maximum velocity of particle excitation measured along any of the three orthogonal axes (longitudinal, vertical or transverse). In addition the following guidelines shall be applicable to new concrete.

<u>Age of Concrete, Days*</u>	<u>Maximum Permissible Particle Velocity, IPS**</u>
0 to 1	0.25
2	0.50
3-or more	1.00

* Concrete is defined as properly designed and placed, well-consolidated Portland Cement concrete achieving a normal increase in strength with age.

** Measured at location of concrete, by probe fixed in or on soil surface.

As an option, a scaled distance (distance from blast to concrete/-square root of charge weight) of 130 or more can be used conservatively to design blast events.

- B. Unless otherwise required by ordinance or law, each excavation crew shall be provided with two metal boxes equipped with suitable locks. One of these boxes shall be for storing explosives and one for caps. The boxes shall always be locked except when in actual use. They shall be painted a bright color and stenciled with appropriate warning signs. At night, explosives and caps shall be stored in separate magazines.

- C. If any possibility exists of rock or any other debris leaving the site during a blast event, the shot shall be covered with rope, heavy timber or rubber mats, to prevent the aforementioned.
- D. The Contractor shall keep a blasting log and, for each blast, shall record the date, time of blast, number of holes, type of explosive, number of delays, amount of charge per delay; stemming type, and number of caps; and all other items as required by State laws and regulations.
- E. All blasting shall be supervised and performed by qualified personnel and shall be monitored to ensure compliance with the particle velocity requirements. The Contractor shall submit a monitoring plan to the Engineer prior to beginning blasting activities.
- F. A pre-blast survey shall be performed by the Contractor. The pre-blast survey shall be accurate and up to date at the time of the blast event. The survey shall be a compilation of the condition, type, and general appearance of all nearby structures. It shall also include a listing of any vibration-sensitive equipment or conditions which exist at adjacent facilities. The owners and occupants of these facilities shall be notified of the intent to blast and the blasting schedule. The survey shall be conducted by a competent engineering firm or other qualified firm and sufficiently documented by photographs, video, measurements, and diagrams. The survey shall include all structures within 200' of the project or any such structure the Contractor feels may be reasonably affected by ground and/or air vibrations from blasting. Pre-blast survey results shall be submitted to the Owner upon request.
- G. Shot rock which is excavated shall be disposed of offsite by the Contractor. No rock larger than one-half cubic foot will be permitted in the backfill.

1.14 COMPLIANCE WITH SAFETY REGULATIONS

- A. The equipment items furnished shall comply with all governing federal and state laws regarding safety, including all current requirements of the Occupational Safety and Health Act (OSHA). Contractor shall be solely responsible for job safety in accordance with all laws, regulations, methods, etc. of OSHA and the state.

1.15 MAINTENANCE AND OPERATIONS MANUAL

- A. Every piece of equipment furnished and installed shall be provided with complete maintenance and operations manuals. These shall be detailed in instructions to the Owner's personnel. They shall be attractively bound for the Owner's records. See 01 33 23 and Section 01 78 23 for requirements. The manuals shall be submitted to the Engineer for review as to adequacy and completeness. Provide four copies each, unless otherwise noted.

1.16 OBSTRUCTIONS

- A. In cases where storm sewers, sanitary sewers, gas lines, water lines, telephone lines, electric lines or other underground structures are encountered, they shall not be displaced or molested unless necessary, in which case they shall be replaced in as good a condition as found and as quickly as possible.

- B. The Contractor is responsible for notifying the appropriate utility companies, and coordinating the protection of the utility. All such lines or underground structures damaged or molested in the construction shall be replaced at the Contractor's expense, unless in the opinion of the Engineer, such damage was caused through no fault of the Contractor.

1.17 STORAGE FACILITIES

- A. The Contractor shall be responsible for proper and adequate storage of all materials and equipment used on the site. Any additional off-site space required for construction purposes shall be the Contractor's responsibility to obtain.
- B. Upon completion of the work, the Contractor shall remove all storage facilities, surplus materials and equipment and restore the site to its original condition, or to the finished condition as required by the Contract.

1.18 STANDARDS OF WORKMANSHIP

- A. Work of all crafts and trades shall be laid out to lines and elevations as established by the Contractor from the Drawings or from instructions by the Engineer. Unless otherwise shown, all work shall be plumb and level, in straight lines and true planes, parallel or square to the established lines and levels. The work shall be accurately measured and fitted to tolerance as established by the best practices of the crafts and trades involved, and shall be as required to fit all parts of the work carefully and neatly together.

1.19 PERFORMANCE AND PAYMENT BONDS

- A. Performance and payment bonds, as specified in of the General Conditions, shall run for a period of one (1) year after final acceptance of the work by the Owner. These bonds shall be executed on the forms provided as a part of the Contract Documents.

1.20 INITIAL START-UP AND OPERATION

- A. The initial operation period provided for herein is to check and provide the satisfactory mechanical operation of the facilities. These requirements for start-up and operation in no way relieve the Contractor of his responsibility with respect to guaranty of work as specified in the "General Conditions." The manufacturer's representatives shall be present during this period to instruct the operators in the care, operation and maintenance of the equipment. When the shakedown period is completed, the Owner will assume responsibility for maintenance and operation, provided that all major items of the Work are operating satisfactorily.
- B. If any or all of the facilities are not operating satisfactorily at the end of the shakedown period, the Contractor shall continue to maintain those facilities that are incomplete or not operating satisfactorily until they are complete and acceptable to the Owner. Maintenance by the Contractor shall include all mechanical facilities such as pumps and like equipment. Prior to start-up, the Contractor will be required to prepare an operating schedule detailing the proposed start-up and his plans for manpower and auxiliary facilities to be provided.

1.21 GUARANTY

- A. Except as otherwise specified herein, the Contractor shall guarantee all work from latent defects in materials, equipment and workmanship for one (1) year from the date of substantial completion of the Contract as defined in Section 01 77 00 of the technical Specifications.
- B. The Contractor agrees that he will obtain from the manufacturers of equipment and materials furnished under this Contract, guarantees against defective materials and workmanship, and if those guarantees furnished by the manufacturer do not extend for the term of one (1) year from and after the date upon which the final estimate is formally approved by the Owner or other established date as set forth hereinbefore, he shall make the necessary arrangements and assume all cost for extending this guarantee for the required period.
- C. The Contractor shall promptly make such repairs or replacement as may be required under the above specified guarantee, and, when the repairs or replacements involve one or more items of installed equipment, shall provide the services of qualified factory-trained servicemen in the employ of the equipment manufacturers to perform or supervise the repairs or replacements.
- D. When the Engineer or the Owner deems it necessary, and so orders, such replacements or repairs under this section shall be undertaken by the Contractor within twenty-four (24) hours after service of notice. If the Contractor unnecessarily delays or fails to make the ordered replacements or repairs within the time specified, or if any replacements or repairs are of such nature as not to admit of the delay incident to the service of a notice, then the Owner shall have the right to make such replacements or repairs, and the expense thereof shall be paid by the Contractor or deducted from any moneys due the Contractor.
- E. The Performance Bond shall remain in full force and effect throughout the Guaranty period.
- F. All warranties and guarantees remaining in effect at and beyond the Guaranty expiration date shall be relinquished and transferred to the Owner. Copies of such warranty/guaranty shall be submitted to the Engineer prior to date of the start of the guaranty period.

1.22 TRAFFIC CONTROL AND MAINTENANCE

- A. Traffic shall be maintained on all highways and streets at all times during construction of pipe lines across or along side said highways and streets. Access to all existing subdivisions and private residences shall also be kept open. Work shall be performed in accordance with applicable City, County, and state Department of Transportation guidelines. Traffic control shall include proper signing and flagging per these guidelines.
- B. Traffic shall be maintained in accordance with the Manual on Uniform Traffic Control Devices. Work shall include all labor and materials necessary for construction and maintenance of traffic control devices and markings.
- C. Traffic control shall also include all flag persons and traffic control devices such as, but not limited to, flashers, signs, barricades and vertical panels, plastic drums (steel drums will not be permitted) and cones necessary for the control and protection of vehicular and pedestrian traffic as specified by the Manual on Uniform Traffic Control Devices.

- D. Any temporary traffic control items, devices, materials, and incidentals shall remain the property of the Contractor when no longer needed.
- E. The Contractor shall maintain a two-lane traveled way with a minimum lane width of 10 feet; however, during working hours, one-way traffic may be allowed at the discretion of the Engineer, provided adequate signing and flagpersons are at the location.
- F. The Contractor shall fully cover with plywood any signs, either existing, permanent or temporary, which do not properly apply to the current traffic phasing, and shall maintain the covering until the signs are applicable or are removed.
- G. In general, all traffic control devices shall be placed starting and proceeding in the direction of the flow of traffic and removed starting and proceeding in the direction opposite to the flow of traffic.
- H. The Engineer and Contractor shall review the signing before traffic is allowed to use lane closures, crossovers, or detours, and all signing shall be approved by the Engineer before work can be started by the Contractor.
- I. If traffic should be stopped due to construction operations and an emergency vehicle on an official emergency run arrives on the scene, the Contractor shall make provisions for the passage of that vehicle immediately.

1.23 FLOOD INSURANCE

- A. Contractor is required to carry flood insurance for projects which are located in designated flood hazard areas unless Federal Flood Insurance is not available.

1.24 UTILITY LINE ACTIVITIES COVERED UNDER NATIONWIDE PERMIT # 12

- A. All activities involving utility line construction covered under the US Army Corps of Engineers NATIONWIDE PERMIT # 12 shall meet the following conditions:
 1. Utility Line Activities. Activities required for the construction, maintenance, repair, and removal of utility lines and associated facilities in waters of the United States, provided the activity does not result in the loss of greater than 1/2-acre of waters of the United States for each single and complete project. Utility lines: This NWP authorizes the construction, maintenance, or repair of utility lines, including outfall and intake structures, and the associated excavation, backfill, or bedding for the utility lines, in all waters of the United States, provided there is no change in pre-construction contours. This NWP also authorizes temporary structures, fills, and work necessary to conduct the utility line activity.
 2. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

3. Notification: The permittee must submit a pre-construction notification to the US Army Corps district engineer prior to commencing the activity if any of the following criteria are met: (1) The activity involves mechanized land clearing in a forested wetland for the utility line right-of-way; (2) a section 10 permit is required; (3) the utility line in waters of the United States, excluding overhead lines, exceeds 500 feet; (4) the utility line is placed within a jurisdictional area (i.e., water of the United States), and it runs parallel to or along a stream bed that is within that jurisdictional area; (5) discharges that result in the loss of greater than 1/10-acre of waters of the United States; (6) permanent access roads are constructed above grade in waters of the United States for a distance of more than 500 feet; or (7) permanent access roads are constructed in waters of the United States with impervious materials.

B. All activities involving utility line construction covered under KENTUCKY GENERAL CERTIFICATION of Nationwide Permit # 12 shall meet the following conditions:

The general Water Quality Certification applies to surface waters of the Commonwealth as defined in 401KAR10:001 Chapter 10, Section 1(80): Surface waters means those waters having well-defined banks and beds, either constantly or intermittently flowing, lakes and impounded waters; marshes and wetlands; and any subterranean waters flowing in well-defined channels and having a demonstrable hydrologic connection with the surface.

1. The activity will not occur within surface waters of the Commonwealth identified by the Kentucky Division of Water as Outstanding State or National Resource Water, Cold Water Aquatic Habitat, or Exceptional Waters.
2. The activity will not occur within surface waters of the Commonwealth identified as perpetually-protected (e.g. deed restriction, conservation easement) mitigation sites.
3. This general water quality certification does not authorize the installation of utility lines in a linear manner within the stream channel or below the top of the stream bank.
4. For a single crossing, impacts from the construction and maintenance corridor in surface waters shall not exceed 50 feet of bank disturbance.
5. This general certification shall not apply to nationwide permits issued for individual crossings which are part of a larger utility line project where the total cumulative impacts from a single and complete linear project exceed ½ acre of wetlands or 300 linear feet of surface waters. Cumulative impacts include utility line crossings, permanent or temporary access roads, headwalls, associated bank stabilization areas, substations, pole or tower foundations, maintenance corridor, and staging areas.
6. Stream impacts under Conditions 4 and 5 of this certification are defined as the length of bank disturbed. For the utility line crossing and roads, only one bank length is used in calculation of the totals.
7. Stream impacts covered under this General Water Quality Certification and undertaken by those persons defined as an agricultural operation under the Agricultural Water Quality Act must be completed in compliance with the Kentucky Agricultural Water Quality Plan (KWQP).
8. The Kentucky Division of Water may require submission of a formal application for an individual certification for any project if the project has been determined to likely have a significant adverse effect upon water quality or degrade the waters of the Commonwealth so that existing uses of the water body or downstream waters are precluded.
9. Activities that do not meet the conditions of this General Water Quality Certification require an Individual Section 401 Water Quality Certification.
10. Blasting of stream channels, even under dry conditions, is not allowed under this general water quality certification.

11. Utility lines placed parallel to the stream shall be located at least 50 feet from an intermittent or perennial stream, measured from the top of the stream bank. The cabinet may allow construction within the 50 foot buffer if avoidance and minimization efforts are shown and adequate methods are utilized to prevent soil from entering the stream.
12. Utility line stream crossings shall be constructed by methods that maintain flow and allow for a dry excavation. Water pumped from the excavation shall be contained and allowed to settle prior to re-entering the stream. Excavation equipment and vehicles shall operate outside of the flowing portion of the stream. Spoil material from the excavation shall not be allowed to enter the flowing portion of the stream.
13. The activities shall not result in any permanent changes in pre-construction elevation contours in surface waters or wetlands or stream dimension, pattern or profile.
14. Utility line activities which impact wetlands shall not result in conversion of the area to non-wetland status. Mechanized land clearing of forested wetlands for the installation or maintenance of utility lines is not authorized under this certification.
15. Activities qualifying for coverage under this General Water Quality Certification are subject to the following conditions:
 - a. Erosion and sedimentation pollution control plans and Best Management Practices must be designed, installed, and maintained in effective operating condition at all times during construction activities so that violations of state water quality standards do not occur.
 - b. Sediment and erosion control measures, such as check-dams constructed of any material, silt fencing, hay bales, etc., shall not be placed within surface waters of the Commonwealth, either temporarily or permanently, without prior approval by the Kentucky Division of Water's Water Quality Certification Section. If placement of sediment and erosion control measures in surface waters is unavoidable, design and placement of temporary erosion control measures shall not be conducted in such a manner that may result in instability of streams that are adjacent to, upstream, or downstream of the structures. All sediment and erosion control devices shall be removed and the natural grade restored within the completion timeline of the activities.
 - c. Measures shall be taken to prevent or control spills of fuels, lubricants, or other toxic materials used in construction from entering the watercourse.
 - d. Removal of riparian vegetation shall be limited to that necessary for equipment access.
 - e. To the maximum extent practicable, all in-stream work under this certification shall be performed under low-flow conditions.
 - f. Heavy equipment, e.g. bulldozers, backhoes, draglines, etc., if required for this project, should not be used or operated within the stream channel. In those instances in which such in-stream work is unavoidable, then it shall be performed in such a manner and duration as to minimize turbidity and disturbance to substrates and bank or riparian vegetation.
 - g. Any fill shall be of such composition that it will not adversely affect the biological, chemical, or physical properties of the receiving waters and/or cause violations of water quality standards. If rip-rap is utilized, it should be of such weight and size that bank stress or slump conditions will not be created because of its placement.
 - h. If there are water supply intakes located downstream that may be affected by increased turbidity and suspended solids, the permittee shall notify the operator when such work will be done.
 - i. Should evidence of stream pollution or jurisdictional wetland impairment and/or violations of water quality standards occur as a result of this activity (either from a

spill or other forms of water pollution), the Kentucky Division of Water shall be notified immediately by calling (800) 928-2380.

16. Non-compliance with the conditions of this general certification or violation of Kentucky state water quality standards may result in civil penalties.

1.25 PROTECTION OF VEGETATION

- A. Reasonable care shall be taken during construction to avoid damage to vegetation. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Trees which receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. Tree trunks receiving damage from equipment shall be treated with a tree dressing.

1.26 PIPE AND MANHOLE REPLACEMENT

- A. Where indicated in the Contract Documents, pipe and manholes to be replaced shall be removed from the site and disposed of by the Contractor. Material shall not be placed back in the trench or buried on the site.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 011400

SECTION 011410 - SPECIAL PROVISIONS

PART 1 - GENERAL

1.1 GENERAL

- A. These specifications and the drawings accompanying them describe the work to be done and the materials to be furnished for the construction of the Project.
- B. The Contractor and each subcontractor shall be responsible for verification of all measurements at the site before ordering any materials or doing any work. No extra charge or compensation shall be allowed due to differences between actual dimensions and dimensions indicated on the drawings. Any such discrepancy in dimensions which may be found shall be submitted to the Engineer for his consideration before the Contractor proceeds with the work in the affected areas.

1.2 SPECIAL SCHEDULE CONDITIONS

- A. The Contract must be complete within the Contract Time(s) as specified in the Agreement.
- B. "In Basin" Construction Period - No work can begin that requires taking a basin out of service until November 1 and all basins must be back in service by April 15. Only one basin may be out of service at any given time during the "In Basin" Construction Period. No deviations from this criteria will be allowed unless approved by Owner in advance
- C. The Fort Thomas Water Treatment Plant consists of four (4) treatment basins each capable of treating 11 MGD. The Fort Thomas Plant shall be capable of FULL production (44 MGD) between April 15 and November 1 each year. The Contractor shall not anticipate any shutdowns or reduced plant capacity during this time period unless approved in writing by Owner in advance. At no time during the November 1 to April 15 "in basin" construction period can the plant capacity be reduced below 33 MGD unless approved in advance by the Owner. The only exceptions are the following:
 - 1. The plant capacity may be reduced to 22 MGD during the time period in which the work in Rapid Mix #2 is being performed. The Contractor shall obtain Owner approval for the time period during which construction will be conducted on Rapid Mix #2. The Contractor must minimize to the highest degree possible the length of time that Rapid Mix #2 is out of service. Note that construction on Rapid Mix #2 can only be conducted between November 1 and April 15.

- C. See also, Specification 013213

1.3 ORDERING MATERIALS

- A. Immediately following award of contract for this work, the Contractor shall determine length of time required for delivery of all materials, including materials of subcontractors and orders shall be placed for such materials promptly.

- B. If, for any reason, any item specified will not be available when needed and the Contractor can show that he has made a reasonably persistent effort to obtain the item(s) in question, the Engineer shall be notified in writing within thirty (30) days after the contract is signed. Otherwise, the Contractor will not be excused for delays in securing the material specified and will be held accountable if completion of the work is thereby delayed.

1.4 START-UP AND OWNER TRAINING

- A. After each piece of equipment is successfully started-up, the Contractor shall “Video Tape” the Owner’s training administered by the particular piece of equipment’s factory Representative. The tape shall be given to the Owner for future reference.

1.5 AMERICAN IRON AND STEEL REQUIREMENTS

- A. Under the requirements mandated by Section 746 of Title VII of the Consolidated appropriations Act of 2017 and any subsequent statutes mandating domestic preference pertaining to Clean Water and Drinking Water State Revolving Loan Funds, all products made primarily of iron or steel shall be produced in the United States.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 011410

SECTION 012213 - BASIS OF MEASUREMENT AND PAYMENT - LUMP SUM

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

- A. The Contractor shall furnish all necessary labor, machinery, tools, apparatus, equipment, materials, service and other necessary supplies and perform all Work shown on the Drawings and/or described in the Specifications and Contract Documents at the lump sum price as indicated by the Bidder in the Bid.
- B. The Bidder declares that he has examined the site of the Work and informed himself fully in regard to all conditions pertaining to the place where the Work is to be done; that he has examined the Plans, Specification and Contract Documents for the Work, and has read all special provisions furnished prior to the opening of bids; and that he has further satisfied himself relative to the Work to be performed.
- C. Any excavation, if required for the work, shall be done as part of the total price for the complete project. All excavation shall be unclassified.
- D. Owner shall make payments on account of the Contract Price on the basis of Contractor's Applications for Payment as recommended by Engineer, on a monthly schedule during construction. All progress payments will be on the basis of the progress of the Work measured by the Schedule of Values established in Paragraph 2.05 of the General Conditions or, in the event there is no schedule of values, as provided in the General Requirements.
- E. The Progress Payments shall include the cost of Stored Materials, LESS an amount of retainage equal to 10% of their total cost. Stored materials are defined as materials and equipment not incorporated in the Work but delivered, suitably stored and accompanied by documentation satisfactory to Owner as provided in Paragraph 15.01 of the General Conditions.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 012213

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

- A. Definition: An alternate is an amount proposed by Bidders and stated on the Bid Form which will be deducted from the Base Bid amount if the Owner decides to accept a corresponding change in either scope of work or in products, materials, equipment, systems or installation methods described in the Contract Documents.
- B. Coordination: Coordinate related work and modify or adjust adjacent work as required to ensure that work affected by each accepted alternate is complete and fully integrated into the project. The Contractor shall be responsible for all such costs.
- C. Notification: Immediately following award of Contract, prepare and distribute to each party involved, notification of the status of each alternate. Indicate whether alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to alternates, if any.
- D. Schedule: A "Schedule of Alternates" has been incorporated into the Bid Form for preparation by the Bidders. Individual Specification sections contain requirements for materials and methods necessary to achieve the work described for each alternate. Include as part of each alternate, miscellaneous devices, appurtenances and similar items incidental to or required for a complete installation whether or not mentioned as part of the alternate.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 012300

SECTION 012500 - PRODUCTS AND SUBSTITUTIONS

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

- A. General: Substitution of materials and/or equipment is defined in Paragraph 6.7.1 of the General Conditions and more fully hereinafter.
- B. Definitions: Definitions used in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents including such terms as "specialties", "systems", "structure", "finishes", "accessories", "furnishings", "special construction" and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry.
1. "Products" are items purchased for incorporation in the Work, regardless of whether they were specifically purchased for the project or taken from the Contractor's previously purchased stock. The term "product" as used herein includes the terms "material", "equipment", "system" and other terms of similar intent.
 2. "Named Products" are products identified by use of the manufacturer's name for a product, including such items as a make or model designation, as recorded in published product literature, of the latest issue as of the date of the Contract Documents.
 3. "Materials" are products that must be substantially cut, shaped, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form units of work.
 4. "Equipment" is defined as a product with operational parts, regardless of whether motorized or manually operated, and in particular, a product that requires service connections such as wiring or piping.
- C. Substitutions: The Contractor's requests for changes in the products, materials, equipment and methods of construction required by the Contract Documents are considered requests for "substitutions", and are subject to the requirements specified herein. The following are not considered as substitutions:
1. Revisions to the Contract Documents, where requested by the Owner, Engineer are considered as "changes" not substitutions.
 2. Substitutions requested during the bidding period, which have been accepted prior to the Contract Date, are included in the Contract Documents and are not subject to the requirements for substitutions as herein specified.
 3. Specified Contractor options on products and construction methods included in the Contract Documents are choices available to the Contractor and are not subject to the requirements for substitutions as herein specified.
 4. Except as otherwise provided in the Contract Documents, the Contractor's determination of and compliance with governing regulations and orders as issued by governing authorities do not constitute "substitutions" and do not constitute a basis for change orders.
- D. Standards: Refer to Division-01 section "Definitions and Standards" for applicability of industry standards to the products specified for the project, and for acronyms used in the text of the specification sections.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-01 Specification sections, apply to Work of this Section.

1.3 SUBMITTALS

The information required to be furnished for evaluation of product substitution will be as follows:

- A. Performance capabilities, and materials and construction details will be evaluated based upon conformance with the Specifications. Products that do not conform with the Specification shall not be accepted.
- B. Manufacturer's production and service capabilities, and evidence of proven reliability will be acceptable if the following is furnished.
 - 1. Written evidence that the manufacturer has not less than (3) years experience in the design and manufacture of the substitute product.
 - 2. Written evidence of at least one application, of a type and size similar to the proposed substitute product, in successful operation in a wastewater treatment plant for a period of at least one year.
 - 3. In lieu of furnishing evidence of a manufacturer's Experience and successful operation of an application of the product to be substituted, the Contractor has the option of furnishing a cash deposit or bond which will guarantee replacement if the product the furnished does not satisfy the other requirements specified in this section. The amount of each deposit or bond will be subject to the approval.
- C. Specific reference to characteristics either superior or inferior to specified requirements will be evaluated based on their net effect on the project. Products with any characteristics inferior to those specified will not be acceptable unless offset by characteristics that, in the opinion of the Engineer, will cause the overall effect of the product on the project to be at least equal to that of those specified.

1.4 QUALITY ASSURANCE

- A. Source Limitations: To the fullest extent possible, provide products of the same generic kind, from a single source, for each unit of work.
- B. Compatibility of Options: Compatibility of products is a basic requirement of product selection. When the Contractor is given the option of selecting between two or more products for use on the project, the product selected must be compatible with other products previously selected, even if the products previously selected were also Contractor options. The complete compatibility between the various choices available to the Contractor is not assured by the various requirements of the Contract Documents, but must be provided by the Contractor.
- C. The detailed estimate of operating and maintenance costs will be evaluated based on comparison with similar data on the specified products. Proposed substitute products which have an operating and maintenance cost that, in the opinion of the Engineer, exceeds that of the specified products will not be considered equal and will not be acceptable.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

General: Deliver, store, and handle products in accordance with manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft. Control delivery schedules to minimize long-term storage at the site and to prevent overcrowding of construction spaces. In particular coordinate delivery and installation to ensure minimum holding or storage times for items known or recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other sources of loss.

- A. Deliver products to the site in the manufacturer's sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
- B. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
- C. Store heavy materials away from the project structure in a manner that will not endanger the supporting construction.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT COMPLIANCE

- A. General: Requirements for individual products are indicated in the Contract Documents; compliance with these requirements is in itself a Contract Requirement. These requirements may be specified in any one of several different specifying methods, or in any combination of these methods. These methods include the following:
 - 1. Proprietary.
 - 2. Descriptive.
 - 3. Performance.
 - 4. Compliance with Reference Standards.

Compliance with codes, compliance with graphic details, allowances, and similar provisions of the Contract Documents also have a bearing on the selection process.

- B. Procedures for Selecting Products: Contractor's options in selecting products are limited by requirements of the Contract Documents and governing regulations. They are not controlled by industry traditions or procedures experienced by the Contractor on previous construction projects.

2.2 SUBSTITUTIONS

- A. Conditions: Contractor's request for substitution will be received and considered when extensive revisions to the Contract Documents are not required, when the proposed changes are in keeping with the general intent of the Contract Documents, when the request are timely, fully documented and properly submitted, and when one or more of the following conditions is satisfied, all as judged by the Engineer; otherwise the requests will be returned without action except to record non-compliance with these requirements.

1. The Engineer will consider a request for substitution where the request is directly related to an "or equal" clause or similar language in the Contract Documents.
2. The Engineer will consider a request for substitution where the specified product or method cannot be provided within the Contract Time. However, the request will not be considered if the product or method cannot be provided as a result of the Contractor's failure to pursue the work promptly or to coordinate the various activities properly.
3. The Engineer will consider a request for substitution where the specified product or method cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
4. The Engineer will consider a request for a substitution where a substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. These additional responsibilities may include such considerations as additional compensation to the Engineer for redesign and evaluation services, the increased cost of other work by the Owner or separate contractors, and similar considerations.
5. The Engineer will consider a request for substitution when the specified product or method cannot be provided in a manner which is compatible with other materials of the work, and where the Contractor certifies that the substitution will overcome the incompatibility.
6. The Engineer will consider a request for substitution when the specified product or method cannot be properly coordinated with other materials in the work, and where the Contractor certifies that the proposed substitution can be properly coordinated.
7. The Engineer will consider a request for substitution when the specified product or method cannot receive a warranty as required by the Contract Documents and where the Contractor certifies that the proposed substitution receive the required warranty.
8. The Contractor shall reimburse the Owner any costs for review by the Engineer of proposed product substitutions which require major design changes, as determined by the Owner, to related of adjacent work made necessary by the proposed substitutions.

B. Work-Related Submittals: Contractor's submittal of and the Engineer's acceptance of shop drawings, product data or samples which relate to work not complying with requirements of the Contract Documents, does not constitute an acceptable or valid request for a substitution, nor approval thereof.

2.3 GENERAL PRODUCT REQUIREMENTS

- A. General: Provide products that comply with the requirements of the Contract Documents and that are undamaged and, unless otherwise indicated, unused at the time of installation. Provide products that are complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
1. Standard Products: Where they are available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 2. Continued Availability: Where, because of the nature of its application, the Owner is likely to need replacement parts or additional amounts of a product at a later date, either for maintenance and repair or replacement, provide standard, domestically produced products for which the manufacturer has published assurances that the products and its parts are likely to be available to the Owner at a later date.

- B. Nameplates: Except as otherwise indicated for required labels and operating data, do not permanently attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view either in occupied spaces or on the exterior of the completed project.
1. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface which, in occupied spaces, is not conspicuous.
 2. Equipment Nameplates: Provide permanent nameplate on each item of service-connected or power operated equipment. Locate the nameplate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data.
 - a. Name of manufacturer
 - b. Name of product
 - c. Model number
 - d. Serial number
 - e. Capacity
 - f. Speed
 - g. Ratings

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS

- A. General: Except as otherwise indicated in individual sections of these Specifications, comply with the manufacturer's instructions and recommendations for installation of the products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other work. Clean exposed surfaces and protect surfaces as necessary to ensure freedom from damage and deterioration at Time of Acceptance.

END OF SECTION 012500

SECTION 013113 - PROJECT COORDINATION

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

Minimum administrative and supervisory requirements necessary for coordination of work on the project include but are not necessarily limited to the following:

- A. Coordination and meetings.
- B. Limitations for use of site.
- C. Coordination of crafts, trades and subcontractors.
- D. General installation provisions.
- E. Cleaning and protection.
- F. Conservation and salvage.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.

1.3 COORDINATION AND MEETINGS

- A. Monthly general project coordination meetings will be held at regularly scheduled times convenient for all parties involved. These meetings are in addition to specific meetings held for other purposes, such as regular project meetings and special pre-installation meetings. Representation at each meeting by every party currently involved in coordination or planning for the work of the entire project is requested. Meetings shall be conducted in a manner which will resolve coordination problems. Results of the meeting shall be recorded and copies distributed to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.4 LIMITATIONS ON USE OF THE SITE

- A. Limitations on site usage as well as specific requirements that impact site utilization are indicated on the drawings and by other contract documents. In addition to these limitations and requirements, allocation of available space shall be administered equitably among entities needing both access and space so as to produce the best overall efficiency in performance of the total work of the project. Schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site.

1.5 COORDINATION OF CRAFTS, TRADES AND SUBCONTRACTORS

- A. The Contractor shall coordinate the work of all the crafts, trades and subcontractors engaged on the work, and he shall have final responsibility as regards the schedule, workmanship and completeness of each and all parts of the work.
- B. All crafts, trades and subcontractors shall be made to cooperate with each other and with others as they may be involved in the installation of work which adjoins, incorporates, precedes or follows the work of another. It shall be the Contractor's responsibility to point out areas of cooperation prior to the execution of subcontractor agreements and the assignment of the parts of the work. Each craft, trade and subcontractor shall be made responsible to the Owner, for furnishing embedded items and giving directions, for doing all cutting and fitting and making all provisions for accommodating the work, and for protecting, patching, repairing and cleaning as required to satisfactorily perform the work.
- C. The Contractor shall be responsible for all cutting, digging and other action of his subcontractors and workmen. Where such action impairs the safety or function of any structure or component of the project, the Contractor shall make such repairs, alterations and additions as will, in the opinion of the Engineer, bring said structure or component back to its original design condition at no additional cost to the Owner.
- D. Each subcontractor is expected to be familiar with the General Requirements and all sections of the detailed Specifications for all other trades and to study all Drawings applicable to his work including Architectural and Structural Drawings, to the end that complete coordination between trades will be effected. Consult with the Engineer if conflicts exist on the Drawings.
- E. Special attention shall be given to points where ducts or piping must cross other ducts or piping, where lighting fixtures must be recessed in ceilings and where ducts, piping and conduits must fit into walls and columns. It shall be the responsibility of such subcontractor to leave the necessary room for other trades.
- F. No extra compensation will be allowed to cover the cost of removing piping, conduit, ducts, etc., or equipment found encroaching on space required by others.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 013113

SECTION 013213 - CONTRACTORS SEQUENCE OF CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.1 CONTRACTOR'S CONSTRUCTION SEQUENCE, SCHEDULE & PROVISIONS

The Contractor shall be responsible for all planning, coordination and execution of the work. The sequence of work shall provide assurances that reliable treatment plant operation will be maintained and such sequences shall be approved by the Owner. No cost or schedule adjustments shall be given for changes to the construction sequence not approved by the Owner.

The Contractor's proposed construction sequence schedule must allow the Owner to maintain full operation of their existing water treatment plant during the construction period of the proposed expansion to the existing facilities.

The contractor shall be responsible for all damages brought about by the disruption of the operation if such disruptions are a direct cause of Contractor negligence and/or a failure of the Contractor to coordinate his work effort to minimize and/or eliminate disruptions in service.

Some general constraints to the Contractor's construction sequence are noted as follows:

- A. "In Basin" Construction Period - No work can begin that requires taking a plant basin out of service until November 1 and must be back in service by April 15. Only one basin may be out of service at any given time during the "In Basin" Construction period. No deviations from this criteria will be allowed unless approved by Owner in advance.
- B. The Fort Thomas Water Treatment Plant consists of four (4) treatment basins each capable of treating 11 MGD. The Fort Thomas Plant shall be capable of FULL production (44 MGD) between April 15 and November 1 each year. The Contractor shall not anticipate any shutdowns or reduced plant capacity during this time period unless approved in writing by Owner in advance. At no time during the November 1 to April 15 "in basin" construction period can the plant capacity be reduced below 33 MGD unless approved in advance by the Owner. The only exceptions are the following:
 1. The plant capacity may be reduced to 22 MGD during the time period in which the work in Rapid Mix #2 is being performed. The Contractor shall obtain Owner approval for the time period during which construction will be conducted on Rapid Mix #2. The Contractor must minimize to the highest degree possible the length of time in which the Rapid Mix #2 is out of service. Note that construction on Rapid Mix #2 can only be conducted between November and April 15.
- C. Only one (1) sodium hypochlorite peristaltic pump may be taken out of service at any given time to replace the discharge piping. Note that this does not include the spare sodium hypochlorite peristaltic pump that is on standby.
- D. Contractor shall provide all temporary piping and pumping which may be required for construction of the treatment plant.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 013213

SECTION 013216 - PROGRESS SCHEDULES

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. Scheduling Responsibilities:

1. In order to provide a definitive basis for determining job progress, a construction schedule of a type approved by the Owner will be used to monitor the project.
2. The Contractor shall be responsible for preparing the schedule and updating on a monthly basis. It shall at all times remain the Contractor's responsibility to schedule and direct his forces in a manner that will allow for the completion of the work within the contractual period.

B. Construction Hours:

1. No work shall be done between 6:00 p.m. and 7:00 a.m. nor on Saturdays, Sundays or legal holidays without the prior written permission of the Owner. However, emergency work may be done without prior written permission.
2. If the Contractor, for his convenience and at his own expense, should desire to carry on his work at night or outside the regular hours, he shall submit a written request to the Engineer and shall allow nine (9) days for satisfactory arrangements to be made for inspecting the work in progress. If permission is granted, the Contractor shall light the different parts of the project as required to comply with all applicable federal, state, and local regulations. The Contractor shall also revise his schedule as appropriate at the next monthly schedule update meeting to reflect the changes in working hours.

C. Progress of the Work:

1. The work shall be started within thirty (30) days following the Notice to Proceed and shall be executed with such progress as may be required to prevent delay to other Contractors or to the general completion of the project. The work shall be executed at such times and in or on such parts of the project, and with such forces, material and equipment, to assure completion of the work in the time established by the Contract.
2. The Contractor agrees that whenever it becomes apparent from the current monthly schedule update that delays have resulted and, hence, that the Contract completion date will not be met or when so directed by the Owner, he will take some or all of the following actions at no additional cost to the Owner:
 - a. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of work.
 - b. Increase the number of working hours per shift, shifts per working day or days per week, the amount of construction equipment, or any combination of the foregoing to substantially eliminate the backlog of work.
 - c. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities, and comply with the revised schedule.
 - d. The Contractor shall submit to the Owner or the Owner's representative for review a written statement of the steps he intends to take to remove or arrest the delay to

the critical path in the accepted schedule. If the Contractor should fail to submit a written statement of the steps he intends to take or should fail to take such steps as required by the Contract, the Owner may direct the level of effort in manpower (trades), equipment, and work schedule (overtime, weekend and holiday work, etc.), to be employed by the Contractor in order to remove or arrest the delay to the critical path in the accepted schedule, and Contractor shall promptly provide such level of effort at no additional cost to the Owner.

1.2 CONSTRUCTION SCHEDULE

- A. Within ten (10) calendar days of the Notice to Proceed, the Contractor shall submit to the Engineer five (5) copies of his proposed schedule. The schedule will be the subject of a schedule review meeting with the Contractor, the Engineer and the Owner or the Owner's representative within one (1) week of its submission. The Contractor will revise and resubmit the schedule until it is acceptable and accepted by the Owner or the Owner's representative.

1.3 SUBMITTAL SCHEDULE

- A. In addition to the above scheduling requirements, the Contractor will be required to submit a complete and detailed listing of anticipated submittals during the course of the Contract. The Contractor will coordinate his submittals with those of his Subcontractors and Suppliers and will identify each submittal by Contract drawing number and specification number. The anticipated submission date for each submittal must be indicated along with the date on which its return is anticipated. For planning purposes, the Engineer will usually return shop drawings thirty (30) days after receipt. However, longer durations for review will not be considered a basis for a claim.
- B. The Submittal Schedule must be submitted within twenty (20) working days of the Notice to Proceed and will be the subject of a special meeting with the Engineer and the Owner or the Owner's representative within one (1) week of the schedule's submission. At that meeting, the Submittal Schedule will be reviewed for comprehensiveness and feasibility. The Engineer will adjust the projected return dates based on the need for more or less time for each submittal's review. The Submittal Schedule will then be accepted or revised as required.

1.4 SCHEDULE UPDATES

- A. Monthly Meetings:
 - 1. A monthly Schedule Update Meeting will be held in conjunction with the applicable progress meeting at the construction site to review and update the Schedule. The Schedule Update Meetings will be chaired by the Owner or the Owner's representative and attended by the Contractor and the Engineer. Actual progress of the previous month will be recorded and future activities will be reviewed. The duration of activities and their logical connections may be revised as needed. Decisions made at these meetings and agreed to by all parties are binding with the exception that no contractual completion dates will be modified without formal written requests and acceptance as specified herein.

B. Revisions to Schedule:

1. The Schedule shall be formally revised if any of the following conditions are encountered:
 - a. When a delay in completion of any work item or sequence of work items results in an indicated extension of the project completion.
 - b. When delays in submittals or deliveries or work stoppages are encountered which make replanning or rescheduling of the work necessary.
 - c. When the schedule does not represent the actual prosecution and progress of the project.

1.5 CONTRACT COMPLETION TIME

A. Causes for Extensions:

1. The Contract completion time will be adjusted only for causes specified in this Contract. In the event the Contractor requests an extension of any Contract completion date, he shall furnish such justification and supporting evidence as the Owner or the Owner's representative may deem necessary for a determination as to whether the Contractor is entitled to an extension of time under the provisions of this Contract. The Owner, with the assistance of the Engineer, will, after receipt of such justification and supporting evidence, make findings of fact and will advise the Contractor in writing thereof.

B. Requests for Time Extension:

1. Each request for change in any Contract completion date shall be initially submitted to the Owner within the time frame stated in the General Conditions. All information known to the Contractor at that time concerning the nature and extent of the delay shall be transmitted to the Owner at that time. Within the time frame stated in the General Conditions but before the date of final payment under this Contract, all information as required above concerning the delay must be submitted to the Owner. No time extension will be granted for requests which are not submitted within the foregoing time limits.

1.6 WEATHER DELAYS

A. This provision specifies the procedures for the determination of time extensions for unusually severe weather in accordance with Article 6 - Contractor's Responsibilities and Article 12 - Change of Contract Price; Change of Contract Times of the EJCDC General Conditions, specification section 007200. In order for the Owner to award a time extension under this clause, the following conditions must be satisfied:

1. The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the average inclement weather anticipated for the project location during the given month.
2. The unusually severe weather must actually cause a delay to a project activity that is vital to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.

3. The Contractor must demonstrate that the weather caused a delay long enough to use up the scheduled activity's "float".
4. The following schedule of monthly anticipated inclement weather delay is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these potential weather days in all weather dependent activities.

Average Inclement Weather Days per Calendar Month	
Month	Number of Days
January	10.4
February	10.1
March	11.9
April	11.7
May	12.6
June	10.3
July	10.0
August	8.0
September	8.0
October	7.7
November	10.1
December	12.0

5. Upon acknowledgement of the Notice to Proceed and continuing throughout the Contract, the Contractor will maintain daily records in which the occurrence of adverse weather and resultant impact to normally scheduled work are identified. If the number of actual adverse weather days exceeds the number of days anticipated listed above, the Owner may consider granting a time extension.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 013216

SECTION 013323 - SHOP DRAWINGS, PRODUCT DATA, SAMPLES AND RFI'S

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

- A. General: This section specifies procedural requirements for non- administrative submittals including shop drawings, product data, samples (when samples are specifically requested) and other miscellaneous work-related submittals. Shop drawings, product data, samples and other work-related submittals are required to amplify, expand and coordinate the information contained in the Contract Documents.
- B. Refer to other Division-01 sections and other Contract Documents for Specifications on administrative, non-work-related submittals. Such submittals include, but are not limited to the following items:
1. Permits.
 2. Payment applications.
 3. Performance and payment bonds.
 4. Insurance certificates.
 5. Inspection and test reports.
 6. Schedule of values.
 7. Progress reports.
 8. Listing of subcontractors.
 9. Operating and Maintenance Manuals
- C. Engineer prefers initial submittals be in electronic media along with one paper copy for review. Engineer utilizes Newforma software and will provide Contractor with the necessary links and instructions for submittal purposes. Upon completion of the review process, Contractor shall print two (2) copies of complete submittal, including transmittal cover page and stamp page, and deliver to Engineer.
- If Contractor does not have capability to submit electronic submittals, then Contractor shall submit a request to Engineer for waiver. In the event a waiver is granted, paper submittals shall be provided as directed by the Engineer.
- D. Submittals shall be checked and reviewed by the Contractor and stamped with Contractor's review stamp before submission to the Engineer. The review of the submittals by the Engineer shall not be construed as a complete check but will indicate only that the general method of construction and detailing is satisfactory. Review of such submittals will not relieve the Contractor of the responsibility for any errors which may exist as the Contractor shall be responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work.
- E. All Requests for Information (RFI) to Engineer shall be submitted electronically via Engineer's Newforma software.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-01 Specification sections, apply to work of this section.
- B. Section 017823 - Operating and Maintenance Manuals.

1.3 DEFINITIONS

- A. Shop drawings are technical drawings and data that have been specially prepared for this project, including but not limited to the following items:

1. Fabrication and installation drawings.
2. Setting diagrams.
3. Shopwork manufacturing instructions.
4. Templates.
5. Patterns.
6. Coordination drawings (for use on site).
7. Schedules.
8. Design mix formulas.
9. Contractor's engineering calculations.

Standard information prepared without specific reference to a project is not considered to be shop drawings.

- B. Product data includes standard printed information on manufactured products that has not been specially-prepared for this project, including but not limited to the following items:

1. Manufacturer's product specifications and installation instructions.
2. Standard color charts.
3. Catalog cuts.
4. Roughing-in diagram and templates.
5. Standard wiring diagrams.
6. Printed performance curves.
7. Operational range diagrams.
8. Mill reports.
9. Standard product operating and maintenance manuals.

- C. Samples, where specifically required, are physical examples of work, including but not limited to the following items:

1. Partial sections of manufactured or fabricated work.
2. Small cuts or containers of materials.
3. Complete units of repetitively-used materials.
4. Swatches showing color, texture and pattern.
5. Color range sets.
6. Units of work to be used for independent inspection and testing.

- D. Miscellaneous submittals are work-related, non-administrative submittals that do not fit in the three previous categories, including, but not limited to the following:

1. Specially-prepared and standard printed warranties.
2. Maintenance agreements.
3. Workmanship bonds.
4. Survey data and reports.
5. Testing and certification reports.
6. Record drawings.
7. Field measurement data.

1.4 SUBMITTAL PROCEDURES

- A. General: Refer to the General Conditions and Paragraph 1.1 hereinbefore for basic requirements for submittal handling.
- B. Coordination: Coordinate the preparation and processing of submittals with the performance of the work. Coordinate each separate submittal with other submittals and related activities such as testing, purchasing, fabrication, delivery and similar activities that require sequential activity.
 1. It is the Contractor's responsibility to make such field measurements as are needed to base submittals on actual field conditions to assure proper connection, fit, function and performance of all work and equipment in the execution of the contract work.
 2. Coordinate the submittal of different units of interrelated work so that one submittal will not be delayed by the Architect/Engineer's need to review a related submittal. The Architect/Engineer reserves the right to withhold action on any submittal requiring coordination with other submittals until related submittals are forthcoming.
- C. Coordination of Submittal Times: Prepare and transmit each submittal to the Architect/Engineer sufficiently in advance of the scheduled performance of related work and other applicable activities. Transmit different kinds of submittals for the same unit of work so that processing will not be delayed by the Architect/Engineer's need to review submittals concurrently for coordination.
- D. Review Time: Allow sufficient time so that the installation will not be delayed as a result of the time required to properly process submittals, including time for resubmittal, if necessary. Advise the Architect/Engineer on each submittal, as to whether processing time is critical to the progress of the work and if the work would be expedited if processing time could be shortened.
 1. Allow a longer time period where processing must be delayed for coordination with subsequent submittals. The Architect/Engineer will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination.
 2. No extension of time will be authorized because of the Contractor's failure to transmit submittals to the Architect/Engineer sufficiently in advance of the work.
- E. Submittal Preparation: Mark each submittal with a permanent label for identification. Provide the following information on the label for proper processing and recording of action taken.
 1. Project name.
 2. Date.
 3. Name and address of Architect/Engineer.
 4. Name and address of Contractor.

5. Name and address of subcontractor.
 6. Name and address of supplier.
 7. Name of manufacturer.
 8. Number and title of appropriate specification section.
 9. Drawing number and detail references, as appropriate.
 10. Similar definitive information as necessary.
- F. All submittals shall be referenced to the applicable item, section and division of the Specifications, and to the applicable drawing(s) or drawing schedule(s). Include only one item in a submittal.
- G. The Contractor shall review and check submittals, and shall indicate his review by initials and date. Any submittal received without this evidence of review shall be returned to the Contractor without review.
- H. If the submittals deviate from the Contract Drawings and/or Specifications, the Contractor shall advise the Engineer in writing of the deviation and the reasons therefore.
- I. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Architect/Engineer, and to other destinations as indicated, by use of a transmittal form. Submittals received from sources other than the Contractor will be returned to the sender "without action".
- J. Electronic Submittals: If the electronic method of submittals is agreed to by Contractor, Engineer, and Owner, the format and procedures will be determined and implemented prior to any submittals. Submittals will be processed through "Newforma" software. Each item of the submittal documents shall be in .pdf format and shall be oriented so that they are read from upper left corner to lower right corner, with no rotation of said document being required after receiving it. The .pdf file shall be named so that it describes the item being submitted. All other requirements herein are part of the electronic submittal process with the exception of the duplicate copies. Contractor stamp indicating review and any comments or notes must be on the .pdf submittal.

1.5 SPECIFIC SUBMITTAL REQUIREMENTS

- A. Shop drawings shall be prepared by a qualified detailer. Details shall be identified by reference to sheet and detail numbers shown on Contract Drawings. Where applicable, show fabrication, layout, setting and erection details.

Shop drawings are defined as original drawings prepared by the Contractor, subcontractors, suppliers, or distributors performing work under this Contract. Shop drawings illustrate some portion of the work and show fabrication, layout, setting or erection details of equipment, materials and components. The Contractor shall, except as otherwise noted, have prepared the number of reviewed copies required for his distribution plus four (4) which will be retained by the Engineer. Shop drawings shall be folded to an approximate size of 8-1/2" x 11" and in such manner that the title block will be located in the lower right-hand corner of the exposed surface.

- B. Project data shall include manufacturer's standard schematic drawings modified to delete information which is not applicable to the project, and shall be supplemented to provide additional information applicable to the project. Each copy of descriptive literature shall be

clearly marked to identify pertinent information as it applies to the project.

- C. Where samples are required, they shall be adequate to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged. Provide sufficient size and quantity to clearly illustrate functional characteristics of product and material, with integrally related parts and attachment devices, along with a full range of color samples.
- D. In the event the Engineer does not specifically reject the use of material or equipment at variance to that which is shown on the Drawings or specified, the Contractor shall, at no additional expense to the Owner, and using methods reviewed by the Engineer, make any changes to structures, piping, controls, electrical work, mechanical work, etc., that may be necessary to accommodate this equipment or material. Should equipment other than that on which design drawings are based be accepted by the Engineer, shop drawings shall be submitted detailing all modification work and equipment changes made necessary by the substituted item.
- E. Additional information on particular items, such as special drawings, schedules, calculations, performance curves, and material details, shall be provided when specifically requested in the technical Specifications.
- F. Submittals for all electrically operated items (including instrumentation and controls) shall include complete size, color coding, all terminations and connections, and coordination with related equipment.
- G. Equipment shop drawings shall indicate all factory or shop paint coatings applied by suppliers, manufacturers and fabricators; the Contractor shall be responsible for insuring the compatibility of such coatings with the field-applied paint products and systems.
- H. Fastener specifications of manufacturer shall be indicated on equipment shop drawings.
- I. Where manufacturers brand names are given in the Specifications for building and construction materials and products, such as grout, bonding compounds, curing compounds, masonry cleaners, waterproofing solutions and similar products, the Contractor shall submit names and descriptive literature of such materials and products he proposes to use in this Contract.
- J. No material shall be fabricated or shipped unless the applicable drawings or submittals have been reviewed by the Engineer and returned to the Contractor.
- K. All bulletins, brochures, instructions, parts lists, and warranties package with and accompanying materials and products delivered to and installed in the project shall be saved and transmitted to the Owner through the Engineer.

1.6 REVIEW STATUS

- A. Submittals will be returned, stamped with the following classifications: "Reviewed", "Furnish as Corrected", "Revise and Resubmit", "Rejected", or "Submit Specified Item".
- B. In some instances, corrections to dimensions or clarification notations will be required, in which case the drawings will be marked "Furnish as Corrected." These shop drawings will not be required to be resubmitted for further approval. If the supplier makes additional modifications

after receiving a "Furnish as Corrected" disposition, the drawings must then be resubmitted for review.

- C. If the shop drawing is returned with the notation "Revise and Resubmit", the Contractor shall promptly make the revisions indicated and repeat the submittal approval procedure.
- D. If the shop drawing is returned with the notation "Submit Specified Item", this indicates that the submittal does not meet the specification, will not be reviewed, and is unacceptable. Upon return of a drawing so marked, the Contractor shall repeat the initial approval procedure, submitting acceptable materials or equipment.
- E. The "Rejected" notation is used to indicate materials or equipment that are not acceptable and are not included in the project.

1.7 REMINDER OF CONTRACTOR RESPONSIBILITIES

- A. Verify field measurements, field construction criteria, catalog numbers, and similar data.
- B. Coordinate each submittal with requirements of work and of Contract Documents.
- C. Notify Engineer, in writing at time of submission, of deviations in submittals from requirements of Contract Documents.
- D. Begin no work, and have no material or products fabricated or shipped which requires submittals until return of submittals with Engineer's stamp and initials or signature indicating review.
- E. Upon review and close-out of a submittal, Contractor shall print two (2) copies of complete submittal, including transmittal cover page and stamp page, and deliver to Engineer.
- F. It is emphasized that the review of shop drawings by the Engineer is for general conformance to the Contract Drawings and Specifications, but subject to the detailed requirements of the Contract Drawings and Specifications. Although the Engineer may check submitted data in more or less detail, such checking is an effort to discover errors and omissions in the Contractor's drawings and to assist the Contractor in coordinating and expediting his work, but shall in no way relieve the Contractor of his obligation and responsibility to properly coordinate the work, and to Engineer the details of the work in such a manner, that the purpose and intent of the Contract will be achieved nor shall any such detailed checking by the Engineer be construed as placing on him or on the Owner, any responsibility for the accuracy, proper fit, functioning or performance of any phase of the work included in this Contract. The Contractor is responsible for confirmation and correlation of dimensions at the job site; for information that pertains solely to the fabrication processes or to the techniques of construction; for the coordination of the work of all trades; and for performance of his work in a safe and satisfactory manner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 013323

SECTION 014216 - DEFINITIONS AND STANDARDS

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

- A. This section specifies procedural and administrative requirements for compliance with governing regulations and codes and standards imposed upon the Work. These requirements include obtaining permits, licenses, inspections, releases and similar documentation, as well as payments, statements and similar requirements associated with regulations, codes and standards.
- B. The term, "Regulations", is defined to include laws, statutes, ordinances and lawful orders issued by governing authorities, as well as those rules, conventions and agreements within the construction industry which effectively control the performance of the Work regardless of whether they are lawfully imposed by governing authority or not.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-01 Specification Sections, apply to Work of this Section.

1.3 DEFINITIONS

A substantial amount of specification language consists of definitions of terms found in other Contract Documents, including Drawings. (Drawings are recognized as being diagrammatic in nature and not completely descriptive of the requirements indicated thereon). Certain terms used in Contract Documents are defined in this article. Definitions and explanations contained in this section are not necessarily either complete or exclusive, but are general for the Work to the extent that they are not stated more explicitly in another element of the Contract Documents.

The provisions or requirements of other Division-01 sections apply to entire Work of the Contract and, where so indicated, to other elements which are included in the Project.

- A. Indicated: The term, "indicated", is a cross-reference to graphic representations, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications, and to similar means of recording requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used in lieu of "indicated", it is for the purpose of helping the reader locate the cross-reference, and no limitation of location is intended except as specifically noted.
- B. Directed, Requested, Etc.: Where not otherwise explained, terms such as "directed", "requested", "authorized", "selected", "approved", "required", "accepted", and "permitted" mean "directed by the Architect/ Engineer", "requested by the Architect/ Engineer", and similar phrases. However, no such implied meaning will be interpreted to extend the Architect's/Engineer's responsibility into the Contractor's area of construction supervision.

- C. Approve: Where used in conjunction with the Architect's/Engineer's response to submittals, requests, applications, inquiries, reports and claims by the Contractor, the meaning of the term "approved" will be held to limitations of the Architect's/Engineer's responsibilities and duties as specified in General and Supplementary Conditions. In no case will the Architect/Engineer's approval be interpreted as a release of the Contractor from responsibilities to fulfill requirements of Contract Documents.
- D. Project Site: The term, "project site", is defined as the space available to the Contractor for performance of the Work, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is shown on the Drawings, and may or may not be identical with the description of the land upon which the Project is to be built.
- E. Furnish: Except as otherwise defined in greater detail, the term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations" as applicable in each instance.
- F. Install: Except as otherwise defined in greater detail, the term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing protecting, cleaning and similar operations", as applicable in each instance.
- G. Provide: Except as otherwise defined in greater detail, the term "provide" means "to furnish and install, complete and ready for intended use", as applicable in each instance.
- H. Installer: The term "installer" is defined as "the entity" (person or firm) engaged by the Contractor, its subcontractor or sub-subcontractor for performance of a particular unit of work at the project site, including installation, erection, application and similar required operations. It is a requirement that installers are experienced in the operations they are engaged to perform.
- I. Testing Laboratories: The term "testing laboratory" is defined as an independent entity engaged to perform specific inspections or tests of the Work, either at the project site or elsewhere, and to report, and (if required) interpret results of those inspections or tests.

1.4 INDUSTRY STANDARDS

- A. Applicability of Standards: Except where more explicit or more stringent requirements are written into the Contract Documents, applicable construction industry standards have the same force and effect as if bound into or copied directly into the Contract Documents. Such industry standards are made a part of the Contract Documents by reference. Individual specification sections indicate which codes and standards the Contractor must keep available at the project site for reference.
 - 1. Referenced standards (standards referenced directly in the Contract Documents) take precedence over non-referenced standards that are recognized in the industry for applicability to the Work.
 - 2. Non-referenced standards are defined as not being applicable to the Work, except as a general requirement of whether the Work complies with recognized construction industry standards.

- B. Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with standard in effect as of date of Contract Documents.
- C. Conflicting Requirements: Where compliance with two (2) or more standards is specified, and where these standards establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents specifically indicate a less stringent requirement. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to the Architect/Engineer for a decision before proceeding.
 - 1. Minimum Quantities or Quality Levels: In every instance the quantity or quality level shown or specified is intended to be the minimum for the work to be provided or performed. Unless otherwise indicated, the actual work may either comply exactly, within specified tolerances, with the minimum quantity or quality specified, or may exceed that minimum within reasonable limits. In complying with these requirements, the indicated numeric values are either minimum or maximum values, as notes, or as appropriate for the context of the requirements. Refer instances of uncertainty to the Architect/Engineer for decision before proceeding.
- D. Copies of Standards: The Contract Documents require that each entity performing work be experienced in that part of the Work being performed. Each entity is also required to be familiar with industry standards applicable to that part of the work. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed for proper performance of the Work, the Contractor is required to obtain such copies directly from the publication source.
 - 2. Although certain copies of standards needed for enforcement of the requirements may be required submittals, the Architect/ Engineer reserves the right to require the Contractor to submit additional copies of these standards as necessary for enforcement of the requirements.

1.5 SUBMITTALS

- A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 014216

SECTION 014531 – STRUCTURAL TESTS AND INSPECTIONS

PART 1 - PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Provision of Structural Tests and Inspections is included as part of the quality assurance plan for this project. The agency performing the Structural Tests and Inspections are to verify the performance and fully document the results of all required tests and inspections for elements and systems identified as requiring inspection and testing.
- B. The Owner will engage one or more qualified inspectors and / or testing agencies to conduct structural tests and inspections specified in this section and related sections and as may be specified in other divisions of these specifications and as indicated elsewhere in the contract documents.
- C. Structural testing and inspection agencies are required to verify compliance with requirements specified or indicated.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the construction document requirements.
- D. Structural Tests and Inspections are required for the following items:
 - 1. As indicated on the Drawings.

1.3 DEFINITIONS

- A. Construction Documents: Written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building permit. Construction Documents include all supplemental instructions, sketches, addenda, and revisions to the drawings and specifications issued by the registered design professional beyond those issued for a building permit.
- B. Shop Drawings / Submittal Data: Written, graphic and pictorial documents prepared and / or assembled by the contractor based on the Construction Documents.

- C. Structural Observation: Visual observation of the structural system by a representative of the registered design professional's office for general conformance to the approved construction documents. Structural observations are not considered part of the structural tests and inspections and do not replace inspections and testing by the testing agency or inspector.
- D. Inspector: A qualified person who demonstrates competence, to the satisfaction of Registered Design Professional in responsible charge, for inspection of the particular type of construction or operation requiring inspection.
 - 1. The inspector shall be a licensed professional engineer, engineering intern, or a qualified representative from the testing agency.
- E. Inspection, Continuous: The full-time observation of work requiring inspection by an approved inspector who is present in the area where the work is being performed.
- F. Inspection, Periodic: The part-time or intermittent observation of work requiring inspection by an approved inspector who is present in the area where the work has been or is being performed and at the completion of the work.
- G. Testing Agency: A qualified materials testing laboratory under the responsible charge of a licensed professional engineer, approved by the Registered Design Professional in responsible charge, to measure, examine, test, calibrate, or otherwise determine the characteristics or performance of construction materials and verify confirmation with construction documents.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications:
 - 1. Minimum qualifications of inspection and testing agencies and their personnel shall comply with ASTM E329 Standard Specification for Agencies in the Testing and / or Inspection of Materials Used in Construction.
 - a. Inspectors and individuals performing tests shall be certified for the work being performed as outlined in the appendix of the ASTM E329, unless more stringent certification requirements are indicated in the Construction Documents.
 - b. Certification by organizations other than those listed must be submitted to the Designated Inspecting Design Professional for consideration before proceeding with work.
 - 2. In addition to these requirements, local jurisdiction may have additional requirements. It is the responsibility of the testing and inspection agencies to meet local requirements and comply with local procedures.
- B. Inspector Qualifications.

1.5 CONFLICTING REQUIREMENTS, REPORTS, AND TEST RESULTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the

most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to the registered design professional in responsible charge for a decision before proceeding.

- B. The inspector's reports and testing agencies results shall have precedence over reports and test results provided by the contractor.
- C. Where a conflict exists between the construction documents and approved shop drawings / submittal data, the construction documents shall govern unless the shop drawings / submittal data are more restrictive. All conflicts shall be brought to the attention of the registered design professional in responsible charge.
- D. Where a conflict exists between individual specification sections and this specification, provide testing and inspection to satisfy the more stringent requirements.

1.6 SUBMITTALS BY CONTRACTOR (CONTRACTOR-ENGAGED INSPECTION)

- A. When the Contractor is required to engage the Inspection Coordinator, the Contractor shall submit to the Designated Inspecting Design Professional for review a minimum of 14 days prior to commencement of construction of elements requiring inspection, the following:
 - 1. Name(s), address(es), telephone number(s), email address(es) and statement(s) of qualifications of all Inspection Coordinators and Inspectors to be engaged on the project.
 - 2. A listing of all items to receive inspection, designating the name of the individual that will be performing inspection for each item.

1.7 SUBMITTALS BY INSPECTION COORDINATOR (OWNER-ENGAGED INSPECTION)

- A. When the Owner engages the Inspection Coordinator, the Inspection Coordinator shall submit to the Designated Inspecting Design Professional for review a minimum of 14 days prior to commencement of construction of elements requiring inspection, the following:
 - 1. Name(s), address(es), telephone number(s), email address(es) and statement(s) of qualifications of all Inspection Coordinators and Inspectors to be engaged on the project.
 - 2. A listing of all items to receive inspection, designating the name of the individual that will be performing inspection for each item.

1.8 SUBMITTALS BY STRUCTURAL TESTS AND INSPECTION AGENCIES

- A. A minimum of 14 days prior to construction, for all materials and systems specified and/or referenced in this Section, the Testing and Inspection Agency shall prepare and submit to the Registered Design Professional in responsible charge and Contractor for review a complete and detailed schedule of required tests and inspections.
- B. The Test Agency/Inspection Agency shall review, keep and distribute records of required tests and inspections. The Test Agency/Inspection Agency shall furnish interim reports to the Registered Design Professional in responsible charge and Contractor. Interim reports shall indicate whether work inspected was done in compliance with approved construction documents. Bring all noncompliant items to the immediate attention of the contractor for

correction. If the noncompliant items are not corrected, the noncompliant items shall be brought to the attention of the Registered Design Professional in responsible charge prior to the completion of that element of the work.

1. Interim Reports and test results shall include, but not be limited to, the following:
 - a. Date of inspection and/or test.
 - b. Description of inspections or tests performed including location (reference grid lines, floors, elevations, etc.).
 - c. Results of inspections or tests performed including data, descriptions, photographs, etc., as evidence of compliance or noncompliance.
 - d. Statement noting that the work, material, and / or product complies or does not comply with the construction document requirements.
 - 1) Name and signature of contractor's representative who was notified of work, material, and/or products that do not meet the construction document requirements.
 2. Interim reports shall be submitted within one week of inspection or test.
- C. Final Report of Inspections. Submitted by the Inspection Coordinator at completion of construction for each element requiring inspection confirming that all work has been completed in compliance with approved construction documents. Final Report shall document all noncompliant items (if any) that remain uncorrected at completion of construction.
1. Final report shall be submitted at a point in time agreed upon by the Registered Design Professional in responsible charge and Contractor prior to the start of work, but not later than 14 days after completion of construction of all elements requiring inspection and/or testing.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.1 DESIGN PROFESSIONAL'S RESPONSIBILITY

- A. The Registered Design Professional in Responsible Charge shall respond to valid requests for clarification of structural testing and inspection requirements and as necessary to resolve reported noncompliant items.

3.2 CONTRACTOR'S RESPONSIBILITY

- A. The contractor shall provide sufficient notice to the Inspection Coordinator to allow proper scheduling of all personnel and the contractor shall provide safe access for performing inspection and on site testing. The Registered Design Professional in responsible charge shall review reports provided by the Testing/Inspection agencies and coordinate resolution of reported noncompliant items with the Contractor and Testing/Inspection agencies.

- B. The contractor shall submit schedules to the Registered Design Professional and Testing/Inspection agencies. Schedules will note milestones and durations of time for materials requiring structural tests and inspections.
- C. The contractor shall repair and/or replace work that does not meet the requirements of the construction documents.
 - 1. If directed by the Registered Design Professional, contractor shall engage a qualified design professional to prepare repair and / or replacement procedures.
 - 2. Contractor's design professional shall be registered in the State of Indiana. The contractor's design professional shall be acceptable to the registered design professional in responsible charge, code enforcement official, and owner.
 - 3. Procedures shall be submitted for review and acceptance by the Registered Design Professional before proceeding with corrective action.
- D. The contractor shall be responsible for costs of:
 - 1. Re-testing and re-inspection of materials, work, and products that do not meet the requirements of the construction documents and shop drawings / submittal data.
 - 2. Review of proposed repair and / or replacement procedures by the Registered Design Professional in responsible charge and the Testing Inspection agencies.
 - 3. Repair or replacement of work that does not meet the requirements of the construction documents.

3.3 TESTING/INSPECTION AGENCY RESPONSIBILITIES

- A. The Testing/Inspection Agent for each element requiring testing and inspection is responsible to confirm that all specified tests and inspections are performed and documented.
- B. The Testing/Inspection Agent for each element requiring testing and inspection may engage and coordinate additional approved qualified Inspector(s) as required to perform the required tests and inspections.
- C. Prior to commencement of construction of an element requiring inspection, the Testing/Inspection Agent shall review the testing and inspection requirements and the construction documents to determine the necessary tests and inspections and shall coordinate these requirements with the Contractor.
- D. As the construction progresses, the Testing/Inspection Agent shall coordinate with the Contractor to ensure performance of the required inspections and shall confirm that all required testing and inspection is satisfactorily completed.
- E. The Testing/Inspection Agent shall alert the Contractor immediately of any observed noncompliant items so that the Contractor may make corrections to the work. The Testing/Inspection Agent shall document all noncompliant items and related corrective work.
- F. The Testing/Inspection Agent shall keep and maintain detailed records of all tests and inspections performed and shall include copies of test and inspection reports with interim reports.

- G. The Testing/Inspection Agent shall submit interim and final reports in accordance with the provisions of this specification.
- H. Perform tests and inspections as directed by the Testing/Inspection Agent.

3.4 STRUCTURAL OBSERVATIONS

- A. Structural observations may be made periodically as determined by the registered design professional in responsible charge.

3.5 TESTING AND INSPECTION

- A. Testing and inspection shall be in accordance with the provisions of this specification and as outlined elsewhere in the Construction Documents.
- B. Reference related specifications for the minimum level of inspections and testing. Provide additional inspections and testing as necessary to determine compliance with the construction drawings.

PART 4 - SCHEDULES AND FORMS (ATTACHED)

4.1 SCHEDULE OF STRUCTURAL TESTS AND INSPECTIONS

- A. To be submitted by the Testing/Inspection Agency prior to commencement of construction in accordance with the provisions of this specification along with Inspector and Testing Agent qualifications. Indicate the specific individual(s) responsible for testing/inspecting each material/system.

4.2 SCHEDULE OF TESTS

- A. The scope of testing shall be in accordance with this section. Where other testing requirements are indicated elsewhere in the contract documents they shall be in addition to the requirements in this section. Where conflicting provisions occur, the more stringent requirements shall apply.

1. SOILS AND EARTHWORK

- a. Footing Subgrade: At footing subgrades, perform at least one test of each soil stratum to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Structural Engineer.
- b. Test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 - 1) Prior to backfill placement perform proof rolling test of exposed subgrades.

- 2) Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of building slab, but in no case fewer than three tests.
- 3) Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length, but no fewer than two tests.

c. Controlled Structural Fill:

- 1) Perform sieve tests (ASTM D422 & D1140), Atterberg limits (D4318) and standard Proctor tests (ASTM D698) of each source of fill material.
- 2) Verify proposed fill material meets project specification.
- 3) Test density of each lift of fill by nuclear methods (ASTM D2922) for conformance to compaction requirements.

2. CAST-IN-PLACE CONCRETE

a. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

- 1) Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. m), but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
- 2) Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
- 3) Air Content: ASTM C 231, pressure method, for normal-weight concrete; [ASTM C 173/C 173M, volumetric method, for structural lightweight concrete;] one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
- 4) Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
- 5) Lightweight Concrete Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
- 6) Compression Test Specimens: ASTM C 31/C 31M.
 - a) Cast and laboratory cure one set of six standard cylinder specimens for each composite sample.
- 7) Compressive-Strength Tests: ASTM C 39/C 39M.
 - a) Test one laboratory-cured specimen at 7 days and one standard sample set at 28 days. Reserve additional specimen as spares for testing at the discretion of the Structural Engineer as needed.
 - b) A compressive-strength test shall be the average compressive strength of one standard sample set obtained from same composite sample and tested at age indicated.

- 8) Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
 - 9) Test results shall be reported in writing to Structural Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
3. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Structural Engineer but will not be used as sole basis for approval or rejection of concrete.
 4. Additional Tests: Testing agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Structural Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Structural Engineer.
 5. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 6. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
 7. SLABS-ON-GRADE
 - a. Perform flatness and levelness measurements as follows:
 - 1) Measure slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 24 hours of finishing.
 8. STRUCTURAL STEEL FRAMING
 - a. Perform testing of structural steel as follows:
 - 1) <Insert testing requirements>
 9. STRUCTURAL STEEL TRUSSES
 - a. Perform tests of structural steel trusses as follows:
 - 1) < Insert testing requirements>
 10. POST-INSTALLED ANCHORS AND DOWELS
 - a. Proof test mechanical anchors as follows:
 - 1) Anchor type: <insert anchor type>
 - 2) Anchor location(s): <insert anchor locations>
 - 3) Percentage of anchors to be tested: 10 percent plus an additional 10 percent for every failed test.

- 4) Proof test tension load: 100% of allowable tension load capacity.
- b. Proof test adhesive anchors as follows:
 - 1) Anchor type: <insert anchor type>
 - 2) Anchor location(s): <insert anchor locations>
 - 3) Percentage of anchors to be tested: 10 percent plus an additional 10 percent for every failed test.
 - 4) Proof test tension load: 100 percent of allowable tension load capacity.

4.3 SCHEDULE OF INSPECTIONS

A. The scope of inspections shall be in accordance with this section.

1. SOILS AND EARTHWORK

- a. Inspect soils below foundations and slabs for adequate compaction and bearing capacity prior to placement of concrete.
- b. Verify performance of required quality control testing.
- c. Inspect all earthwork operations affecting the building foundations, slabs, envelope and related structural items.
- d. Inspect removal of unsuitable material and preparation of subgrade prior to placement of controlled fill. Document extents of necessary removal.
- e. Controlled Structural Fill:
 - 1) Inspect placement, lift thickness and compaction of controlled fill.
 - 2) Verify extent and slope of fill placement.

2. SHALLOW FOUNDATIONS

- a. The inspector must be present full time during the entire placement of the first 2 shallow foundation concrete pours and then must be present at the start of 100% of other concrete pours.
- b. Verify approval of the footing subgrade prior to placement of foundation concrete.
- c. Verify that forms are plumb and straight, braced against movement, and lubricated for removal.
- d. For earth-formed foundations, verify that earth forms are sufficiently uniform to allow for proper dimensions and required concrete cover over reinforcement.
- e. Verify foundation dimensions.
- f. Verify anchor rods and/or dowels are installed with the embedment and projected lengths and in accordance with the contract documents.
- g. Verify foundation reinforcement prior to placement of concrete.
- h. Verify concrete placement as outlined in this inspection plan.

3. CONCRETE COLUMNS, WALLS, AND SHEAR WALLS

- a. The inspector must be present full time during the entire placement of the first 2 concrete pours and then must be present at the start of 100% of other concrete pours.
- b. Verify all reinforcement before vertical forms are placed.

- c. Verify that forms are plumb and straight, braced against movement, lubricated for removal, and conform to approved shop drawings.
- d. Verify proper dimensions and orientation.
- e. For flat slab construction, verify that top of column or wall elevation is set 1/2 inch below the future slab soffit, or as shown on the contract documents.
- f. Verify wall openings and sleeves as follows:
 - 1) Correct size and location as shown on the contract documents.
 - 2) Check placement of additional reinforcement around openings.
 - 3) Report all wall openings larger than 12" that are not shown on the contract documents.
 - 4) Verify that all debris is removed from within the forms prior to concrete placement.

4. SLABS-ON-GRADE

- a. The inspector must be present full time during the entire placement of the first 2 slab-on- grade concrete pours and then must be present at the start of 100% of all other concrete pours.
- b. Observe subgrade preparation including backfilling, compaction, and performance of compaction tests by the testing laboratory prior to concrete placement.
- c. Note any alteration and subsequent replacement of subgrade materials required by other trades.
- d. Verify that required moisture retarder or vapor barrier is lapped properly, and is not torn or punctured.
- e. Observe that formwork at turndowns and slab edges is plumb and straight, braced against movement and lubricated for removal.
- f. Observe placement of screeds to obtain proper level and thickness of slabs. Observe location of slab depressions and steps in slab while maintaining required slab thickness.
- g. Verify the pour area is free of standing water and other debris.
- h. Verify placement of reinforcement and observe concreting operations as outlined in this inspection plan.
- i. Check that the location and type of slab control joints and construction joints conform to the contract documents.
- j. Verify that sawcut control joints on slab-on-grades are cut within 12 hours of placement.
- k. Verify that flatness and levelness measurements are performed as required.

5. REINFORCING STEEL

- a. This section applies to all elements of construction identified in this inspection plan that contain reinforcing steel.
- b. Verify that reinforcement surfaces are free of excess rust or other coatings that may adversely affect bonding capacity. If oiling of forms is required, verify that it is applied before reinforcing is placed.
- c. Verify all reinforcing bars for compliance with contract documents and approved shop drawings as follows:
 - 1) Material Grade,
 - 2) Reinforcement size,

- 3) Quantity, spacing, and layering,
- 4) Proper hook type and location.
- 5) Splice locations and required length of lap.
- 6) Proper clearance and cover requirements from concrete surfaces.
- 7) Sufficient spacing between reinforcement for concrete placement.
- 8) Verify that unscheduled/additional reinforcing bars shown on plan, in details, or specified in notes are provided and are in compliance with contract documents and approved shop drawings.
- 9) Mechanical splices:
 - a) Provide visual inspection of 100% of the mechanical splices (tension and/or compression) on the project.
 - b) Verify compliance with specifications and conformance with the manufacturer's recommendations for installation.
 - c) Verify that the manufacturer is present for the first installation of each type of splice on the project.
- 10) Verify that welded wire reinforcement is composed of flat sheets, has proper wire gage and spacing, is properly supported, and is properly lapped.
- 11) Inspect headed stud shear reinforcement to ensure that it conforms to the project requirements:
 - a) Review type and spacing.
 - b) Verify that reinforcing is adequately supported to resist displacement or shifting during concrete placement.
 - c) Verify welding of reinforcement is performed according to AWS requirements and that it is inspected by the testing laboratory.

6. CONCRETE PLACEMENT

- a. This section applies to all cast-in-place concrete elements identified in this inspection plan.
- b. Verify that debris and foreign materials have been removed before concrete is placed.
- c. Verify that quality control testing is provided in accordance with the project requirements.
- d. Verify the following with regard to the testing laboratory:
 - 1) Verify contractor is coordinating with testing agency to allow testing technician to be available to make tests as required.
 - 2) Verify slump is measured at the point of discharge.
 - 3) Verify concrete test cylinders are taken in accordance with the contract documents.
- e. Periodically inspect concrete upon arrival to verify the following:
 - 1) Proper concrete mix number, type of concrete, and concrete strength for the placement location.
 - 2) Verify that the concrete is not over 90 minutes old at the time of placement.
- f. Verify that hot-weather or cold-weather techniques are being applied as required.

- g. Verify that concrete being deposited is uniform, that the vertical drop does not exceed six feet, and that concrete is not permitted to drop freely over reinforcement causing segregation.
- h. Verify that the concrete is properly vibrated.
- i. Verify that embedded items and reinforcing steel are not adversely altered during placement. Note if anything was displaced or otherwise altered during placement.
- j. Verify that there are no cold joints within the area of the pour.
- k. Verify that the curing process is as specified in the contract documents and that any curing compound used is applied in accordance with manufacturer's printed application instructions.

7. STRUCTURAL STEEL FRAMING

- a. Visually inspect structural steel elements as follows:
 - 1) Inspect 100% of beam and girder construction and assemblies
 - 2) Inspect 100% of all braced frames and moment frames
- b. Visually inspect steel as it is received for possible damage in shipping, workmanship, and piece marking.
- c. Review certified mill test reports and identification markings on wide-flange shapes, high-strength bolts, nuts and welding electrodes.
- d. Verify that steel member sizes and steel grade conform to the contract documents and approved shop drawings.
- e. Check the installation of base plates for proper leveling.
- f. Verify the proper grout type and installation procedures are followed.
- g. Inspect field welded connections as follows:
 - 1) Inspect 100% of complete joint penetration field welds.
 - 2) Inspect 100% of partial joint penetration field welds.
 - 3) Inspect 100% of fillet field welds in lateral-load-resisting braced frames and moment frames.
 - 4) Inspect 10% of other fillet field welds.
 - 5) Perform pre-welding inspections to verify that materials (i.e. structural steel, weld filler material, etc.), welding procedures, and welding personnel qualifications are appropriate.
 - 6) Visually inspect field welds according to AWS D1.1/D1.1M.
 - 7) Verify welding procedures are in accordance with AWS requirements.
 - 8) Inspect pre-heat, post-heat and surface preparation between passes.
 - 9) Verify size and length of fillet welds.
 - 10) Verify that welds are clean; welder identification is legible; size, length and location of welds; verify that welds meet acceptance criteria; placement of reinforcement fillets; removal of backing bars and weld tabs as required; and repair activities.
 - 11) Provide continuous inspection for full-penetration and partial-penetration groove welds and multi-pass fillet welds.
- h. Inspect bolted connections as follows:
 - 1) Inspect 100% of all pre-tensioned and slip-critical bolted connections.

- 2) Inspect 100% of bolted connections in lateral-load-resisting braced frames and moment frames
 - 3) Inspect 20% of all other bolted connections.
 - 4) For slip-critical bolted connections, verify installation is performed in accordance with one of the following methods:
 - a) Turn-of-Nut: According to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - b) Calibrated Wrench: According to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - c) Twist-off Tension Control Bolt: ASTM F 1852.
 - d) Direct-Tension Control Bolt: ASTM F 1852.
 - 5) For all bolted connections, verify quantity, size and grade of bolts, required surface preparation and proper fit-up of connected elements.
- i. Inspect 100% of the column splices and base joints for verification that gaps in contact bearing do not exceed 1/16 inch.
 - 1) Gaps greater than 1/16 inch shall be reported to the engineer of record for assessment.
 - j. Inspect steel frame for compliance with structural drawings, including bracing, member configuration and connection details.
 - k. Composite steel beams:
 - 1) Observe the welding of shear connectors. Inspect studs for full 360 degree flash.
 - 2) Inspect size, number, positioning and welding of shear connectors.
 - 3) Ring test 100% of shear connectors with a 3 lb hammer.
 - 4) Bend test all questionable studs to 15 degrees.
 - l. Steel grating:
 - 1) Visually inspect the grating for damage during shipping.
 - 2) Verify that the grating depth, type or properties, and finish comply with the contract documents and/or approved shop drawings.
 - 3) Verify all grating attachment to the supporting concrete, steel, and/or masonry as specified in the contract documents and/or approved shop

8. STRUCTURAL STEEL TRUSSES

- a. Visually inspect field splices to ensure that trusses are properly connected before removal of temporary bracing.
- b. Verify that trusses are picked up by the crane at the specified and approved points.
- c. Verify that erection proceeds in the sequence and method as shown on the approved erection plan. Report any discrepancies to the engineer of record.
- d. Welded Connections:
 - 1) Visually inspect all field-welded connections are for conformance with the contract documents and the approved shop drawings.

- 2) Verify that proper welding procedures are being implemented.
- e. Bolted connections:
- 1) Verify bolt and washer sizes and types.
 - 2) Verify the tightening method for high strength bolts and that impact wrenches are being properly calibrated.
 - 3) Visually check that bolts are being tightened properly.
- f. Erection Procedures:
- 1) Obtain a copy of the approved erection plan.
 - 2) Verify that steel is erected in accordance with the approved erection plan.
 - 3) Verify that temporary bracing is installed and is in conformance with the approved erection drawings.
 - 4) Verify that surveys are occurring as required by the contract documents to check plumbness and frame alignment as erection progresses.
 - 5) Review the submitted survey report.
9. POST-INSTALLED ANCHORS AND DOWELS
- a. Inspect post-installed anchor installation at the following frequencies:
- 1) Mechanical Anchors:
 - a) Inspect installation of first 10 post-installed mechanical anchors for each individual installer with each individual anchor product.
 - b) Inspect 10% of remaining anchor installations after the initial verification.
 - 2) Adhesive Anchors and Reinforcing Dowels:
 - a) Inspect installation of first 10 post-installed adhesive anchors for each individual installer with each individual anchor product.
 - b) Inspect 10% of remaining anchor installations after the initial verification.
 - 3) Verify that each inspected anchor and dowel is installed in accordance with manufacturer's printed installation instructions as well as the following requirements:
 - a) Anchor/product type, manufacturer and material grade
 - b) Anchor diameter, length and installed embedment depth
 - c) Hole diameter and depth
 - d) Hole preparation (cleaning procedure and cleanliness)
 - e) Edge distances and spacing
 - f) Inspect expansion bolt installations for proper torque.
 - 4) The following additional requirements apply to adhesive anchors and reinforcing dowels:

- a) Verify the proper adhesive product is used for each application.
- b) Verify the adhesive product being installed has not exceeded its expiration date.
- c) Verify proper mixing and installation of the adhesive

10. EXISTING STRUCTURES

- a. Verify that storage of materials on existing floors has been approved by the engineer of record.
- b. Verify that the demolition and installation limitations defined on the contract documents are not exceeded.
- c. Verify that all demolition and installation procedures are in conformance with the contract documents.
- d. Verify that all hoisting and demolition equipment used on site has been approved or is as specified in the contract documents.
- e. Verify that all new openings in the existing structure have been reviewed by the engineer of record before the commencement of core drilling or demolition.

END OF SECTION 014531

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

This section specifies administrative and procedural requirements for temporary services and facilities, including such items as temporary utility services, temporary construction and support facilities, and project security and protection.

- A. Use Charges: No cost or usage charges for temporary services or facilities are chargeable to the Owner or Engineer. Cost or use charges for temporary services or facilities will not be accepted as a basis of claims for a change-order extra.
- B. Temporary utility services required for use at the project site include but are not limited to the following:
 - 1. Water service and distribution.
 - 2. Temporary electric power and light.
 - 3. Telephone service.
 - 4. Storm and sanitary sewer.
 - 5. Provide adequate utility capacity at each stage of construction. Prior to availability of temporary utilities at the site, provide trucked-in services for start-up of construction operations.
 - 6. Obtain and pay for temporary easements required to bring temporary utilities to the project site, where the Owner's permanent easement cannot be utilized for that purpose.
 - 7. High speed internet service.
- C. Temporary construction and support facilities required for the project include but are not limited to the following:
 - 1. Temporary heat.
 - 2. Field offices and storage sheds.
 - 3. Temporary roads and paving.
 - 4. Sanitary facilities, including drinking water.
 - 5. Dewatering facilities and drains.
 - 6. Temporary enclosures.
 - 7. Project identification, bulletin boards and signs.
 - 8. Waste disposal services.
 - 9. Construction aids and miscellaneous general services and facilities.
 - 10. Alternate temporary services and facilities, equivalent to those specified, may be used, subject to acceptance by the Engineer.
- D. Security and protection facilities and services required for the project include but are not limited to the following:
 - 1. Environmental protection.
 - 2. Alternate security and protection methods or facilities, equivalent to those specified, may be used, subject to acceptance by the Engineer.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-01 Specification sections, apply to the Work of this Section.

1.3 PROPERTY PROTECTION

- A. Care is to be exercised by the Contractor in all phases of construction, to prevent damage and/or injury to the Owner's and/or other property. Payments for the repair and restoration are limited as set forth in the "Conflict With or Damage to Existing Utilities Facilities" of the Supplementary General Conditions.
- B. All exposed existing piping must be immediately supported to prevent damage. Prior to completion of each day's work, such piping must be adequately covered by the Contractor and approved by the Owner's representative.
- C. The Contractor shall avoid unnecessary injury to trees and shall remove only those authorized to be removed by written consent of the Owner. Fences, gates, and terrain damaged or disarranged by the Contractor's forces shall be immediately restored in their original condition or better.

1.4 CONSTRUCTION WARNING SIGNS

- A. The Contractor shall provide construction warning signs for each location where he is working in the state highway right-of-way or in City or County streets. He will further provide flagmen as required and shall abide by all Department of Highways safety rules, including size, type and placement of construction signs. All signs shall be of professional quality.

1.5 ACCESS ROADWAYS

- A. The Contractor shall construct all access roadways needed during construction, and the planned access roadways for the completed project. The Contractor shall maintain access roadways continuously during the construction period.
- B. The Contractor shall maintain all existing roadways within the project site which are used for any purpose by his construction operations. The degree and frequency of maintenance shall be adequate to keep existing roadways in a condition at least equal to their condition prior to construction. Road maintenance shall include daily dust control and grading as necessary on all roads and sweeping of paved roads every other day.

1.6 RESPONSIBILITY FOR TRENCH SETTLEMENT

- A. The Contractor shall be responsible for any settlement caused by the construction, that occurs within one (1) year after the final acceptance of this Contract by the Owner. Repair of any damage caused by settlement shall meet the approval of the Owner.

1.7 WASTE DISPOSAL

- A. The Contractor shall dispose of waste, including hazardous waste, off-site in accordance with all applicable laws and regulations.

1.8 CONTRACTOR'S TRAILERS AND MATERIAL STORAGE

- A. The location of the Contractor's and Subcontractor's office and work trailers and parking areas on the project site shall be subject to the Owner's approval.
- B. The location of the Contractor's and Subcontractor's material storage yards on the project site shall be subject to the Owner's approval.

1.9 QUALITY ASSURANCE

- A. Regulations: Comply with requirements of local laws and regulations governing construction and local industry standards, in the installation and maintenance of temporary services and facilities, including but not limited to the following:
 - 1. Obtain all permits as required by governing authorities.
 - 2. Obtain and pay for temporary easements required across property other than that of Owner.
 - 3. Comply with applicable codes.
 - a. In addition, comply with "Environmental Impact" commitments the Owner or previous Owners of the site may have made to secure approval to proceed with construction of the project.
- B. Inspections: Inspect and test each service before placing temporary utilities in use. Arrange for required inspections and tests by governing authorities, and obtain required certifications and permits for use.

1.10 JOB CONDITIONS

- A. General: Provide each temporary service and facility ready for use at each location when the service or facility is first needed to avoid delay in performance of the Work. Maintain, expand as required, and modify temporary services and facilities as needed throughout the progress of the Work. Do not remove until services or facilities are no longer needed, or are replaced by the authorized use of completed permanent facilities.

With the establishment of the job progress schedule, establish a schedule for the implementation and termination of service for each temporary utility. At the earliest feasible time, and when acceptable to the Owner and Engineer, change over from the use of temporary utility service to the use of the permanent service, to enable removal of the temporary utility and to eliminate possible interference with completion of the Work.

- B. Conditions of Use: Operate temporary services and facilities in a safe and efficient manner. Do not overload temporary services or facilities, and do not permit them to interfere with the

progress of the Work. Do not allow unsanitary conditions, public nuisances or hazardous conditions to develop or persist on the site.

1. Temporary Utilities: Do not permit the freezing of pipes, flooding or the contamination of water sources.
2. Temporary Construction and Support Facilities: Maintain temporary facilities in such a manner as to prevent discomfort to users. Take necessary fire prevention measures. Maintain temporary support facilities in a sanitary manner so as to avoid health problems and other deleterious effects.
3. Security and Protection: Maintain site security and protection facilities in a safe, lawful and publicly acceptable manner. Take necessary measures to prevent erosion of the site.

PART 2 - PRODUCTS

2.1 MATERIALS, EQUIPMENT AND SERVICES

- A. General: Provide new materials and equipment for temporary services and facilities; used materials and equipment that are undamaged and in serviceable condition may be used, if acceptable to the Engineer. Provide only materials and equipment that are recognized as being suitable for the intended use, by compliance with appropriate standards.
- B. Temporary Electricity:
 1. Provide temporary electrical service for construction needs, power to all construction trailers, and for lighting and heating facilities, throughout construction period.
 2. Service shall be adequate for construction use by all trades during construction period.
 3. Contractor shall make all necessary arrangements with the power company to obtain this service. He shall furnish, erect, and maintain the service pole, wires, main switch, panelboards, outlets, lights and metering facilities as required by the power company and as necessary to provide electrical service throughout the construction site.
 4. Contractor shall be responsible for payment of all monthly billing charges for temporary electric power. Contractor shall pay costs of equipment, materials, furnishing, installing, maintenance and removal of temporary electric service facilities.
 5. Contractor shall pay costs of equipment, furnishing, installing, maintenance and removal of temporary service facilities.
 6. Maintenance of temporary electric service shall be the sole responsibility of the General Contractor.
- C. Temporary Lighting:
 1. Furnish and install temporary lighting required for:
 - a. Construction needs.
 - b. Safe and adequate working conditions.
 - c. Public Safety.
 - d. Security lighting.
 - e. Temporary office and storage area lighting.

2. As each building is enclosed, temporary lighting shall be furnished to provide not less than 10 foot-candles in all areas.
3. Service Periods:
 - a. Security lighting: All hours of darkness.
 - b. Safety lighting:
 - c. Within construction area: All times that authorized personnel are present.
 - d. Public areas: At all times.
4. Costs of installation and operation: Contractor shall pay all installation, maintenance and removal costs of temporary lighting.
5. Maintenance of temporary lighting service (replacement of bulbs, etc.) shall be the sole responsibility of the General Contractor.

D. Temporary Heating and Ventilating

1. Furnish and install temporary heat and ventilation in enclosed areas throughout construction period required to:
 - a. Facilitate progress of work.
 - b. Protect work and products against dampness and cold.
 - c. Prevent moisture condensation on surfaces.
 - d. Provide suitable ambient temperatures and humidity levels for installation and curing of materials.
 - e. Provide adequate ventilation to meet health regulations for safe working environment.
 - f. Heat and ventilate temporary field offices for Contractor and for Engineer, and other storage and construction buildings.
 - g. Allow beneficial occupancy of project, or portion of project, prior to final completion, including air conditioning.
2. Temperatures required in buildings:
 - a. Generally, 24 hours a day: Minimum 40 degrees F. (4.5 degrees C.).
 - b. 24 hours a day during placing, setting and curing of cementitious materials: As required by specification section for each product.
 - c. 24 hours a day, seven (7) days prior to, and during, placing of interior finishes; woodwork, flooring, painting and finishing: As required by specification section for each product.
 - d. 24 hours a day after application of finishes, and until Substantial Completion: Minimum 70 degrees F. (21 degrees C.).
 - e. Storage areas: As required by Specification Section for each product.
3. Ventilation Required:
 - a. General: Prevent hazardous accumulations of dusts, fumes, mists, vapors or gases in areas occupied during construction.
 - b. Provide local exhaust ventilation to prevent harmful dispersal of hazardous substances into atmosphere of occupied areas.

- c. Dispose of exhaust materials in a manner that will not result in harmful exposure to persons.
 - d. Ventilate storage spaces containing hazardous or volatile materials.
 - e. Provide adequate ventilation for:
 - 1) Curing installed materials.
 - 2) Dispersal of humidity.
 - 3) Ventilation of temporary sanitary facilities.
 - f. Duration of operation:
 - 1) At all times personnel occupies an area subject to hazardous accumulations of harmful elements.
 - 2) Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful elements.
 - 3) For curing installed materials: As required by specification section for respective materials.
 - 4) For humidity dispersal: As needed to provide suitable ambient conditions for work.
4. Contractor shall pay costs of installation, operation, maintenance and removal of temporary heat and ventilation.
- E. Temporary Telephone and Fax Service:
- 1. Furnish and install temporary telephone service for construction needs throughout construction periods.
 - 2. Pay costs for temporary telephone service including installation, maintenance, and removal.
 - 3. Pay service costs for all local telephone service.
 - 4. Pay costs of toll charges related to construction of the Project.
 - 5. Do not use Owner's existing telephone system.
- F. Temporary Water:
- 1. Contractor shall make his own arrangements at his own expense for obtaining the water supply necessary for construction purposes.
 - 2. Contractor shall pay costs of the furnishing, maintaining and removing all temporary water service equipment, fixtures, hose, piping, etc.
- G. Protection and Security:
- 1. Provide barricades, lanterns and other such signs and signals as may be necessary to warn of the dangers in connection with open excavation and obstructions.
 - 2. Provide an adequate and approved system to secure the project area at all times, especially during non-construction periods; General Contractor shall be solely responsible for taking proper security measures.
 - 3. Contractor shall pay all costs for protection and security systems.

H. Sanitary Facilities:

1. The Contractor shall furnish, install and maintain ample sanitary facilities for the workmen. As the needs arise, enclosed temporary toilets, in sufficient number, shall be placed as directed by the Engineer. Permanent toilets installed under this Contract shall not be used during construction. Drinking water shall be provided from a proven safe source so piped or transported as to be kept clean and fresh and served from single service containers of satisfactory types.

I. Temporary Protection:

1. Temporary Enclosures:

- a. Furnish and install temporary enclosures at doorways, windows and other openings in exterior walls, as necessitated by weather and other conditions, and when required for the progress of the Work. Temporary doors shall be substantially built and hung, equipped with proper hinges, locks and other necessary hardware and shall be removed and reset whenever required to accommodate the work of other trades requiring their removal. All enclosures shall be maintained in good repair and removed when no longer needed. Door and window frames and sills shall be protected as necessary to prevent damage to items during construction.

2. Temporary Covering:

- a. Provide substantial temporary wood covering over all floor openings for ducts, shafts, equipment, etc., using rough planking at least two (2) inches thick, cleated together and made sufficiently strong and put in place wherever required.

3. Temporary Railing:

- a. Temporary railing shall be provided on stairs and around wells, pits and other locations where needed, to prevent accidents or injury to persons.

J. Project Sign:

1. The Contractor shall provide sign(s), as detailed hereinafter, near the site of the work. The sign(s) shall set forth the description of the work and the names of the Owner, Engineer, and Contractor, and other information as required.
2. The sign shall be constructed of 3/4-inch thick APA A-B Exterior grade or marine plywood. Posts shall be 4" x 4" of fencing type material. Prime all wood with white primer.
3. The sign shall be maintained in good condition until completion of the project.

K. Contractor's Field Office:

1. Each Contractor shall establish and maintain a field office on his project and have available at the office a responsible representative who can officially receive instructions from the Engineer. The Contractor's Field Office shall be provided in accordance with Section 01 52 13.

L. Resident Project Representative's Field Office:

1. The Contractor shall furnish and maintain a field office for the exclusive use of the Resident Project Representative at a location designated by the Engineer and shall be in accordance with the requirements of Section 01 52 13.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

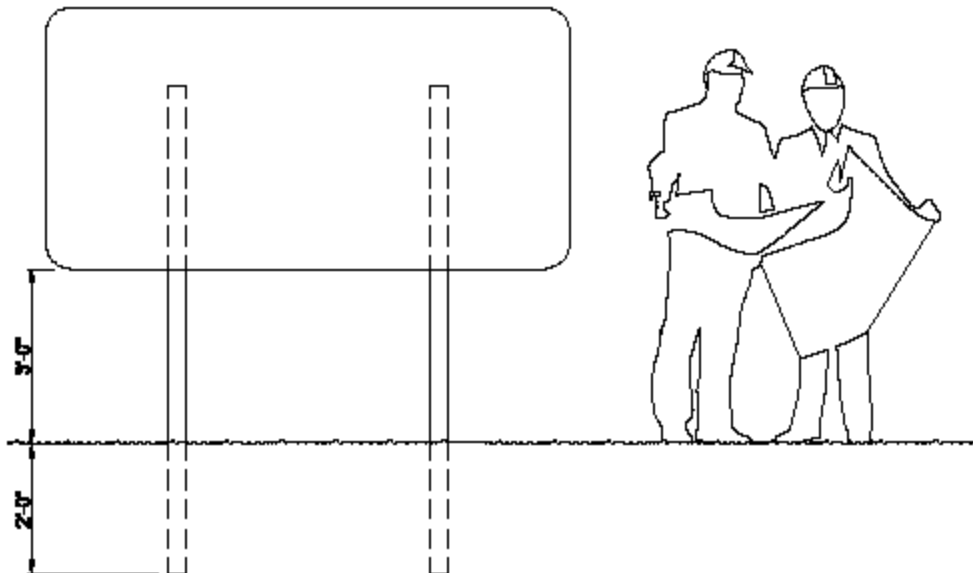
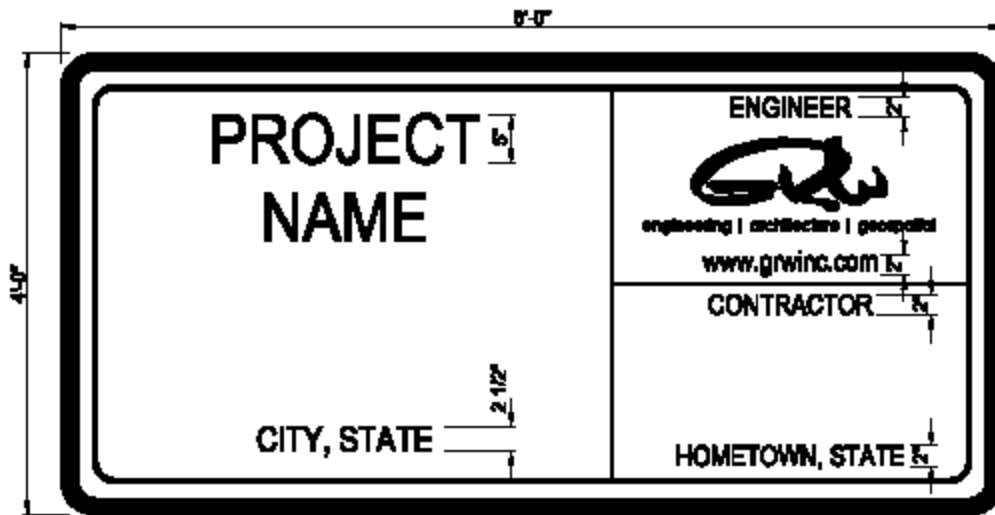
- A. Use qualified tradesmen for installation of temporary services and facilities. Locate temporary services and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the Work.
- B. Relocate, modify and extend services and facilities as required during the course of work so as to accommodate the entire work of the Project.

3.2 REMOVAL

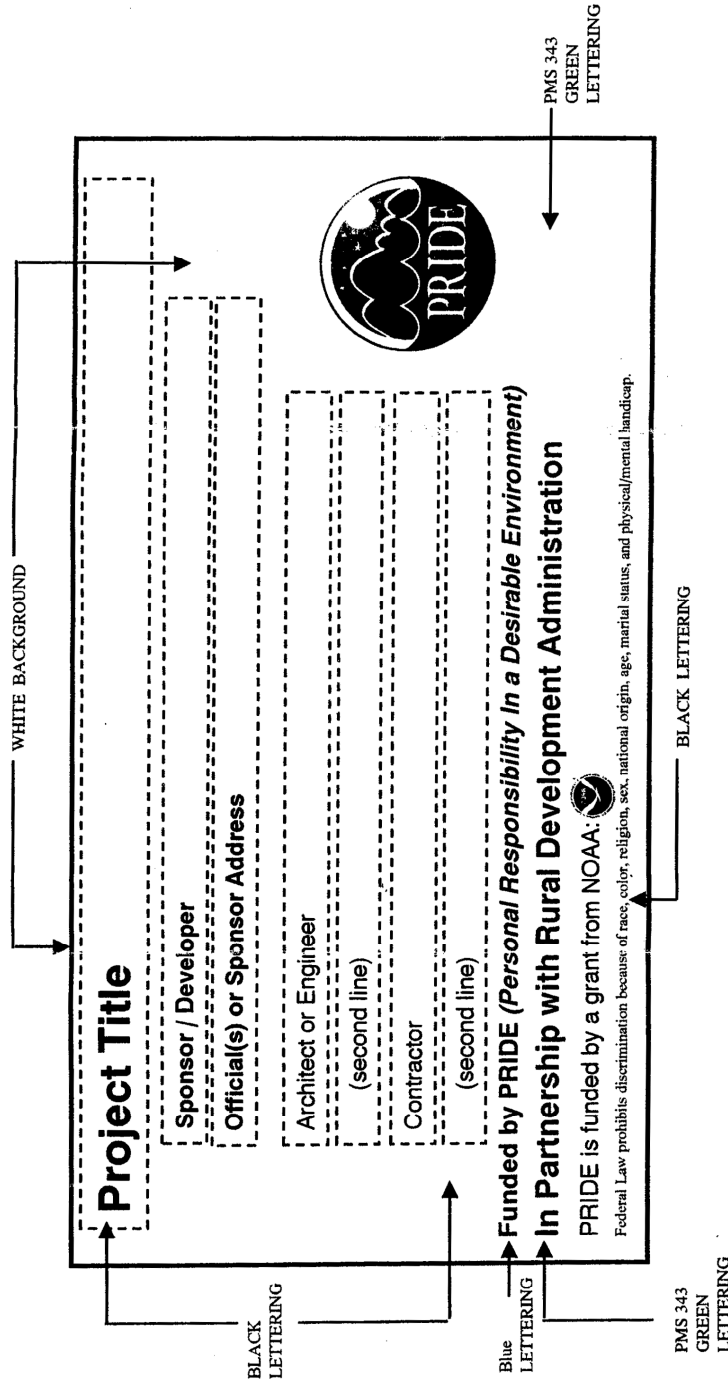
- A. Completely remove temporary materials, equipment, and offices upon completion of construction.
- B. Repair damage caused by installation, and restore to specified or original condition.

END OF SECTION 015000

Figure 1: Typical Project Sign



temporary construction sign for PRIDE projects



SIGN DIMENSIONS: 1200mm x 2400mm x 19mm (approx. 4' x 8' x 3/4")
 PLYWOOD PANEL (APA RATED A-B GRADE - EXTERIOR)

2/5/02

Temporary Black & White Construction Sign for projects funded by the
Department for Local Government (DLG)

Steven L. Beshear
Governor



Office of the Governor
Department for Local Government

Tony Wilder
Commissioner

Project Title
Centered, Black Letters

Project Sponsor: City or County Government

Sponsor Address:

Architect or Engineer:

Contractor:



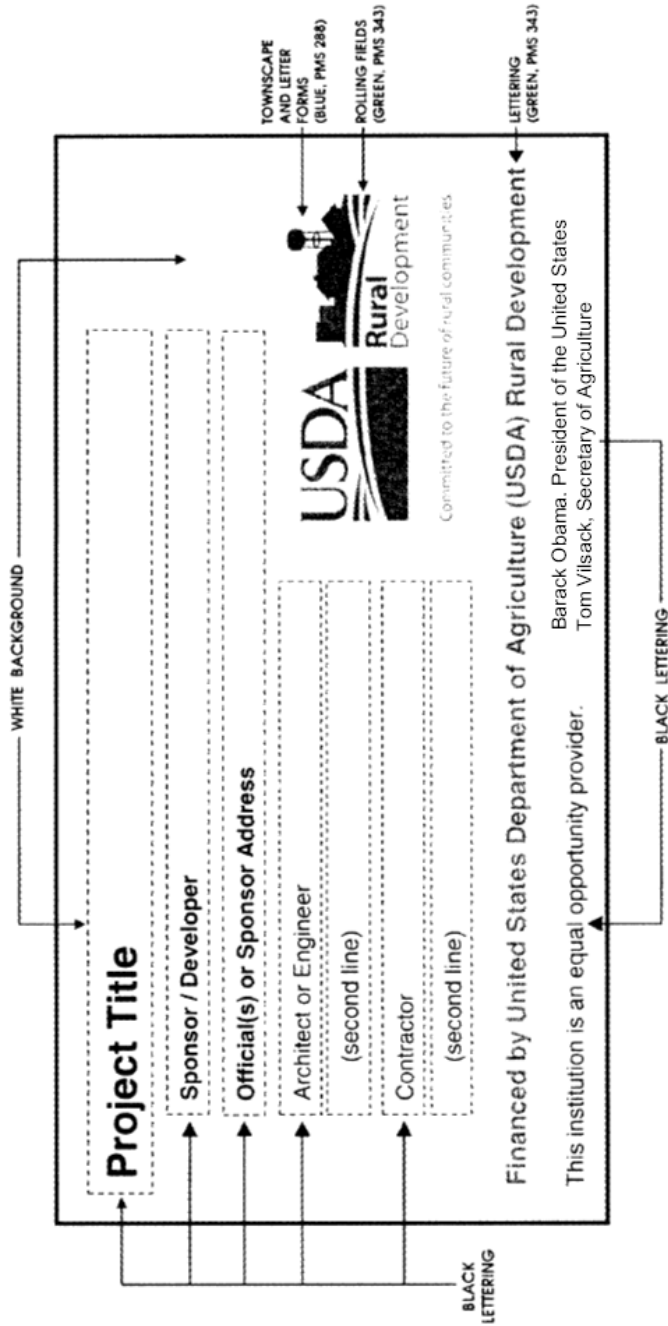
This project is funded by a Community
Development Block Grant administered by the
Department for Local Government and
financed by the U.S. Department of Housing
and Urban Development.
Equal Opportunity Employer

Sign Dimensions: 1200mm x 2400mm x 19 mm (app. 4' x 8' x 3/4") Plywood Panel (APA Rated A-B grade – Exterior)

USE THIS SIGN FOR CDBG FUNDED PROJECTS

USE THIS SIGN FOR RD FUNDED PROJECTS

**TEMPORARY CONSTRUCTION SIGN FOR
RURAL DEVELOPMENT PROJECTS**



SIGN DIMENSIONS: 1200 mm x 2400 mm x 19 mm (approx. 4' x 8' x 3/4")
PLYWOOD PANEL (APA RATED A-B GRADE-EXTERIOR)

SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

- A. Definition: "Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other Work and subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cutting and patching" is performed for coordination of the work, to uncover work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes upon written instructions of the Engineer.
- C. Cutting and patching is performed during the manufacture of products, or during the initial fabrication. Erection or installation processes are not considered to be "cutting and patching" under this definition. Drilling of holes to install fasteners and similar operations are also not considered to be "cutting and patching".
- D. "Cutting and Patching" includes removal and replacement of Work not conforming to requirements of the Contract Documents, removal and replacement of defective Work, and uncovering Work to provide for installation of ill-timed Work.
- E. No Work shall be endangered by cutting or altering Work or any part of it.

1.2 RELATED DOCUMENTS

- A. Drawing and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to Work of this Section.

1.3 SUBMITTALS

- A. Prior to cutting which affects structural safety of Project, submit written notice to the Engineer, requesting consent to proceed with cutting, including:
 - 1. Identification of Project.
 - 2. Description of affected work.
 - 3. Necessity for cutting.
 - 4. Effect on structural integrity of Project.
 - 5. Description of proposed work. Designate:
 - a. Scope of cutting and patching.
 - b. Trades to execute work.
 - c. Products proposed to be used.
 - d. Extent of refinishing.
 - 6. Alternatives to cutting and patching.

- B. Should conditions of work, or schedule, indicate change of materials or methods, submit written recommendation to the Engineer, including:
 - 1. Conditions indicating change.
 - 2. Recommendations for alternative materials or methods.
 - 3. Submittals as required for Substitutions.
- C. Submit written notice to the Engineer, designating time Work will be uncovered, to provide for observation.

1.4 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural Work in a manner that would result in a reduction of load-carrying capacity or of load-deflection ratio.
- B. Operational and Safety Limitations: Do not cut and patch operational elements or safety related components in a manner that would result in a reduction of their capacity to perform in the manner intended, including energy performance, or that would result in increased maintenance, or decreased operational life or decreased energy.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. For replacement of work removed, comply with Specifications for type of work to be done.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Before cutting, examine the surfaces to be cut and patched and the conditions under which the Work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the Work.

3.2 PREPARATION

- A. Temporary Support: To prevent failure, provide temporary support of Work to be cut. Provide shoring, bracing and support as required to maintain structural integrity of project.
- B. Protection: Protect other Work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas. Take precautions not to cut existing pipe, conduit or duct serving the building but scheduled to be relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching Work. Except as otherwise indicated or as approved by the Engineer, proceed with cutting and patching at the earliest feasible time and complete Work without delay.
- B. Cutting: Cut the Work using methods that are least likely to damage work to be retained or adjoining Work. Where possible, review proposed procedures with the original installer; comply with original installer's recommendations.
 - 1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine such as a carborundum saw or core drill to insure a neat hole. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.
 - 2. Comply with requirements of applicable sections of Division 2 where cutting and patching requires excavating and backfilling.
 - 3. By-pass utility services such as pipe and conduit, before cutting, where such utility services are shown or required to be removed, relocated or abandoned. Cut-off conduit and pipe in wall or partitions to be removed. After by-pass and cutting, cap, valve or plug and seal tight remaining portion of pipe and conduit to prevent entrance of moisture or other foreign matter.
- C. Patching: Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the Work.
 - 1. Where feasible, inspect and test patched areas to demonstrate integrity of work.
 - 2. Restore exposed finishes of patched areas and where necessary, extend finish restoration into retained adjoining Work in a manner which will eliminate evidence of patching and refinishing.
 - 3. Execute fittings and adjustment of products to provide finished installations to comply with specified tolerances.
 - 4. Restore work which has been cut or removed; install new products to provide completed work in accord with requirements of Contract Documents.
 - 5. Refinish entire surfaces as necessary to provide an even finish.
 - a. Continuous Surfaces: To nearest intersection.
 - b. Assembly: Entire refinishing.

3.4 CLEANING

- A. Thoroughly clean areas and spaces where Work is performed or used as access to work. Remove completely point, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 017329

SECTION 017400 - CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

- A. Maintain premises free from accumulations of waste, debris, and rubbish.
- B. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all exposed surfaces. Leave project clean and ready for occupancy.

1.2 RELATED DOCUMENTS

- A. Cutting and Patching: Section 01 73 29.
- B. Project Closeout: Section 01 77 00.
- C. Cleaning for Specific Products of Work: Specification Section for that work.

1.3 SAFETY REQUIREMENTS

- A. Hazards Control:
 - 1. Store volatile wastes in covered metal containers, and remove from premises daily.
 - 2. Prevent accumulation of wastes which create hazardous conditions.
 - 3. Provide adequate ventilation during use of violative noxious substances.
- B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on project site.
 - 2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
 - 3. Do not dispose of wastes into streams or waterways.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.1 DURING CONSTRUCTION

- A. Execute cleaning to ensure that building, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.
- B. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
- C. At reasonable intervals during progress of work, clean site and public properties, and dispose of waste materials, debris and rubbish.
- D. Provide on-site containers for collection of waste materials, debris and rubbish.
- E. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.
- F. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- G. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

3.2 FINAL CLEANING

- A. Employ experienced workmen, or professional cleaners, for final cleaning.
- B. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- C. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from sight-exposed interior or exterior finished surfaces; polish surfaces so designated to shine finish.
- D. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.
- E. Broom clean paved surfaces; rake clean other surfaces of grounds.
- F. Maintain cleaning until project, or portion thereof, is occupied by Owner.

END OF SECTION 017400

SECTION 017700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Liquidated Damages: Supplemental General Conditions
- B. Cleaning: Section 017400.
- C. Project Record Documents: Section 017839.

1.2 SUBSTANTIAL COMPLETION

- A. In order to initiate project closeout procedures, the Contractor shall submit the following:
 - 1. Written certification to Engineer that project is Substantially Complete.
 - 2. List of major items to be completed or corrected.
- B. Engineer will make an inspection within seven (7) days after receipt of certification, together with Owner's Representative.
- C. Should Engineer consider that work is Substantially Complete:
 - 1. Contractor shall prepare, and submit to Engineer, a list of items to be completed or corrected, as determined by the inspection.
 - 2. Engineer will prepare and issue a Certificate of Substantial Completion, containing:
 - a. Date of Substantial Completion.
 - b. Contractor's list of items to be completed or corrected, verified and amended by Engineer.
 - c. The time within which Contractor shall complete or correct work of listed items.
 - d. Time and date Owner will assume possession of work or designated portion thereof.
 - e. Responsibilities of Owner and Contractor for:
 - 1) Insurance
 - 2) Utilities
 - 3) Operation of Mechanical, Electrical, and Other Systems.
 - 4) Maintenance and Cleaning.
 - 5) Security.
 - f. Signatures of:
 - 1) Engineer
 - 2) Contractor
 - 3) Owner

3. Owner occupancy of Project or Designated Portion of Project:
 - a. Contractor shall:
 - 1) Obtain certificate of occupancy.
 - 2) Perform final cleaning in accordance with Section 017400.
 - b. Owner will occupy Project, under provisions stated in Certificates of Substantial Completion.
 4. Contractor: Complete work listed for completion or correction, within designated time.
- D. Should Engineer consider that work is not Substantially Complete:
1. He shall immediately notify Contractor, in writing, stating reasons.
 2. Contractor: Complete work, and send second written Engineer, certifying that Project, or designated portion of Project is substantially complete.
 3. Engineer will reinspect work.
- E. Should Engineer consider that work is still not finally complete:
1. He shall notify Contractor, in writing, stating reasons.
 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send third written notice to the Engineer certifying that the work is complete.
 3. Engineer and Owner will reinspect work at Contractor's expense.

1.3 FINAL INSPECTION

- A. Contractor shall submit written certification that:
1. Contract Documents have been reviewed.
 2. Project has been inspected for compliance with Contract Documents.
 3. Work has been completed in accordance with Contract Documents.
 4. Equipment and systems have been tested in presence of Owner's Representative and are operational.
 5. Project is completed, and ready for final inspection.
- B. Engineer will make final inspection within seven (7) days after receipt of certification.
- C. Should Engineer consider that work is finally complete in accordance with requirements of Contract Documents, he shall request Contractor to make Project Closeout submittals.
- D. Should Engineer consider that work is not finally complete:
1. He shall notify Contractor in writing, stating reasons.
 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to Engineer certifying that work is complete.
 3. Engineer will reinspect work.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: To requirements of Section 017839.
- B. Guarantees, Warranties and Bonds: To requirements of particular technical Specifications and Section 017834.

1.5 INSTRUCTION

- A. Instruct Owner's personnel in operation of all systems, mechanical, electrical, and other equipment.

1.6 FINAL APPLICATION FOR PAYMENT

- A. Contractor shall submit final applications in accordance with requirements of General Conditions.

1.7 FINAL CERTIFICATE FOR PAYMENT

- A. Engineer will issue final certificate in accordance with provisions of general conditions.
- B. Should final completion be materially delayed through no fault of Contractor, Engineer may issue a Semi-Final Certificate for Payment.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 017700

SECTION 017823 – OPERATIONS AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Compile product data and related information appropriate for Owner's maintenance and operation of equipment furnished under the Contract. Prepare operating and maintenance data as specified.
- B. In addition to maintenance and operations data, the manufacturer's printed recommended installation practice shall also be included. If not part of the operations and maintenance manual, separate written installation instructions shall be provided, serving to assist the Contractor in equipment installation.
- C. Related requirements specified elsewhere:
 - 1. Shop Drawings, Product Data and Samples: 01 33 23.
 - 2. Project Closeout: Section 01 77 00.
 - 3. Project Record Documents: Section 01 78 39.
 - 4. Warranties and Bonds: Section 01 78 34.

1.2 QUALITY ASSURANCE

- A. Preparation of data shall be done by personnel:
 - 1. Trained and experienced in maintenance and operation of the described products.
 - 2. Completely familiar with requirements of this Section.
 - 3. Skilled as a technical writer to the extent required to communicate essential data.
 - 4. Skilled as a draftsman competent to prepare required drawings.

1.3 SUBMITTAL SCHEDULE

- A. Submit one (1) printed copy of operation and maintenance data for each item of equipment prior to 80% completion of the Contract. Binder is not required for Preliminary submittals. Digital submittal is **NOT** required for preliminary review.
- B. Upon approval of **ALL** O&M submittal items, the complete manual shall be assembled as described in the following sections.
- C. The complete, assembled Operation and Maintenance Manual shall be submitted ten (10) days prior to final inspection or acceptance to the Owner. Provide a total of two (2) hard copies and one (1) digital copy of the complete manual. Do not submit individual equipment items as final O&M manuals. The final submittal shall be the **COMPLETE** assembled manual, with a master table of contents included.

1.4 FORM OF SUBMITTALS

- A. Format: Preliminary submittals may be made of each individual item of equipment. The final O & M Manual shall be assembled by combining the individual equipment submittals in one or more 3-ring binder(s). Large equipment operating and maintenance instructions may be contained in their individual binder(s). Smaller O&M instructions shall be assembled in a binder, with the sections separated by a tabbed divider page, and a table of contents.
1. Size: 8-1/2 in. x 11 in.
 2. Paper: 20 pound minimum, white, for typed pages.
 3. Text: Manufacturer's printed data, or neatly typewritten.
 4. Photo copies must be clear and legible.
 5. Drawings:
 - a. Provide reinforced punched binder tab, bind in with text.
 - b. Fold large drawings to the size of the text pages where feasible.
 - c. For flow or piping diagrams that cannot be detailed on the standard size drawings, a larger, appropriate size drawing may be submitted and supplied in a properly marked map packet.
 6. Provide fly-leaf for each separate product, or each piece of operating equipment.
 - a. Provide typed description of product, and major component parts of equipment.
 - b. Provide indexed tabs.
 7. Cover: Identify each volume with types or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:
 - a. Title of Project.
 - b. Identity of separate structure as applicable.
 - c. Identity of general subject matter covered in the manual.
- B. Binders:
1. Commercial quality, durable and cleanable, 3-ring binders, with oil and moisture resistant hard covers.
 3. Imprinted on the front cover and side of each binder shall be the name of the treatment plant or project, the Contract Number and the title of equipment.
 4. Binders shall be new and not recycled from a prior data manual.

1.5 CONTENTS OF MANUAL

- A. Table of Contents: Each item shall be placed in a logical sequential order, according to the operating process of the facility as shown on the Hydraulic Profile in the Contract Drawings.
- B. Content, for each unit of equipment and system, as appropriate:
1. Process Description: Detailed description of the process and operation functions as applicable.

2. Component Instructions: Instructions for all components of the equipment whether manufactured by the supplier or not, including valves, controllers and other miscellaneous components.
3. Component Data: Description of unit and component parts.
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data and tests.
 - c. Complete nomenclature and commercial number of all replaceable parts.
 - d. Exploded and/or sectional drawing views.
 - e. Piping diagrams numbered to correspond to the installation.
 - f. Equipment model number and serial number.
4. Control and Wiring Diagrams:
 - a. Internal and external wiring diagrams numbered to correspond to the installation.
 - b. Control circuit diagrams
 - c. One line diagrams
 - d. P&ID drawings
 - e. As-installed control diagrams by controls supplier.
5. Operating procedures:
 - a. Start-up, break-in, routine and normal operating instructions.
 - b. Regulation, control, stopping, shutdown and emergency instructions.
 - c. Summer and winter operating instructions.
 - d. Special operating instructions.
 - e. Description of sequence of operation by control supplier.
6. Maintenance Procedures:
 - a. Routine operations.
 - b. Guide to "trouble-shooting".
 - c. Disassembly, repair and reassembly.
 - d. Alignment, adjusting and checking.
 - e. Equipment parts list.
 - f. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
 - 1) Predicted life of parts subject to wear.
 - g. Local service center.
7. Lubrication and Service schedule.
 - a. Preventative maintenance schedule.
 - b. Component lubrication and servicing interval schedule.
 - c. List of lubricants and/or filters required.
 - d. Lubrication and servicing procedures.
8. Recommended spare parts list and quantities.

9. Guide to "trouble-shooting".
 10. Plant specific instructions:
 - a. Each Contractor's coordination drawings.
 - b. As-installed color coded piping diagrams.
 - c. Detailed specific "Sequence of Operation" for the constructed plant or project.
 - d. Charts of valve tag numbers, if appropriate, with the location and function of each valve.
 11. Plant specific start-up and shut-down procedures.
 12. Detailed instructions for emergency operation
 13. Other data as required under pertinent sections of Specifications.
- C. Content, for each electrical system, as appropriate:
1. Description of system and component parts.
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data and tests.
 - c. Complete nomenclature and commercial number of replacement parts.
 2. Circuit directories of panel boards.
 - a. Electrical service.
 - b. Controls.
 - c. Communications.
 3. As-installed color-coded wiring diagrams.
 4. Operating procedures:
 - a. Routine and normal operating instructions.
 - b. Sequences required.
 - c. Special operating instructions.
 5. Maintenance procedures:
 - a. Routine operations.
 - b. Guide to "trouble-shooting".
 - c. Disassembly, repair and reassembly.
 - d. Adjustment and checking.
 6. Manufacturer's printed operating and maintenance instructions.
 7. List of original manufacturer's recommended spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
- D. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel.
- E. Additional requirements for operating and maintenance data: The respective section of Specifications.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 017823

		Manufacturer Submittals/ Operation and Maintenance Manual Review Guide										Project Name						
												Project Number						
Spec Section	Equipment Items	Initial Submittal Date	Format/Binder/TOC	Manufacturer Data	Process Description	Component Instructions	Operating Procedures	Maintenance Procedures	Lubrication Schedule	Plant Specific Instructions	Parts List	Spare Parts List	Troubleshooting Guide	Start-up/Shut-Down	Emergency Operation	Control Diagrams	Model/Serial Number	Notes

SECTION 017834 - WARRANTIES AND BONDS

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

- A. Compile specified warranties and bonds.
- B. Compile specified service and maintenance contracts.
- C. Co-execute submittals when so specified.
- D. Review submittals to verify compliance with Contract Documents.
- E. Submit to Engineer for review and transmittal to Owner. **Comply with provisions of Section 013323.**

1.2 RELATED DOCUMENTS

- A. Bid Bond: Instructions to Bidders.
- B. Performance and Payment Bonds: General Conditions and Supplemental General Conditions.
- C. Guaranty: General Conditions and Supplemental General Conditions.
- D. General Warranty of Construction: General Conditions.
- E. Project Closeout: Section 017700.
- F. Warranties and Bonds required for specific products: As listed in technical specifications in these Contract Documents herein.
- G. Provisions of Warranties and Bonds, Duration: Respective specification sections for particular products.

1.3 SUBMITTALS REQUIREMENTS

- A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers and subcontractors.
- B. Furnish two (2) original signed copies.
- C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.
 - 1. Product, equipment or work item.

2. Firm name, address and telephone number.
3. Scope
4. Date of beginning of warranty, bond or service and maintenance contract.
5. Duration of warranty, bond or service and maintenance contract.
6. Provide information for Owner's personnel:
 - a. Proper procedure in case of failure.
 - b. Instances which might affect the validity of warranty or bond.
7. Contractor name, address and telephone number.

1.4 FORM OF SUBMITTALS

- A. Prepare in duplicate packets.
- B. Format:
 1. Size 8-1/2 in. x 11 in., punch sheets for 3-ring binder.
 - a. Fold larger sheets to fit into binders.
 2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS."
List:
 - a. Title of Project
 - b. Name of Contractor
- C. Binders: Commercial quality, three-ring, with durable and cleanable plastic covers.

1.5 TIME OF SUBMITTALS

- A. For equipment or component parts of equipment put into service during progress of construction:
 1. Submit documents within 10 days after inspection and acceptance.
- B. Otherwise make submittals within 10 days after date of substantial completion, prior to final request for payment.
- C. For items of work, where acceptance is delayed materially beyond the Date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing the date of acceptance as the start of the warranty period.

1.6 SUBMITTALS REQUIRED

- A. Submit warranties, bonds, service and maintenance contracts as specified in the respective sections of the Specifications.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 017834

SECTION 017839 - PROJECT RECORD DOCUMENTS - WATER

PART 1 - GENERAL

1.1 MAINTENANCE OF DOCUMENTS

- A. Maintain at job site, one copy of:
 - 1. Contract Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Reviewed Shop Drawings
 - 5. Change Orders
 - 6. Other Modifications to Contract
- B. Store documents in approved location, apart from documents used for construction.
- C. Provide files and racks for storage of documents.
- D. Maintain documents in clean, dry, legible condition.
- E. Do not use record documents for construction purposes.
- F. Make documents available at all times for inspection by Engineer and Owner.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Shop Drawings, Product Data, and Samples: Section 01 33 23.

1.3 MARKING DEVICES

- A. Provide colored pencil or felt-tip marking pen for all marking.

1.4 RECORDING

- A. Label each document "PROJECT RECORD" in 2-inch high printed letters.
- B. Keep record documents current.
- C. Do not permanently conceal any work until required information has been recorded.
- D. Contract Drawings: Legibly mark to record actual construction:
 - 1. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.

2. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
3. Field changes of dimension and detail.
4. Changes made by Change Order or Field Order.
5. Details not on original Contract Drawings.

E. Specifications and Addenda: Legibly mark up each section to record:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
2. Changes made by Change Order or Field Order.
3. Other matters not originally specified.

F. Shop Drawings: Maintain as record documents; legibly annotate shop drawings to record changes made after review. Coordinate and confirm with Engineer that electronic versions of all shop drawings have been provided to Engineer.

1.5 SUBMITTALS

A. At completion of project, deliver record documents to Engineer.

B. Accompany submittal with transmittal letter, in duplicate, containing:

1. Date.
2. Project Title and Number.
3. Contractor's Name and Address.
4. Title and Number of each Record Document.
5. Certification that each Document as Submitted is Complete and Accurate.
6. Signature of Contractor, or His Authorized Representative.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 017839

DIVISION 02
EXISTING CONDITIONS

SECTION 024100 - DEMOLITION & SALVAGE

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Provide all labor, materials, equipment and services required for demolition as shown on the Drawings and specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Earthwork: Section 31 20 00

1.3 PROCEDURE

- A. The procedures proposed for the accomplishment of salvage and demolition work shall be submitted for review. The procedures shall provide for safe conduct of the work, careful removal and disposition of materials specified to be salvaged, protection of property which is to remain undisturbed, coordination with other work in progress and timely disconnection of utility services. The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operations.
- B. It is the responsibility of the Contractor to visit the site to familiarize himself with the amount of Work that is included under this Section.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 DUST CONTROL

- A. The amount of dust resulting from the demolition shall be controlled to prevent the spread of dust to occupied portions of the plant and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding and pollution.

3.2 DISCONNECTION OF UTILITY SERVICES

- A. Utilities shall be disconnected at the points indicated by the Owner or Engineer and left in a safe condition.

3.3 BURNING

- A. The use of burning at the project site for the disposal of refuse and debris will not be permitted, unless authorized in writing by the Owner.

3.4 PROTECTION OF EXISTING WORK

- A. Existing work to remain shall be protected from damage. Work damaged by the Contractor shall be repaired to match existing work.

3.5 BACKFILL OF STRUCTURES

- A. All existing structures to be abandoned shall have equipment removed and walls demolished a minimum of two feet below finish grade. The portion of the demolished structures remaining below grade shall be backfilled with concrete, masonry, etc., from the demolition or any backfill material which is acceptable to the Engineer. The top two (2) feet of the backfill shall be made up of topsoil and graded to match the existing ground. It shall be free of any of the demolition material. The entire backfill shall be compacted in such a manner as to prevent settlement.
- B. All existing demolished basins shall have some method of positive drainage thru the bottom slab as approved by the Engineer.
- C. It is the responsibility of the Contractor to dispose of all excess demolition material from the site as soon as practicable.

3.6 SALVAGE MATERIAL

- A. All equipment, pumps, controls, valves, piping, etc., is the property of the Owner and care shall be taken in its removal so not to damage it in any way. Such salvage material shall be removed and delivered to the Owner to a site designated by him. The Owner has the right to refuse any salvage material, and in such cases it is the responsibility of the Contractor to dispose of the unwanted material.

END OF SECTION 024100

DIVISION 03

CONCRETE

SECTION 030132 - CONCRETE REHABILITATION BY PATCHING, RESURFACING AND REFORMING

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Furnish all materials, labor, tools, equipment and services necessary for the preparation of the substrate and the application of the concrete repair systems as indicated by the drawings and specifications.
- B. This specification describes the patching or overlay of exterior vertical surfaces with a penetrating corrosion inhibitor to reduce the effects of corrosion in reinforced concrete. Removal of existing concrete and formwork for replacement mortar/concrete may be required.

1.2 QUALITY ASSURANCE

- A. Manufacturing qualifications: The manufacturer of the specified product shall be ISO 9001 certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis.
- B. Contractor qualifications: Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have received product training by a manufacturer's representative.
- C. Install materials in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.
- D. The contractor shall schedule a site meeting with a representative of the product prior to commencement of work. The representative of the product shall be available as reasonably requested throughout the project.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. All materials must be delivered in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers. Damaged material must be removed from the site immediately.
- B. Store all materials off the ground and protect from rain, freezing or excessive heat until ready for use.
- C. Condition the specified product as recommended by the manufacturer.

1.4 JOB CONDITIONS

- A. Environmental Conditions: Do not apply material if it is raining or snowing or if such conditions appear to be imminent. Minimum application temperature 40°F (5°C) and rising.
- B. Protection: Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified material.

1.5 SUBMITTALS

- A. Submit two copies of manufacturer's literature, to include: Product Data Sheets, and appropriate Material Safety Data Sheets (MSDS).
- B. Comply with requirements of Section 01 33 23.

1.6 WARRANTY

- A. Provide a written warranty from the manufacturer against defects of materials for a period of five (5) years, beginning with date of substantial completion of the project.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The specified products have been selected to establish a minimum standard of quality that will be accepted. The listing of the product is not intended to limit competition, but to establish the standard of quality. Proposed substitutions must be submitted, and shall conform to the standard of quality, as established in these specifications.
- B. Specified product: Sika Armatex 110 and SikaTop 111 Plus as manufactured by Sika Corporation, Lyndhurst, New Jersey.

2.2 PERFORMANCE CRITERIA

- A. Bond strength (ASTM C882, 14 day moist cure): >2,500 psi.
- B. Compressive strength (ASTM C-109, 28 day): >8,000 psi.
- C. Flexural strength (ASTM C-348, 28 day): >1,000 psi.
- D. Splitting tensile strength (ASTM C-496, 28 day): >500 psi.
- E. Open time at 68oF: 0 to 12 hours.
- F. Corrosion initiation (Time-to-Corrosion Study): > 3 times untreated.

- G. Corrosion rate (Time-to-Corrosion Study): > 40% reduction.

2.3 POLYMER-MODIFIED PORTLAND CEMENT MORTAR

- A. Component A shall be a liquid polymer emulsion of an acrylic copolymer base and additives.
 - 1. pH: 4.5-6.5
 - 2. Film Forming Temperature: 73°F max.
 - 3. Tear Strength: 950-psi min.
 - 4. Elongation at Break: 500% min.
- B. Component A shall contain an organic, penetrating corrosion inhibitor which has been independently proven to reduce corrosion in concrete via ASTM G3 (half-cell potential tests). The corrosion inhibitor shall not be calcium nitrite, and shall have a minimum of 5 years of independent field-testing to document performance on actual construction projects.
- C. Component B shall be a blend of selected Portland cements, specially graded aggregates, admixtures for controlling setting time, water reducers for workability, and an organic accelerator.
- D. The materials shall be non-combustible, both before and after cure.
- E. The materials shall be supplied in a factory-proportioned unit.
- F. The polymer-modified, Portland cement mortar must be placeable from 1/2-in. to 1-in. in depth per lift for horizontal applications.
- G. To prepare a polymer-modified Portland cement concrete: aggregate shall conform to ASTM C-33. The factory-proportioned unit shall be extended with 42-lb. max. of a 3/8 in. (No. 8 distribution per ASTM C-33, Table II) clean, well graded, saturated surface dry aggregate, having low absorption and high density. Aggregate must be approved for use by the engineer.

2.4 PERFORMANCE CRITERIA

- A. Typical Properties of the mixed polymer-modified, Portland cement mortar:
 - 1. Working Time: Approximately 30 minutes.
 - 2. Finishing Time: 50-120 minutes
 - 3. Color: concrete gray
- B. Typical Properties of the cured polymer-modified, Portland cement mortar:
 - 1. Compressive Strength (ASTM C-109 Modified)
 - a. 1 day: 2500 psi min. (17.2 MPa)
 - b. 7 day: 5500 psi min. (37.9 MPa)
 - c. 28 day: 7000 psi min. (48.3 MPa)

2. Flexural Strength (ASTM C-293) @ 28 days: 1500 psi (10.3 MPa)
3. Splitting Tensile Strength (ASTM C-496) @ 28 days 700 psi (4.8 MPa)
4. Bond Strength (ASTM C-882 Modified) @ 28 days: 2500 psi (17.2 MPa)
5. The Portland cement mortar shall not produce a vapor barrier.
6. Density (wet mix): 136 lbs. / cu. ft. (2.18 kg/l)
7. Permeability (AASHTO T-277 @ 28 days Approximately 500 Coulombs)

PART 3 - EXECUTION

3.1 SURFACE PREPARATION FOR MORTAR APPLICATION

- A. Areas to be repaired must be clean, sound, and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means. Mechanically prepare the concrete substrate to obtain a surface profile of +/- 1/16" (CSP 5 or greater as per ICRI Guidelines) with a new exposed aggregate surface. Area to be patched shall not be less than 1/2" in depth.
- B. Where reinforcing steel with active corrosion is encountered, sandblast the steel to a white metal finish to remove all contaminants and rust. Where corrosion has occurred due to the presence of chlorides, the steel shall be high pressure washed after mechanical cleaning. Prime steel with 2 coats of Sika Armatec 110 EpoCem (Bonding Agent) as directed by manufacturer.

3.2 PREPARATION AND APPLICATION FOR BONDING AGENT

- A. Surfaces should be clean and sound with an open textured surface. Remove all grease, curing compounds, surface treatments, coatings, oils, and the like by mechanical means such as sandblasting or waterblasting. Substrate must be saturated surface dry. All standing water must be removed. Steel must be thoroughly cleaned with rust removed.
- B. The bonding agent should be applied to achieve 80 sq ft/gal, or 20 mils in thickness. Spray application is best means of production to gain coverage. Work the product into the pore structure of the substrate using a stiff-bristle broom or brush. Place concrete or repair mortar following application, or up to open time appropriate for existing temperature conditions. For steel coating, apply product at 20 mils thickness, wait at least 2 hours, and apply second coat at 20 mils thickness. Wait at least 2 hours for second coat to dry before placing repair mortar or concrete.
- C. Adhere to all procedures, limitations, and cautions for the product in the manufacturer's current printed literature.

3.3 MIXING AND APPLICATION

- A. Mechanically mix in appropriate sized mortar mixer or with a Sika jiffy paddle and low speed (400-600 rpm) drill. Pour approximately 4/5 gal Component A into the mixing container. Add Component B while continuing to mix. Mix to a uniform consistency for a maximum of three minutes. Add remaining Component A to mix if a more loose consistency is desired. Should smaller quantities be needed, be sure the components are measured in the correct ratio and that

the Component B is uniformly blended before mixing the components together. Mix only that amount of material that can be placed in 30 minutes. Do not retemper material.

- B. Mixing of the polymer-modified Portland cement concrete: Pour all (1-gal) of Component A into the mixing container. Add Component B while continuing to mix. Add correct amount of the pre-approved coarse aggregate, and continue mixing to a uniform consistency. Mixing time should be 3 minutes maximum.
- C. Placement Procedure: At the time of application, the substrate should be saturated surface dry with no standing water. Mortar and/or concrete must be scrubbed into substrate filling all pores and voids. While the scrub coat is still wet, force material against edge of repair, working toward center. If repair area is too large to fill while scrub coat is still wet use Sika Armatec 110 EpoCem in lieu of scrub coat (See Spec Component SC-200). After filling, consolidate, then screed. Allow mortar or concrete to set to desired stiffness, then finish with trowel, manual or power, for smooth surface. Broom or burlap drag for rough surface. Areas where the depth of the repair is less than 1-inch shall be repaired with polymer-modified Portland cement mortar. In areas where the depth of the repair is greater than 1 inch, the repair shall be made with polymer-modified Portland cement concrete.
- D. As per ACI recommendations for Portland cement concrete, curing is required. Moist cure with wet burlap and polyethylene, a fine mist of water or a water-based* compatible curing compound. Moist curing should commence immediately after finishing and continue for 48 hours. Protect newly applied material from rain, sun, and wind until compressive strength is 70% of the 28-day compressive strength. To prevent from freezing cover with insulating material. Setting time is dependent on temperature and humidity.

* Pretesting of curing compound is recommended.
- E. Adhere to all procedures, limitations and cautions for the polymer-modified Portland cement mortar in the manufacturers current printed technical data sheet and literature.

3.4 CLEANING

- A. The uncured polymer-modified Portland cement mortar can be cleaned from tools with water. The cured polymer-modified Portland cement mortar can only be removed mechanically.
- B. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

END OF SECTION 030132

SECTION 031000 - CONCRETE FORMING 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. Form-facing material for cast-in-place concrete.
- 2. Form liners.
- 3. Insulating concrete forms.
- 4. Shoring, bracing, and anchoring.

- B. Related Requirements:

- 1. Section 321313 "Concrete Paving" for formwork related to concrete pavement and walks.
- 2. Section 321316 "Decorative Concrete Paving" for formwork related to decorative concrete pavement and walks.

1.3 DEFINITIONS

- A. Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.
- B. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site at the same time as concrete preinstallation meeting.

- 1. Review the following:

- a. Structural Tests and inspection agency procedures for field quality control.
- b. Construction, movement, contraction, and isolation joints
- c. Forms and form-removal limitations.
- d. Shoring and reshoring procedures.
- e. Anchor rod and anchorage device installation tolerances.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following:

1. Exposed surface form-facing material.
2. Concealed surface form-facing material.
3. Forms for cylindrical columns.
4. Pan-type forms.
5. Void forms.
6. Form liners.
7. Insulating concrete forms.
8. Form ties.
9. Waterstops.
10. Form-release agent.

B. Shop Drawings: Prepared by, and signed and sealed by, a qualified professional engineer responsible for their preparation, detailing fabrication, assembly, and support of forms.

1. For exposed vertical concrete walls, indicate dimensions and form tie locations.
2. Indicate dimension and locations of construction and movement joints required to construct the structure in accordance with ACI 301.
 - a. Location of construction joints is subject to approval of the Architect.
3. Indicate location of waterstops.
4. Indicate form liner layout and form line termination details.
5. Indicate proposed schedule and sequence of stripping of forms, shoring removal, and reshoring installation and removal.
6. Indicate layout of insulating concrete forms, dimensions, course heights, form types, and details.

C. Samples:

1. For waterstops.
2. For Form Liners: 12-inch by 12-inch sample, indicating texture.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing and inspection agency.

B. Research Reports: For insulating concrete forms indicating compliance with International Code Council Acceptance Criteria AC308.

C. Field quality-control reports.

D. Minutes of pre-installation conference.

1.7 QUALITY ASSURANCE

- A. Testing and Inspection Agency Qualifications: An independent agency acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Form Liners: Store form liners under cover to protect from sunlight.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.
 - 1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
 - 2. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.
- B. Design, engineer, erect, shore, brace, and maintain insulating concrete forms in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.
 - 1. Design cross ties to transfer the effects of the following loads to the cast-in-place concrete core:
 - a. Wind Loads: As indicated on Drawings.
 - 1) Horizontal Deflection Limit: Not more than 1/240 of the wall height.

2.2 FORM-FACING MATERIALS

- A. As-Cast Surface Form-Facing Material:
 - 1. Provide continuous, true, and smooth concrete surfaces.
 - 2. Furnish in largest practicable sizes to minimize number of joints.
 - 3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete, and as follows:
 - a. Plywood, metal, or other approved panel materials.
 - b. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

- 1) APA HDO (high-density overlay).
 - 2) APA MDO (medium-density overlay); mill-release agent treated and edge sealed.
 - 3) APA Structural 1 Plyform, B-B or better; mill oiled and edge sealed.
 - 4) APA Plyform Class I, B-B or better; mill oiled and edge sealed.
- B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.
1. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces without spiral or vertical seams not exceeding specified formwork surface class.
1. Provide forms with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

2.3 RELATED MATERIALS

- A. Reglets: Fabricate reglets of not less than 0.022-inch-thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- B. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- D. Rustication Strips: Wood, or PVC, kerfed for ease of form removal.
- E. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
 2. Form release agent for form liners shall be acceptable to form liner manufacturer.
- F. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

PART 3 - EXECUTION

3.1 INSTALLATION OF FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete" for as-cast finishes.
- C. Environmental Surface Finish 2.0 (ESF-2.0) on concrete surfaces not exposed to view and expected to contain liquids, gases or both:
 - 1. Patch voids greater than 3/4 inch wide or 1/4 inch deep.
 - 2. Remove projections greater than 1/4 inch.
 - 3. Patch tie holes.
 - 4. Surface tolerance Class B as specified in ACI 117.
 - 5. Mockup not required.
- D. Environmental Surface Finish 3.0 (ESF-3.0) on concrete surfaces exposed to view:
 - 1. Patch voids greater than 3/4 inch wide or 1/4 inch deep.
 - 2. Remove projections greater than 1/8 inch.
 - 3. Patch tie holes.
 - 4. Surface tolerance Class A as specified in ACI 117.
 - 5. Provide mockup of concrete surface appearance and texture, when required.
- E. Limit concrete surface irregularities as follows:
 - 1. Surface Finish-1.0: ACI 117 Class D, 1 inch.
 - 2. Surface Finish-2.0: ACI 117 Class B, 1/4 inch.
 - 3. Surface Finish-3.0: ACI 117 Class A, 1/8 inch.
- F. Construct forms tight enough to prevent loss of concrete mortar.
 - 1. Minimize joints.
 - 2. Exposed Concrete: Symmetrically align joints in forms.
- G. Construct removable forms for easy removal without hammering or prying against concrete surfaces.
 - 1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
 - 2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 3. Install keyways, reglets, recesses, and other accessories, for easy removal.
- H. Do not use rust-stained, steel, form-facing material.
- I. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.

1. Provide and secure units to support screed strips
 2. Use strike-off templates or compacting-type screeds.
- J. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.
1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
 2. Locate temporary openings in forms at inconspicuous locations.
- K. Chamfer exterior corners and edges of permanently exposed concrete.
- L. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.
- M. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.
1. Determine sizes and locations from trades providing such items.
 2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.
- N. Construction and Movement Joints:
1. Construct joints true to line with faces perpendicular to surface plane of concrete.
 2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 3. Place joints perpendicular to main reinforcement.
 4. Locate joints for beams, slabs, joists, and girders in the middle third of spans.
 - a. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 6. Space vertical joints in walls.
 - a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- O. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.
1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
 2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.
- P. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

- Q. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- R. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.
 - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
 - 3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 4. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
 - 5. Clean embedded items immediately prior to concrete placement.

3.3 REMOVING AND REUSING FORMS

- A. General: Concrete has to be hard enough not to be damaged by form-removal operations. Curing and protection operations must continue after form removal until final cure is attained. Time restriction for form removal are minimum and are based on cumulatively curing at not less than 50 degrees F. Minimum strength requirement are also required for some form types.
 - 1. Formwork for sides of beam, walls, columns, and similar parts of work that does not support weight of concrete may be removed after 72 hours of placing concrete.
 - 2. Formwork supporting cap slabs may be removed after 21 days of placing concrete with the concrete having reached design strength $f'c$.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Engineer of Record.

3.4 SHORING AND RESHORING INSTALLATION

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
- B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 FIELD QUALITY CONTROL

- A. Structural Tests and Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
 - 1. Inspect formwork for shape, location, and dimensions of the concrete member being formed.
 - 2. Inspect insulating concrete forms for shape, location, and dimensions of the concrete member being formed.

END OF SECTION 031000

SECTION 032000 - CONCRETE REINFORCING

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. Steel reinforcement bars.
- 2. Welded-wire reinforcement.

- B. Related Requirements:

- 1. Section 321313 "Concrete Paving" for reinforcing related to concrete pavement and walks.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site at same time as concrete preinstallation meeting.

- 1. Review the following:

- a. Special inspection and testing and inspecting agency procedures for field quality control.
- b. Construction contraction and isolation joints.
- c. Steel-reinforcement installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:

- 1. Each type of steel reinforcement.
- 2. Bar supports.
- 3. Mechanical splice couplers.
- 4. Structural thermal break insulated connection system.

- B. Shop Drawings: Comply with ACI SP-066:

- 1. Include placing drawings that detail fabrication, bending, and placement.

2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
3. For structural thermal break insulated connection system, indicate general configuration, insulation dimensions, tension bars, compression pads, shear bars, and dimensions.

C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of the Architect.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1. Reinforcement To Be Welded: Welding procedure specification in accordance with AWS D1.4/D1.4M

B. Material Test Reports: For the following, from a qualified testing agency:

1. Steel Reinforcement:

- a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.

2. Mechanical splice couplers.

C. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4/D 1.4M.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1. Store reinforcement to avoid contact with earth.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.
- B. Low-Alloy Steel Reinforcing Bars: ASTM A706/A706M, deformed.
- C. Headed-Steel Reinforcing Bars: ASTM A970/A970M.
- D. Steel Bar Mats: ASTM A184/A184M, fabricated from ASTM A615, Grade 60, deformed bars, assembled with clips.
- E. Plain-Steel Welded-Wire Reinforcement: ASTM A1064, plain, fabricated from as-drawn steel wire into flat sheets.
- F. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064, flat sheet.

2.2 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
 - 1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
- C. Mechanical Splice Couplers: ACI 318 Type 2, same material of reinforcing bar being spliced; tension-compression type.
- D. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch in diameter.
- E. Additional requirements for environmental concrete are in 033100 "Cast-In-Place Concrete Environmental Structures".

2.3 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protection of In-Place Conditions:
 - 1. Do not cut or puncture vapor retarder.
 - 2. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement.
 - 1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
 - 2. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318.
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
 - 1. Stagger splices in accordance with ACI 318.
 - 2. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
 - 3. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.
- G. Install welded-wire reinforcement in longest practicable lengths.
 - 1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
 - a. For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches.
 - 2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
 - 3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
 - 4. Lace overlaps with wire.

3.3 JOINTS

- A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement.
 - 2. Continue reinforcement across construction joints unless otherwise indicated.
 - 3. Do not continue reinforcement through sides of strip placements of floors and slabs.
- B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

- A. Comply with ACI 117.

3.5 FIELD QUALITY CONTROL

- A. Structural Tests and Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
 - 1. Steel-reinforcement placement.
 - 2. Steel-reinforcement mechanical splice couplers.
 - 3. Steel-reinforcement welding.
- C. Manufacturer's Inspections: Engage manufacturer of structural thermal break insulated connection system to inspect completed installations prior to placement of concrete, and to provide written report that installation complies with manufacturer's written instructions.

END OF SECTION 032000

SECTION 033100 - CAST-IN-PLACE CONCRETE ENVIRONMENTAL STRUCTURES

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 cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. For structures intended for conveying, storing, or treating water, wastewater, or other liquids and non-hazardous material such as solid waste, and for secondary containment of hazardous liquids or solid waste, shall confirm to ACI 350-06 "Code Requirements for Environmental Concrete Structures" and as modified by supplemental requirements, ACI 350.1-10, ACI 350.2R-04, ACI 350.3-06, ACI 350.4R-04, and ACI 350.5-12.
- C. For concrete elements intended for use in construction of buildings shall confirm to ACI 318-14 "Building Code Requirements for Structural Concrete", specification Section 033000.
- D. Related Requirements:
 - 1. Section 031000 "Concrete Forming and Accessories" for form-facing materials, form liners, insulating concrete forms, and waterstops.
 - 2. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
 - 3. Section 033000 "Cast-in-Place Concrete for Architectural Building Structures".
 - 4. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
 - 5. Section 321313 "Concrete Paving" for concrete pavement and walks.
 - 6. Section 071113 "Bituminous Dampproofing".

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete Subcontractor.
 - e. Special concrete finish Subcontractor.
 - f. Owner's Representative
 - g. Engineer of Record

2. Review inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, and concrete protection.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Aggregates.
4. Admixtures:
 - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
5. Vapor retarders.
6. Floor and slab treatments.
7. Liquid floor treatments.
8. Curing materials.
9. Joint fillers.
10. Repair materials.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.

9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
10. Intended placement method.
11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - a. Location of construction joints is subject to approval of the Architect.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Floor and slab treatments.
5. Bonding agents.
6. Adhesives.
7. Vapor retarders.
8. Semirigid joint filler.
9. Joint-filler strips.
10. Repair materials.
11. Evaporation retarder.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.

3. Aggregates.
 4. Admixtures:
- D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.
- E. Research Reports:
1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
 2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.
- F. Preconstruction Test Reports: For each mix design.
- G. Field quality-control reports.
- H. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician with experience installing and finishing concrete, incorporating permeability-reducing admixtures.
1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.
- B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.
1. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- D. Field Quality Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.
1. Personnel conducting field tests shall be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

- E. Mockups: Cast concrete slab-on-ground and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.
 - 1. Slab-On-Ground: Build panel approximately 15 feet by 15 feet in the location indicated or, if not indicated, as directed by Architect.
 - a. Divide panel into four equal panels to demonstrate saw joint cutting.
 - 2. Formed Surfaces: Build panel approximately 128 sq. ft. in the location indicated or, if not indicated, as directed by Architect.
 - a. Divide into four panels:
 - 1) One panel representing FS-2 Forming.
 - 2) One panel representing FS-3 Forming
 - 3) One panel representing FS-2 forming with smooth rubbed finish.
 - 4) One panel representing FS-2 forming with grout-cleaned rubbed finish.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.
 - 1. Include the following information in each test report:
 - a. Admixture dosage rates.
 - b. Slump.
 - c. Air content.
 - d. Seven-day compressive strength.
 - e. 28-day compressive strength.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

1.10 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When the temperature is expected to be or fall below 40 degrees F during the protection period, deliver and maintain concrete mixture temperature within the temperature range required by ACI 301.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
4. See Tables below for concrete temperature requirement per air temperature at time of placing.

MINIMUM CONCRETE TEMPERATURES					
		Section size, minimum dimension			
		<12 in. (300 mm)	12 to 36 in. (300 to 900 mm)	36 to 72 in. (900 to 1800 mm)	>72 in. (1800 mm)
Line	Air temperature	Minimum concrete temperature as placed and maintained			
1.	--	55°F (13°C)	50°F (10°C)	45°F (7°C)	40°F (5°C)
		Minimum concrete temperature as mixed for indicated air temperature*			
2	Above 30°F (-1°C)	60°F (16°C)	55°F (13°C)	50°F (10°C)	45°F (7°C)
3	0 to 30°F (-18 to 1°C)	65°F (18°C)	60°F (16°C)	55°F (13°C)	50°F (10°C)
4	Below °F (-18°C)	70°F (21°C)	65°F (18°C)	60°F (16°C)	55°F (13°C)
		Maximum allowable gradual temperature drop in first 24 hours after end of protection			
5	--	50°F (28°C)	40°F (22°C)	30°F (17°C)	20°F (11°C)

*For colder weather, a greater margin in temperature is provided between concrete as mixed and required min temperature of fresh concrete in place.

Note 1: For Line 1, maximum placement temperature is minimum temperature in the table plus 20°F (11°C).

Note 2: For Lines 2-4, maximum temperature is minimum temperature in the table plus 15°F (9°C).

5. All concrete shall be considered partial load, exposed for use in Table below. Unless noted otherwise.

Length of protection period for concrete placed during cold weather			
Line	Service Condition	Protection period at minimum temperature indicated in Line 1 of table above	
		Normal-Set Concrete	Accelerated-Set Concrete
1	No load, not exposed	2	1
2	No load, exposed	3	2
3	Partial load, exposed	6	4
4	Full load	100% f'c and 21 days minimum	

* A day is a 24-hour period.

B. Hot-Weather Placement: Comply with ACI 305.1 and as follows:

1. Maintain concrete temperature below 90 degrees F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301.
 2. ACI 117.
 3. ACI 350-06 and all updates.

2.2 CONCRETE MATERIALS

- A. Source Limitations:
1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
 2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
 3. Obtain aggregate from single source.
 4. Obtain each type of admixture from single source from single manufacturer.
- B. Cementitious Materials:
1. Portland Cement: ASTM C150/C150M, Type I, Type II, Type I/II, or Type III, gray.
 2. Fly Ash: ASTM C618, Class C or F.
- C. Normal-Weight Aggregates: ASTM C33/C33M, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.
1. Alkali-Silica Reaction: Comply with one of the following:
 - a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
 - b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
 - c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.
 2. Maximum Coarse-Aggregate Size: 3/4 inch.
 3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Lightweight Aggregate: ASTM C330/C330M, 3/8-inch nominal maximum aggregate size.
- E. Air-Entraining Admixture: ASTM C260/C260M.

- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
 2. Retarding Admixture: ASTM C494/C494M, Type B.
 3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
 6. Accelerating Admixture: ASTM C494/C494M, Type C or E.
 7. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
 8. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494/C494M, Type C.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) BASF Corporation.
 - 2) Euclid Chemical Company (The): an RPM company.
 - 3) GCP Applied Technologies Inc.
 - 4) Sika Corporation.
 9. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) BASF Corporation.
 - 2) Cortec Corporation.
 - 3) GCP Applied Technologies Inc.
 - 4) Sika Corporation.
 - 5) Specialty Products Group.
- G. Water and Water Used to Make Ice: ASTM C94/C94M, potable or complying with ASTM C1602/C1602M, including all limits listed in Table 2 and the requirements of paragraph 5.4
- H. The admixture manufacturer, when requested, shall provide a qualified concrete technician employed by the manufacturer to assist in proportioning concrete for optimum use. He shall also be available when requested to advise on proper addition of the admixture to the concrete and on adjustment of the concrete mix proportions to meet changing job conditions.

- I. The use of admixtures to retard setting of the concrete during hot weather, to accelerate setting during cold weather, and to reduce water content without impairing workability will be permitted if the following conditions are met:
- J. The admixture shall conform to ASTM C494, except that the durability factor for concrete containing the admixture shall be at least 100 percent of control, the water content a maximum of 90 percent of control and length change shall not be greater than control, as defined in ASTM C 494.

2.3 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete. Apply per manufacturer's recommendations.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. BASF Corporation.
 - b. Bon Tool Co.
 - c. Brickform; a division of Solomon Colors.
 - d. ChemMasters, Inc.
 - e. Dayton Superior.
 - f. Euclid Chemical Company (The); an RPM company.
 - g. Kaufman Products, Inc.
 - h. Lambert Corporation.
 - i. Laticrete International, Inc.
 - j. Metalcrete Industries.
 - k. Nox-Crete Products Group.
 - l. Sika Corporation.
 - m. SpecChem, LLC.
 - n. TK Products.
 - o. Vexcon Chemicals Inc.
 - p. W.R. Meadows, Inc.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
 - 1. Color:
 - a. Ambient Temperature Below 50 deg F: Black.
 - b. Ambient Temperature Between 50 deg F and 85 deg F: Any color.
 - c. Ambient Temperature Above 85 deg F: White.
- D. Curing Paper: Eight-feet- wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Fortifiber Building Systems Group.

- E. Water: Potable or complying with ASTM C1602/C1602M.

- F. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Anti-Hydro International, Inc.
 - b. ChemMasters, Inc.
 - c. Dayton Superior.
 - d. Euclid Chemical Company (The); an RPM company.
 - e. Kaufman Products, Inc.
 - f. Lambert Corporation.
 - g. Laticrete International, Inc.
 - h. Nox-Crete Products Group.
 - i. SpecChem, LLC.
 - j. TK Products.
 - k. Vexcon Chemicals Inc.
 - l. W.R. Meadows, Inc.

- G. Clear, Waterborne, Membrane-Forming, Nondissipating Curing Compound: ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Anti-Hydro International, Inc.
 - b. BASF Corporation.
 - c. ChemMasters, Inc.
 - d. Dayton Superior.
 - e. Euclid Chemical Company (The); an RPM company.
 - f. Kaufman Products, Inc.
 - g. Lambert Corporation.
 - h. Laticrete International, Inc.
 - i. Metalcrete Industries.
 - j. Nox-Crete Products Group.
 - k. SpecChem, LLC.
 - l. TK Products.
 - m. Vexcon Chemicals Inc.
 - n. W.R. Meadows, Inc.

- H. Clear, Waterborne, Membrane-Forming, Curing Compound: ASTM C309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. BASF Corporation.
 - b. ChemMasters, Inc.
 - c. Dayton Superior.
 - d. Euclid Chemical Company (The); an RPM company.
 - e. Kaufman Products, Inc.
 - f. Lambert Corporation.
 - g. Laticrete International, Inc.
 - h. Metalcrete Industries.
 - i. Nox-Crete Products Group.
 - j. SpecChem, LLC.
 - k. Vexcon Chemicals Inc.
 - l. V-Seal Concrete Sealers & Specialty Coatings.
 - m. W.R. Meadows, Inc.

- I. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. ChemMasters, Inc.
 - b. Concrete Sealers USA.
 - c. Dayton Superior.
 - d. Euclid Chemical Company (The); an RPM company.
 - e. Kaufman Products, Inc.
 - f. Lambert Corporation.
 - g. Laticrete International, Inc.
 - h. Metalcrete Industries.
 - i. Nox-Crete Products Group.
 - j. Right Pointe.
 - k. SpecChem, LLC.
 - l. TK Products.
 - m. Vexcon Chemicals Inc.
 - n. W.R. Meadows, Inc.

2.4 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 or aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 in accordance with ASTM D2240.
- C. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Floor Slab Protective Covering: Eight-feet- wide cellulose fabric.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. McTech Group, Inc.

2.5 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 PSI at 28 days when tested in accordance with ASTM C109/C109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 4100 PSI at 28 days when tested in accordance with ASTM C109/C109M.

2.6 FORM-FACING MATERIALS

- A. For Environmental Surface Finish 2.0 (ESF-2.0): Use at surfaces not exposed to view. No form-facing material is specified.
- B. For Environmental Surface Finish 3.0 (ESF-3.0): At surfaces exposed to view, use plywood, tempered concrete-form-grade hardboard, steel, plastic, paper, or other acceptable materials capable of producing the desired finish for form-facing materials. Form-facing materials shall produce a smooth, uniform texture on the concrete. Do not use form-facing materials with raised grain, torn surfaces, worn edges, patches, dents, or other defects that will impair the texture of concrete surfaces.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- E. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- F. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates.

2.7 REINFORCEMENT ACCESSORIES

- A. Smooth dowels shall be plain steel bars conforming to ASTM A 615/A615M, Grade 60, or steel pipe conforming to ASTM A 120, Schedule 80. Pipe, if used, shall be closed flush at each end with mortar or metal or plastic cap. Dowels shall be installed at right angles to construction joints and expansion joints. Dowels shall be accurately aligned parallel to the finished surface, and shall be rigidly held in place and supported during placing of the concrete. One end of dowels shall be oiled or greased or dowels shall be coated with high density polyethylene with a minimum thickness of 14 mils.
- B. Reinforcement supports and other accessories in contact with the forms for members which will be exposed to view in the finished work shall be of stainless steel or shall have approved high-density polyethylene tips so that the metal portion shall be at least one-quarter of an inch from the form or surface. Supports for reinforcement, when in contact with the ground or stone fill, shall be precast stone concrete blocks. Particular attention is directed to the requirement of

Paragraph 3.3.2.4 of ACI Standard 301. These requirements apply to all reinforcement, whether in walls or other vertical elements, inclined elements or flatwork.

- C. Particular care shall be taken to bend tie wire ends away from exposed faces of beams, slabs and columns. In no case shall ends of tie wires project toward or touch formwork.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
 - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
 - 3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.8 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Limit water-soluble, chloride-ion content in hardened concrete to 0.10 percent by weight of cement.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.9 CONCRETE MIXTURES

- A. Mix Design Class A: Use for all concrete work.
 - 1. Minimum Compressive Strength: $f'c = 5000$ psi at 28 days.
 - 2. Maximum Water/Cement Ratio: 0.40.
 - 3. Cementitious Material: Type II and Portland cement, minimum 610 lbs/cy.
 - 4. Maximum Aggregate Size: 3/4 inch, normal weight.
 - 5. Air Content: 5 percent plus or minus 1 percent at point of delivery.

6. Slump Limit: 8 inches for concrete with verified slump of 3 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.

2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 1. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 REMOVING AND REUSING FORMS

- A. General: Concrete has to be hard enough not to be damaged by form-removal operations. Curing and protection operations must continue after form removal until final cure is attained. Time restriction for form removal are minimum and are based on cumulatively curing at not less than 50 degrees F. Minimum strength requirement are also required for some form types.
 1. Formwork for sides of beam, walls, columns, and similar parts of work that does not support weight of concrete may be removed after 72 hours of placing concrete.
 2. Formwork supporting cap slabs may be removed after 21 days of placing concrete with the concrete having reached design strength f'c.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Engineer of Record.

3.2 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer of Record.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.3 FINISHING FORMED SURFACES

- A. Environmental Surface Finish 2.0:
1. Apply to concrete surfaces not exposed to public view.
- B. Environmental Surface Finish 3.0:
1. Apply to concrete surfaces exposed to public view, or to receive a rubbed finish.
- C. Rubbed Finish: Apply the following to environmental surface finish 3.0 as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part Portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white Portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces 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.

3.4 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
 - 1. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten concrete by cutting down high spots, and filling low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces to receive trowel finish .
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces exposed to view. (basins, flumes, conduits, tank floors, weirs, and overflow surfaces)
 - 2. Finish and measure surface, so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer of Record before application.
- F. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- G. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

H. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 6 inches high unless otherwise indicated, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
3. Minimum Compressive Strength: Match slab compressive strength requirements.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

- I. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.5 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.
3. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.6 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 1. Defer joint filling until concrete has aged at least **[one] [six]** month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.7 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Engineer of Record. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding

- agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Engineer of Record.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.8 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Steel reinforcement welding.
 - 3. Headed bolts and studs.
 - 4. Verification of use of required design mixture.
 - 5. Concrete placement, including conveying and depositing.
 - 6. Curing procedures and maintenance of curing temperature.
 - 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
 - 8. Forms and form removal.
 - 9. Foundation Preparation.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 degrees F and below or 80 degrees F and above, and one test for each composite sample.
 - 5. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure one set of five 6 inch diameter by 12 inch, or six 4 inch diameter by 8 inch standard cylinder specimens for each composite sample minimum. Increase number of cylinders for early stripping of forms.
 - 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two or three specimens at 28 days.
 - a. For Each Set of Field Cured Specimens: Test one cylinder at 7 days, one cylinder at 14 days, either two or three cylinders based on cylinder size at 28 days. Hold last cylinder for break at 56 days if needed.

- b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Test results shall be reported in writing to Engineer of Record, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer of Record but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer of Record. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Engineer of Record.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

3.9 HYDROSTATIC TIGHTNESS TEST FOR OPEN OR COVERED CONTAINMENT STRUCTURES

- A. The structural adequacy of the containment structure shall be verified for the test pressure or pressures to be applied. One type of test shall not be substituted for another type of test without acceptance of the Architect/Engineer.
- B. Unless specifically allowed by the Architect/Engineer, the containment structure shall not be tested before all of the structure is complete and the concrete has attained its specified compressive strength.
- C. Repair procedures—Submit for acceptance the proposed repair methods, materials, and modifications needed to assure that the Work will meet tightness requirements of Contract Documents.
- D. *Test reports—Test reports provided by the Contractor shall include the results of tightness testing performed during the course of the Work and shall be submitted to the Architect/Engineer. Test reports shall include test locations in the containment structure, dates of testing, water level measurements, amounts of precipitation or evaporation (when applicable), measured temperatures and volume corrections (if any), retest results, corrective*

actions taken, if any, and final results. Final reports shall be provided within 7 days of test completion.

- E. Duties and responsibilities of Contractor—Unless otherwise specified in Contract Documents, the Contractor shall prepare and fill the containment structure and provide access and equipment and make the measurements and observations for the required testing. The Architect/Engineer shall have access to observe measurements and witness observations included in the test reports, for verification.
- F. General
 - 1. Scope: This section covers the hydrostatic tightness test, which consists of two parts. Part 1 shall be a qualitative criterion. Part 2 shall be a quantitative criterion expressed as the maximum allowable percent volume loss per day.
 - a. Containment structures shall be tested for hydrostatic tightness when required by Contract Documents. When a hydrostatic tightness test is required and a particular criterion is not specified, the quantitative criteria shall be:
- G. Products
 - 1. Materials:
 - a. Water: Use potable water unless otherwise specified.
- H. Execution
 - 1. Test preparation:
 - a. The exposed concrete surfaces of the containment structure, including the floor, shall be cleaned of all foreign material and debris. Standing water in or outside of the containment structure that would interfere with the examination of the exposed concrete surfaces of the containment structure shall be removed. The concrete surfaces and concrete joints shall be visually examined by the Contractor for potential leakage points. Areas the Contractor believes are areas of potential leakage shall be repaired before filling the containment structure with water. Unless otherwise specified, coatings shall not be applied until after the hydrostatic tightness testing has been completed.
 - b. All openings, fittings, and pipe penetrations in the containment structure shell shall be visually examined at both faces, if practical.
 - c. Liners that are mechanically locked to the surface during the placement of the concrete shall be installed before the hydrostatic tightness testing. Interior liners shall be visually examined for pinholes, tears, and partially fused splices by the Contractor. Integrity testing of interior liners, when required by the Contract Documents, shall be performed and passed prior to hydrostatic testing. Deficiencies shall be repaired.
 - d. All containment structure penetrations and inlet/outlets shall be securely sealed to prevent the loss of water from the containment structure during the test. If the containment structure is to be filled using the containment structure inlet/outlet pipe, positive means shall be provided to check that water is not entering or

leaving the containment structure through this pipe once the containment structure is filled to the test level.

- e. Containment structure penetrations and pipe, channel, and conduit inlets/outlets shall be monitored before and during the test to verify the watertightness of these appurtenances. Seepage at these locations shall be repaired before test measurements. No allowance shall be made in test measurements for uncorrected known points of seepage. The flow from any underdrain system, if a system is provided, shall be monitored during this same period, and any increase in flow shall be recorded and considered for information as a part of the hydrostatic tightness testing.
- f. The ground water level shall be brought to a level below the top of the base slab and kept at that elevation or at a lower elevation during the test.
- g. No backfill shall be placed against the walls or on the wall footings of the containment structures to be tested, unless otherwise specified.
- h. The initial filling of a new containment structure should not exceed a rate of 4 ft/h. Filling shall be continued until the water surface is at the design maximum liquid level, or either 1 in. below any fixed overflow level in covered containment structure or 4 in. in open containment structure, whichever is lower.
- i. Unlined concrete containment structures shall be kept full to the level specified in 2.3.1.8 for at least 3 days before Part 2 of the hydrostatic tightness test described in 2.3.3.

2. Hydrostatic tightness test—Part 1: Qualitative criteria

- a. The exterior surfaces of the containment structure shall be observed in both the early mornings and late afternoons during the 3-day period before Part 2 of the test. If any water is observed on the containment structure exterior surfaces, including joints, repaired honeycombed areas and cracks, where moisture can be picked up on a dry hand, the containment structure shall be considered to have failed Part 1 of the hydrostatic test.
- b. Wet areas on top of the wall footing shall not be cause to fail Part 1 of the hydrostatic tightness test, unless the water can be observed to be flowing.
- c. Although Part 2 of the test may begin prior to completion of repairs for Part 1, all defects causing the failure of Part 1 of the hydrostatic tightness test shall be repaired before acceptance of the containment structure.

3. Hydrostatic tightness test—Part 2: Quantitative criteria

- a. Part 2 of the hydrostatic tightness test shall not be scheduled for a period when the forecast is for a difference of more than 35°F between the ambient temperature readings at the times of the initial and final level measurements of the water surface. The test shall also not be scheduled when the weather forecast indicates the water surface could freeze before the test is completed.
- b. The vertical distance to the water surface shall be measured to within 1/16 in. from a fixed point on the containment structure above the water surface. Measurements shall be recorded at 24-hour intervals.
- c. The test period for the no measurable loss criterion shall be 3 days (72 hours). For other criteria, the test period shall be at least the theoretical time required to lower the water surface 3/8 in., assuming a loss of water at the maximum allowable rate. The test period need not be longer than 5 days.

- d. The water temperature shall be recorded at a depth of 18 in., unless otherwise specified, below the water surface at the start and end of the test. Volume corrections for temperature differences shall be included in Part 2 of the test.
- e. In uncovered containment structures, evaporation and precipitation shall be measured. Evaporation shall also be measured in well-ventilated covered containment structures.
- f. The containment structure shall continue to be observed in both the early mornings and late afternoons to verify compliance with Part 1 of the hydrostatic tightness testing during Part 2 of the hydrostatic test.
- g. At the end of the test period, the water surface shall be recorded to within 1/16-in. at the location of the original measurements. The water temperature and the evaporation and precipitation measurements shall be recorded.
- h. The change in water volume in the containment structure shall be calculated and corrected, if necessary, for evaporation, precipitation, and temperature. If the loss exceeds the required criterion, the containment structure shall be considered to have failed Part 2 of the test.

4. Retesting

- a. A restart of the test shall be required when test measurements become unreliable due to unusual precipitation or other external factors.
- b. It shall be permitted to immediately retest a containment structure failing Part 2 of the hydrostatic test when Part 1 is passed. If the containment structure fails the second test or if not immediately retested after the first test failure, the interior of the containment structure shall be observed for probable problem areas by the Contractor. The containment structure shall only be retested after the probable problem areas are repaired.
- c. Containment structures shall be retested until they meet the required Part 1 and Part 2 criteria. Repairs shall be made before each retest.

END OF SECTION 033000

SECTION 033516 - CURING, SEALING, AND HARDENING CONCRETE FLOORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Single application cure-seal-hardener for new concrete floors.
- B. Precautions for avoiding staining concrete before and after application.

1.2 RELATED SECTIONS

- A. Section 03 31 00 - Cast-In-Place Concrete: Concrete slabs.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01 33 23.
- B. Material requirements for concrete to which cure-seal-hardener is to be applied, including cement type, water-cement ratio, type of trowel finish, limitations on admixtures, pigments, bonding agents, and bond breakers, etc.
- C. Product Data: Manufacturer's data sheets, including product specifications, test data, preparation instructions and recommendations, storage and handling requirements and recommendations, and installation methods.
- D. Maintenance instructions, including precautions for avoiding staining after application.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Applicator experienced with installation of product and certified by manufacturer, or applicator experienced with similar products and providing manufacturer's field technician on site to advise on application procedures; and providing adequate number of skilled workers trained and familiar with application requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver product in factory numbered and sealed drums, with numbers recorded for Owner's records.
- B. Store products in manufacturer's unopened drums until ready for installation.

1.6 PROJECT CONDITIONS

- A. No satisfactory procedures are available to remove petroleum or rust stains from concrete. Prevention is therefore essential. Take precautions to prevent staining of concrete prior to application of cure-seal-hardener and for minimum of three months after application:
 - 1. Prohibit parking of vehicles on concrete slab.
 - 2. If vehicles must be temporarily parked on slab, place drop cloths under vehicles during entire time parked.
 - 3. If construction equipment must be used for application, diaper all components that might drip oil, hydraulic fluid, or other liquids.
 - 4. Prohibit pipe cutting using pipe cutting machinery on concrete slab.
 - 5. Prohibit temporary placement and storage of steel members on concrete slab.
- B. Do not install products under environmental conditions outside manufacturer's absolute limits.
- C. Do not use frozen material; thaw and agitate prior to use.

1.7 WARRANTY

- A. Provide manufacturer's warranty that a structurally sound concrete surface prepared and treated according to the manufacturer's directions will remain permanently dustproof, hardened and water repellent. If after the specified sealing period the treated surface does not remain dustproof, hardened and water repellent, provide, at manufacturer's expense, sufficient material to reseal defective areas.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Curecrete Distribution, Inc; 1203 West Spring Creek Place, Springville, UT 84663. ASD. Tel: (800) 998-5664. Fax: (801) 489-3307. Email: techsupport@ashfordformula.com. www.ashfordformula.com

2.2 MATERIALS

- A. Cure-Seal-Hardener: Ashford Formula; water-based chemically-reactive penetrating sealer and hardener, that seals by densifying concrete so that water molecules cannot pass through but air and water vapor can, while allowing concrete to achieve full compressive strength, minimizing surface crazing, and eliminating dusting.
 - 1. Colorless, transparent, odorless, non-toxic, non-flammable.
 - 2. Containing no solvents or volatile organic compounds.
 - 3. USDA approved for food handling facilities.
 - 4. Allowing traffic on floors within 2 to 3 hours, with chemical process complete within 3 months.

5. No change to surface appearance except a sheen developed due to traffic and cleaning.

B. Water: Clean, potable.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared and are suitable for application of product.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. If this is the applicator's first project using this product, provide the manufacturer's technical representative on-site to familiarize installers with proper procedures.
- C. Prevent damage to and soiling of adjacent work.
- D. New Concrete: Apply cure-seal-hardener to new concrete as soon as the concrete is firm enough to work on after troweling, except on colored concrete wait minimum of 30 days.
 - 1. Spray on at rate of 200 square feet per gallon (4.8 sq m/L).
 - 2. Keep surfaces wet with cure-seal-hardener for minimum soak-in period of 30 minutes, without allowing drying out or becoming slippery. In hot weather slipperiness may appear before the 30 minute time period has elapsed. If that occurs, apply more cure-seal-hardener as required to keep entire surface in a non-slippery state for the first 15 minutes. For the remaining 15 minutes, mist the surface as needed with water to keep the material in a non-slippery state.
 - 3. After this period, when treated surface becomes slippery lightly mist with water until slipperiness disappears.
 - 4. Wait for surface to become slippery again and then flush entire surface with water removing all residue of cure-seal-hardener.
 - 5. Squeegee surface completely dry, flushing any remaining slippery areas until no residue remains.

6. Wet vacuum or scrubbing machines may be used to remove residue, provided manufacturer's instructions are followed.

3.4 PROTECTION

- A. Protect installed floors until chemical reaction process is complete; at least three months.
 1. Comply with precautions listed under PROJECT CONDITIONS.
 2. Clean floor regularly in accordance with manufacturer's recommendations because water will accelerate the sealing and scrubbing will impart a shine.
 3. Clean up spills immediately and spot-treat stains with good degreaser or oil emulsifier.
- B. Precautions cleaning are the responsibility of the General Contractor until Substantial Completion.

END OF SECTION 033516

SECTION 035550 - CONCRETE TOPPING, RESURFACING, AND REHABILITATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification describes the patching or overlay of interior and/or exterior horizontal surfaces with a polymer-modified, portland cement mortar/concrete.

1.2 QUALITY ASSURANCE

- A. Manufacturing qualifications: The manufacturer of the specified product shall be ISO 9001 certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis.
- B. Contractor qualifications: Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have received product training by a manufacturer's representative.
- C. Install materials in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. All materials must be delivered in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers. Damaged material must be removed from the site immediately.
- B. Store all materials off the ground and protect from rain, freezing or excessive heat until ready for use.
- C. Condition the specified product as recommended by the manufacturer.

1.4 JOB CONDITIONS

- A. Environmental Conditions: Do not apply material if it is raining or snowing or if such conditions appear to be imminent. Minimum application temperature 40°F (5°C) and rising.
- B. Protection: Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified material.

1.5 SUBMITTALS

- A. Submit two copies of manufacturer's literature, to include: Product Data Sheets, and appropriate Material Safety Data Sheets (MSDS).

1.6 WARRANTY

- A. Provide a written warranty from the manufacturer against defects of materials for a period of one (1) year, beginning with date of substantial completion of the project.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. **SikaTop 111 Plus**, as manufactured by Sika Corporation, is considered to conform to the requirements of this specification.

2.2 MATERIALS

- A. Polymer-modified Portland cement mortar:
 - 1. Component A shall be a liquid polymer emulsion of an acrylic copolymer base and additives.
 - a. pH: 4.5-6.5
 - b. Film Forming Temperature: 73°F max.
 - c. Tear Strength: 950-psi min.
 - d. Elongation at Break: 500% min.
 - e. Particle Size: less than 0.1 micron
 - 2. Component A shall contain an organic, penetrating corrosion inhibitor which has been independently proven to reduce corrosion in concrete via ASTM G3 (half-cell potential tests). The corrosion inhibitor shall not be calcium nitrite, and shall have a minimum of 5 years of independent field testing to document performance on actual construction projects.
 - 3. Component B shall be a blend of selected portland cements, specially graded aggregates, admixtures for controlling setting time, water reducers for workability, and an organic accelerator.
 - 4. The materials shall be non-combustible, both before and after cure.
 - 5. The materials shall be supplied in a factory-proportioned unit.
 - 6. The polymer-modified, portland cement mortar must be placeable from 1/2-in. to 1-in. in depth per lift for horizontal applications.
- B. To prepare a polymer-modified portland cement concrete: aggregate shall conform to ASTM C-33. The factory-proportioned unit shall be extended with 42-lb. max. of a 3/8 in. (No.8 distribution per ASTM C-33, Table II) clean, well-graded, saturated surface dry aggregate, having low absorption and high density. Aggregate must be approved for use by the engineer.

2.3 PERFORMANCE CRITERIA

- A. Typical Properties of the mixed polymer-modified, portland cement mortar:
 - 1. Working Time: Approximately 30 minutes

2. Finishing Time: 50-120 minutes
3. Color: concrete gray

B. Typical Properties of the cured polymer-modified, portland cement mortar:

1. Compressive Strength (ASTM C-109 Modified)
 - a. 1 day: 2500 psi min. (17.2 MPa)
 - b. 7 day: 5500 psi min. (37.9 MPa)
 - c. 28 day: 7000 psi min. (48.3 MPa)
2. Flexural Strength (ASTM C-293) @ 28 days: 1500 psi (10.3 MPa)
3. Splitting Tensile Strength (ASTM C-496) @ 28 days 700 psi (4.8 MPa)
4. Bond Strength (ASTM C-882 Modified) @ 28 days: 2500 psi (17.2 MPa)
5. The portland cement mortar shall not produce a vapor barrier.
6. Density(wet mix): 136 lbs. / cu. ft. (2.18 kg/l)
7. Permeability (AASHTO T-277 @ 28 days Approximately 500 Coulombs)

Note: Tests above were performed with the material and curing conditions @71°F - 75°F and 45-55% relative humidity.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Areas to be repaired must be clean, sound, and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means. Mechanically prepare the concrete substrate to obtain a surface profile of +/- 1/16" (CSP 5 or greater as per ICRI Guidelines) with a new exposed aggregate surface. Area to be patched shall not be less than 1/2" in depth.
- B. Where reinforcing steel with active corrosion is encountered, sandblast the steel to a white metal finish to remove all contaminants and rust. Where corrosion has occurred due to the presence of chlorides, the steel shall be high pressure washed after mechanical cleaning. Prime steel with 2 coats of Sika Dur 32 as directed by manufacturer.

3.2 MIXING AND APPLICATION

- A. Mechanically mix in appropriate sized mortar mixer or with a Sika jiffy paddle and low speed (400-600 rpm) drill. Pour approximately 4/5 gal Component A into the mixing container. Add Component B while continuing to mix. Mix to a uniform consistency for a maximum of three minutes. Add remaining Component A to mix if a more loose consistency is desired. Should smaller quantities be needed, be sure the components are measured in the correct ratio and that the Component B is uniformly blended before mixing the components together. Mix only that amount of material that can be placed in 30 minutes. Do not retemper material.
- B. Mixing of the polymer-modified portland cement concrete: Pour all (1-gal) of Component A into the mixing container. Add Component B while continuing to mix. Add correct amount of the pre-approved coarse aggregate, and continue mixing to a uniform consistency. Mixing time should be 3 minutes maximum.

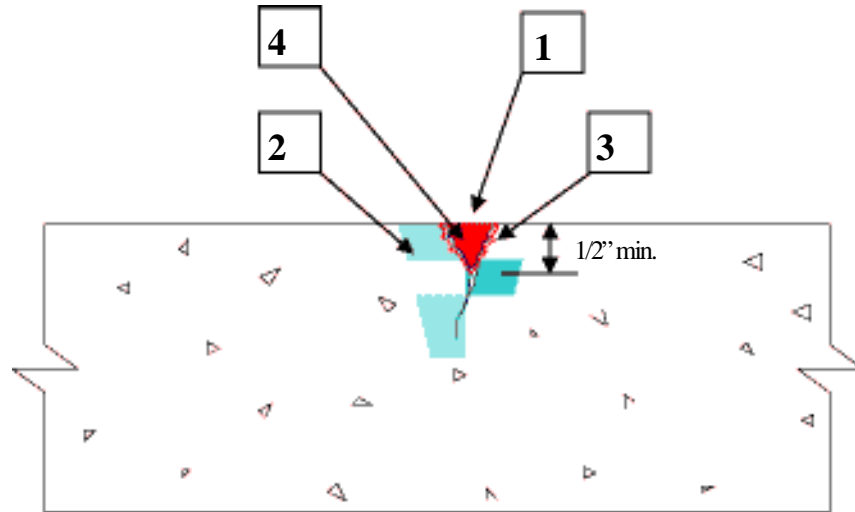
- C. Placement Procedure: At the time of application, the substrate should be saturated surface dry with no standing water. Mortar and/or concrete must be scrubbed into substrate filling all pores and voids. While the scrub coat is still wet, force material against edge of repair, working toward center. If repair area is too large to fill while scrub coat is still wet use Sika Dur 32 in lieu of scrub coat (See Spec Component SC-200). After filling, consolidate, then screed. Allow mortar or concrete to set to desired stiffness, then finish with trowel, manual or power, for smooth surface. Broom or burlap drag for rough surface. Areas where the depth of the repair is less than 1-inch shall be repaired with polymer-modified portland cement mortar. In areas where the depth of the repair is greater than 1 inch, the repair shall be made with polymer-modified portland cement concrete.
- D. As per ACI recommendations for portland cement concrete, curing is required. Moist cure with wet burlap and polyethylene, a fine mist of water or a water-based* compatible curing compound. Moist curing should commence immediately after finishing and continue for 48 hours. Protect newly applied material from rain, sun, and wind until compressive strength is 70% of the 28-day compressive strength. To prevent from freezing cover with insulating material. Setting time is dependent on temperature and humidity.
- E. *Pretesting of curing compound is recommended.
- F. Adhere to all procedures, limitations and cautions for the polymer-modified portland cement mortar in the manufacturers current printed technical data sheet and literature.

3.3 CLEANING

- A. The uncured polymer-modified portland cement mortar can be cleaned from tools with water. The cured polymer - modified portland cement mortar can only be removed mechanically.
- B. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

SC-026

SikaTop[®] 111 Plus Crack Repair

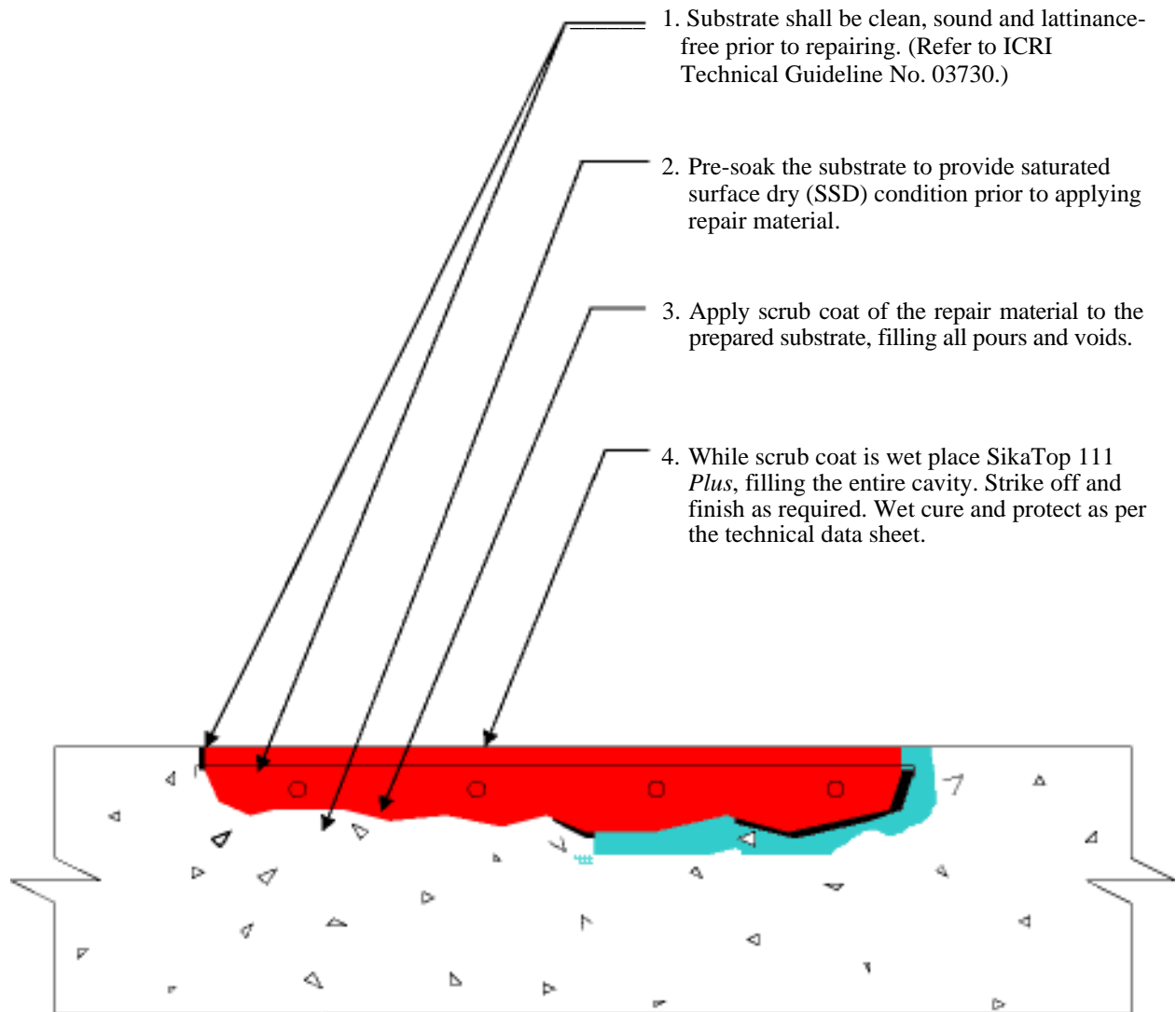


1. Substrate shall be clean, sound and lattinance-free prior to repairing.
2. Pre-soak the substrate to provide saturated surface dry (SSD) condition prior to applying repair material.
3. Apply scrub coat of the repair material to the prepared substrate.
4. While scrub coat is wet place SikaTop 111 *Plus*, filling the entire cavity. Strike off and finish as required. Wet cure and protect as per the technical data sheet.

Concrete Restoration Systems by Sika Corporation, 201 Polito Avenue, Lyndhurst, NJ 07071

SC-026

SikaTop® 111 Plus Hand-applied Repair



Note:

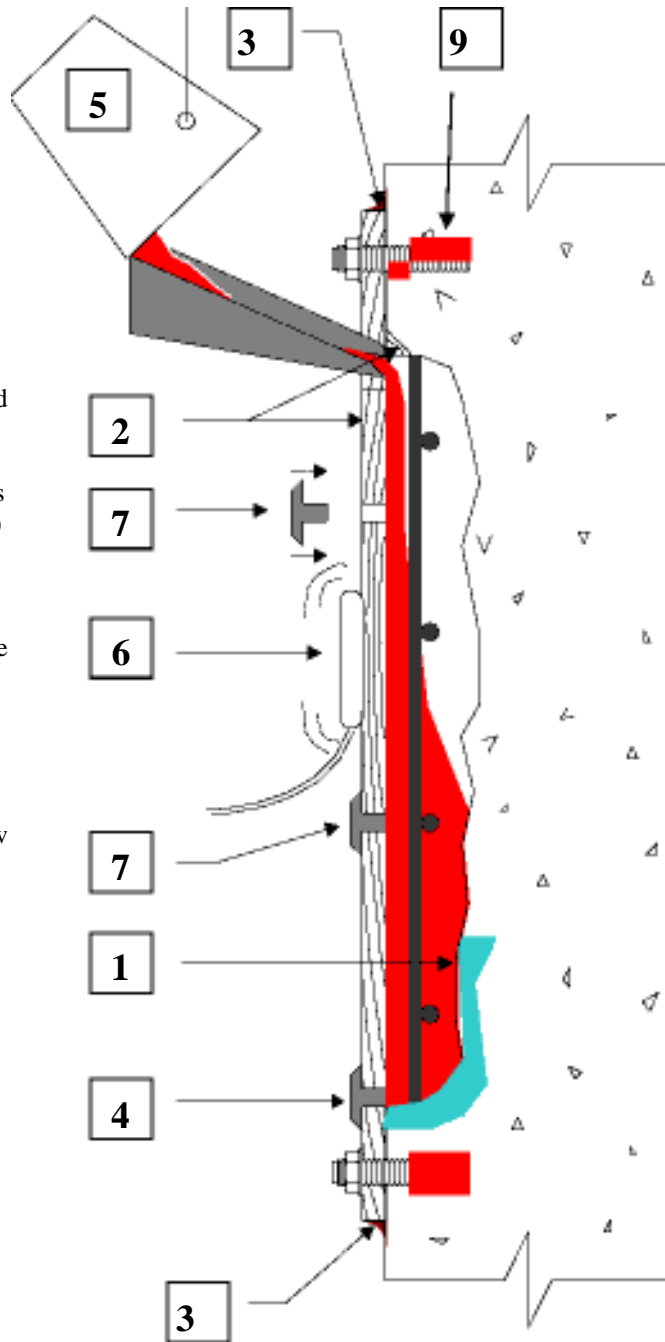
1. If repair area is too large to fill while scrub coat is still wet, use Sika Dur 32 in lieu of the scrub coat. (See Spec Component SC-200)
2. If reinforcing steel is located within the repair location refer to Spec Component SC-201
3. For applications greater than 1" in depth, add 3/8" coarse aggregate in accordance to the technical data sheet.

Concrete Restoration Systems by Sika Corporation, 201 Polito Avenue, Lyndhurst, NJ 07071

SC-026

SikaTop[®] 111 Plus Form & Pour Repair

1. Substrate shall be clean, sound and lamination-free prior to repairing. (Refer to ICRI Technical Guideline No. 03730.)
2. Fit form, provide vent holes and chip spot for pour box. Apply release agent to form, or use plastic lined plywood.
3. Anchor form and seal perimeter with bead of Sikaflex 1a, let cure.
4. Fill with water to check for water tightness and to provide saturated surface dry (SSD) substrate. Let drain to no free standing water.
5. Mix and place SikaTop 111 Plus as per the technical data sheet.
6. Vibrate form while pouring SikaTop 111 Plus.
7. Vent holes to be capped when steady flow is evident.
8. Strip form when appropriate.
9. Dry pack anchor holes with SikaGrout 212.



Note:

1. If reinforcing steel is located within the repair location refer to Spec Component SC-201
2. For applications greater than 1" in depth, add 3/8" coarse aggregate in accordance to the technical data she

SECTION 036000-PRECISION GROUTING

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Provide all labor, material, equipment and services required for grouting of equipment, machinery, structural steel, handrails, anchor bolts and other items or work for which grouting is specified or required.
- B. The object of these Specifications is to obtain grout which can be mixed to a flowable consistency (i.e., thinner than plastic consistency), placed in leak proof forms, with a minimum of strapping, without bleed water exceeding Specification requirements. The requirement of 24 hour presoak of existing concrete is of prime importance and must be adhered to. Trade name of grout shall be submitted to Engineer for review well in advance of preparation for grouting.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Cast-in-place Concrete is included in Section 03 31 00.
- B. Review all divisions and sections for equipment, machinery, and other items to be grouted.

1.3 DESCRIPTION OF WORK

- A. High strength, precision support of machine bases and soleplates, setting anchor bolts, including equipment subject to thermal movement and repetitive dynamic loading.
- B. Work includes providing a non-shrink, ready-to-use, fluid precision grout material; proportioned, pre-mixed and packaged at the factory; delivered to the job-site to place with only the addition of water; forming, placing and curing as specified in this section.

1.4 QUALITY ASSURANCE

Comply with the following codes, standards, tests and recommended practices for foundation concrete as applies to precision grouting.

- A. ACI 304R-85" Guide for Measuring, Mixing, Transporting and Placing Concrete."
- B. ACI 305R-77 (Revised 1982) "Recommended Practice for Hot Weather Concreting."
- C. ACI 306R-78 (Revised 1983) "Recommended Practice for Cold Weather Concreting."
- D. ACI 347-78 "Recommended Practice for Concrete Formwork."
- E. ASTM C 309-74 "Standard Specifications for Liquid Membrane Forming Compounds for Curing Concrete."

- F. Manufacturer's Information Use of Grout: Attached to each bag of grout.
- G. Corps of Engineers CRD C-79 Method of Test for Flow of Grout Mixtures (Flow-Cone method).
- H. ASTM C 109-73 "Tentative Method of Test for Compressive Strength of Hydraulic Cement Mortars."

1.5 SUBMITTALS

- A. Purchase Orders: Furnish copies of submittals in this Section to the Engineer prior to delivery in accordance with section 01 33 23.

PART 2 - PRODUCTS

2.1 GROUT

- A. Precision-support grout shall consist of a cementitious system, special graded and processed ferrous metallic internal reinforcing aggregate, carefully graded natural fine aggregate and additional technical components.
- B. Grouts which depend upon aluminum powders, chemicals or other agents which produce gas for expansion are not acceptable.
 - 1. Free of gas producing agents.
 - 2. Free of oxidizing catalysts.
 - 3. Free of inorganic accelerators, including chlorides.
- C. Provide Performance Characteristics when mixed to fluid consistency, 25 to 30 seconds (Flow Cone Method CRD C-79), as follows:
 - 1. No visible bleeding and/or settlement up to 2 hours on 1/4 to 2 gal. grout poured into gallon can, covered with glass plate to prevent evaporation. Grout shall meet the requirements of Paragraph 4.1 of Corps of Engineers CRD C 588-76.
 - 2. Maintain firm, full contact with underside of 4'x 4' x 2" steel plate firmly bolted to supports at quarter points at 1, 7 and 14 days, evidenced by tapping of plate and visual observation after stripping. Grout shall be cured in accordance with manufacturer's printed instructions.
 - 3. Provide strengths as specified in Paragraph 3.05 (2" x 2" cubes). Prepare specimens and test in accordance with ASTM C 109-73.

2.2 MEMBRANE CURING COMPOUND

- A. Membrane forming curing compound shall be in accordance with ASTM C 309-74.

2.3 WATER

- A. Water shall be suitable for drinking.

PART 3 - EXECUTION

3.1 PREPARATION FOR GROUTING

- A. Remove laitance down to sound concrete.
- B. Surface to receive grout shall be rough and reasonably level.
- C. Surface shall be properly wet cured. DO NOT USE CURING COMPOUNDS. (See Section 03 31 00).
- D. Clean surface of oil, grease, dirt, and loose particles.
- E. Clean bolt holes, bolts and underside of bed plate.
- F. Saturate concrete including bolt holes for 24 hours prior to grouting. Blow out excess water with oil free compressed air, or siphon prior to grouting.

3.2 FORMWORK

Formwork shall be compatible with proposed method of placing grout. Design for rapid, continuous and complete filling of space to be grouted.

- A. Build strong, tight forms braced so they will not leak or buckle under weight of fluid grout. On placing side, slant form at 45o angle and pour grout directly on slanted face. On other sides, place form 2" or more from base of bed plate and 1" or more higher than underside of the plate.
- B. Caulk forms with grouting material being used on inside or a sand-cement mortar outside to prevent leakage and loss of "head." Use expanded polystyrene or other means to caulk between foundation and portions of the bed plate and equipment to seal off areas where grout is not desired.

3.3 PREPARATION OF GROUT

Preparation of grout shall be in paddle-type mortar mixer suitable mechanical mixer. DO NOT MIX BY HAND.

- A. Mix grout adjacent to area being grouted, have sufficient manpower and equipment available for rapid and continuous mixing and placing. DO NOT ADD CEMENT, SAND OR PEA GRAVEL ADDITIVES.

- B. Avoid a consistency that produces bleeding. Mix materials for a minimum of 3 minutes and place immediately. DO NOT RETEMPER. DO NOT USE MIXING WATER ABOVE 80oF. (27°C).

3.4 PLACING

Placing of grout shall be at a temperature of 65-75 degrees F. (18-24 degrees C.) for foundation, bed plate and grout material. Maintain for 24 hours following installation, hereafter above 40 degrees F. (4 degrees C.) until strength exceed 4,000 psi (280 kg/cm2.) DO NOT USE COKE-FIRED SALAMANDERS.

- A. Place grout quickly and continuously; avoid surface of overworking material and segregation. DO NOT VIBRATE GROUT. DO NOT OVERWORK GROUT.
- B. Field service representative of the manufacturer shall be available during initial planning for installation to suggest recommended procedures and at start of placement for further suggestions.
 - 1. A minimum of three (3) days notice shall be given by the Contractor to the manufacturer prior to use of the product.

3.5 FINISHING AND CURING

Follow manufacturer's printed instructions for the brand and type of grout being used.

- A. The grout shall meet the following strengths:

	<u>Plastic Mix</u>	<u>Flowable Mix</u>
1-day	4,000 psi	2,000 psi
3-days	6,000 psi	3,000 psi
7-days	8,000 psi	5,000 psi
28-days	10,000 psi	7,000 psi

END OF SECTION 036000

DIVISION 05

METALS

SECTION 051200 - STRUCTURAL STEEL 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. Section Includes:

1. Structural steel.
2. Shear stud connectors.
3. Shrinkage-resistant grout.

- B. Related Requirements:

1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
2. Section 053100 "Steel Decking" for field installation of shear stud connectors through deck.
3. Section 055000 "Metal Fabrications" for miscellaneous steel fabrications and other steel items not defined as structural steel.
4. Section 099600 "High-Performance Coatings" for painting requirements.
5. Section 133419 "Metal Building Systems" for structural steel.

1.3 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.
- B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.
- C. Heavy Sections: Rolled and built-up sections as follows:
 1. Shapes included in ASTM A6/A6M with flanges thicker than 1-1/2 inches.
 2. Welded built-up members with plates thicker than 2 inches.
 3. Column base plates thicker than 2 inches.
- D. Protected Zone: Structural members or portions of structural members indicated as "protected zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

- E. Demand-Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the seismic-load-resisting system and which are indicated as "demand critical" or "seismic critical" on Drawings.

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct via teleconference .

1.6 ACTION SUBMITTALS

- A. Product Data:

1. Structural-steel materials.
2. High-strength, bolt-nut-washer assemblies.
3. Shear stud connectors.
4. Anchor rods.
5. Threaded rods.
6. Forged-steel hardware.
7. Slide bearings.
8. Prefabricated building columns.
9. Shop primer.
10. Galvanized-steel primer.
11. Etching cleaner.
12. Galvanized repair paint.
13. Shrinkage-resistant grout.

- B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Identify members and connections of the seismic-load-resisting system.
6. Indicate locations and dimensions of protected zones.
7. Identify demand-critical welds.

8. Identify members not to be shop primed.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide in accordance with AWS D1.1 for each welded joint whether prequalified or qualified by testing, including the following:
 1. Power source (constant current or constant voltage).
 2. Electrode manufacturer and trade name, for demand-critical welds.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, fabricator. shop-painting applicators.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural-steel materials, including chemical and physical properties.
- E. Product Test Reports: For the following:
 1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
 2. Direct-tension indicators.
 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 4. Shear stud connectors.
 5. Shop primers.
 6. Nonshrink grout.
- F. Survey of existing conditions.
- G. Source quality-control reports.
- H. Field quality-control reports.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).
- B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE or Category CSE.
- C. Shop-Painting Applicators: Qualified in accordance with AISC's Sophisticated Paint Endorsement P1 or to SSPC-QP 3.
- D. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with applicable provisions of the following specifications and documents:
 1. ANSI/AISC 303.
 2. ANSI/AISC 341.
 3. ANSI/AISC 360.
 4. RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- B. Connection Design Information:
 1. Option 2: Fabricator's experienced steel detailer shall select or complete connections in accordance with ANSI/AISC 303.
 - a. Select and complete connections using schematic details indicated and ANSI/AISC 360-10.
 - b. Use Load and Resistance Factor Design.
 2. Option 3 and 3A: Design connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer. Member reinforcement at connections is indicated on Drawings.
 - a. Use Load and Resistance Factor Design; data are given at factored-load level.

- C. Construction: Shear wall system

2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A992/A992M.
- B. Channels, Angles: ASTM A36/A36M.
- C. Plate and Bar: ASTM A36/A36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade B for round shaped, ASTM A500/A500M, Grade C for square and rectangular shaped structural tubing.
- E. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

- A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressible-washer type with plain finish.
- B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, heavy-hex head assemblies, consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
 - 1. Finish: Plain.

2.4 RODS

- A. Headed Anchor Rods: ASTM F1554, Grade 36, straight.
 - 1. Nuts: ASTM A563 heavy-hex carbon steel.
 - 2. Plate Washers: ASTM A36/A36M carbon steel.
 - 3. Washers: ASTM F436, Type 1, hardened carbon steel.
 - 4. Finish: ASTM A304 or A316 Stainless steel.

2.5 PRIMER

- A. Steel Primer:
 - 1. SSPC-Paint 23, latex primer.
 - 2. Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- B. Galvanized-Steel Primer: [MPI#26] [MPI#80,] [MPI#134].

1. Etching Cleaner: MPI#25, for galvanized steel.
2. Galvanizing Repair Paint: [MPI#18, MPI#19, or SSPC-Paint 20] ASTM A780.

2.6 SHRINKAGE-RESISTANT GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.
 1. Camber structural-steel members where indicated.
 2. Fabricate beams with rolling camber up.
 3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
 4. Mark and match-mark materials for field assembly.
 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 3.
- F. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using automatic end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.
- G. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural-steel frame. Straighten as required to provide uniform, square, and true members in completed wall framing. Build up welded framing, weld exposed joints continuously, and grind smooth.
- H. Welded-Steel Door Frames: Build up welded-steel door frames attached to structural-steel frame. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated on Drawings.
- I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.8 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 and AWS D1.8 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.
 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
 2. Galvanize lintels, shelf angles, and welded door frames attached to structural-steel frame and located in exterior walls.

2.10 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:
 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 2. Surfaces to be field welded.
 3. Surfaces of high-strength bolted, slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 5. Galvanized surfaces unless indicated to be painted.
- B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:
 1. SSPC-SP 7 (WAB)/NACE WAB-4.
 2. SSPC-SP 6 (WAB)/NACE WAB-3.
- C. Surface Preparation of Galvanized Steel: Prepare galvanized-steel surfaces for shop priming by thoroughly cleaning steel of grease, dirt, oil, flux, and other foreign matter, and treating with etching cleaner or in accordance with SSPC-SP 16.

- D. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.11 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
 - 1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
 - 2. Bolted Connections: Inspect and test shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
 - 3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E165/E165M.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E164.
 - d. Radiographic Inspection: ASTM E94/E94M.
 - 4. In addition to visual inspection, test and inspect shop-welded shear stud connectors in accordance with requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear stud connector.
 - b. Conduct tests in accordance with requirements in AWS D1.1/D1.1M on additional shear stud connectors if weld fracture occurs on shear stud connectors already tested.
 - 5. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.
 1. Do not remove temporary shoring supporting composite deck construction and structural-steel framing until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 2. Weld plate washers to top of baseplate.
 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.
- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection.

- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

3.5 REPAIR

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.
- B. Touchup Painting:
 - 1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
 - 2. Cleaning and touchup painting are specified in Section 099600 "High-Performance Coatings."
- C. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

3.6 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.

- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
1. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
 2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
 - a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1) Liquid Penetrant Inspection: ASTM E165/E165M.
 - 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3) Ultrasonic Inspection: ASTM E164.
 - 4) Radiographic Inspection: ASTM E94/E94M.
- C. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

END OF SECTION 051200

SECTION 055000 - MISCELLANEOUS METALWORK

PART 1 - GENERAL

1.1 THE REQUIREMENT

- A. The Contractor shall provide miscellaneous metalwork and appurtenances, complete and in place, in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Federal Specifications

MIL-G-18015 A (3)	(Ships) Aluminum Planks. (6063-T6)
MIL-A-907E	Antiseize Thread Compound, High Temperature

B. Commercial Standards

AA-M32C22A41	Aluminum Assn.
AASHTO HS-20	Truck Loading
AISC	Manual of Steel Construction
AISI	Design of Light Gauge, Cold-Formed Steel Structural Members
ASTM A 36	Carbon Structural Steel
ASTM A 48	Gray Iron Castings
ASTM A 53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
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 193	Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service
ASTM A 194	Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service
ASTM A 307	Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A 325	Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 992	Steel for Structural Shapes for Use in Building Framing
ANSI/AWS D1.1	Structural Welding Code - Steel
ANSI/AWS D1.2	Structural Welding Code - Aluminum
ANSI/AWS QC1	Qualification and Certification of Welding Inspectors

1.3 CONTRACTOR SUBMITTALS

- A. Shop Drawings: Shop Drawings of all miscellaneous metalwork shall be submitted in accordance with Section 013323 – Shop Drawings, Product Data and Samples.

1.4 QUALITY ASSURANCE

- A. All weld procedures and welder qualifications shall be available in the Contractor's field office for review.
- B. All welding shall be inspected by a Contractor-furnished inspector qualified in accordance with AWS requirements and approved by the Engineer.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Steel

Wide Flange Shapes	ASTM A 992
Shapes, Plates, Bars	ASTM A 36
Pipe, Pipe Columns, Bollards	ASTM A 53, Type E or S, Grade B standard weight unless noted otherwise
HSS	ASTM A 500 Grade B

- B. Corrosion Protection: Unless otherwise indicated, fabricated steel metalwork which will be used in a corrosive environment and/or will be submerged in water/wastewater shall be coated in accordance with Section 099610 – High Performance Paint and Coating and shall not be galvanized prior to coating. All other miscellaneous steel metalwork shall be hot-dip galvanized after fabrication.
- C. Stainless Steel: Unless otherwise indicated, stainless steel metalwork and bolts shall be of Type 316 stainless steel. Where anaerobic conditions are noted, Type 304 stainless steel shall be used.
- D. Aluminum: Unless otherwise indicated, aluminum metalwork shall be of Alloy 6061-T6. Aluminum in contact with concrete, masonry, wood, porous materials, or dissimilar metals shall have contact surfaces coated in accordance with Section 099610.
- E. Cast Iron: Unless otherwise indicated, iron castings shall conform to the requirements of ASTM A 48, Class 50B or better.

2.2 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete masonry. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Prime shelf angles located in exterior walls with zinc-rich primer.

- D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to concrete masonry unit walls.

2.3 METAL STAIRS

- A. Metal Stairs: Metal stairs shall be composed of steel or aluminum stringers and supports, be fabricated in accordance with standard practice of the National Association of Ornamental Metal Manufacturers, and be as indicated. Steel stair members shall be hot-dip galvanized after fabrication.

2.4 SAFETY STAIR NOSINGS

- A. Safety stair nosing shall be provided on all concrete stairs and other locations as indicated. The nosing shall be 3-inch wide, extruded aluminum with cast-in abrasive strips and integral extruded anchors. The color of the cast abrasive shall be as selected by the Engineer from the manufacturer's standard colors. The nosing shall be American Abrasive Metals Company, Style "231-A"; American Mason Safety Tread Company, Figure "31A" or equal.

2.5 BOLTS AND ANCHORS

- A. Standard Service (Non-Corrosive Application): Unless otherwise indicated, bolts, anchor bolts, washers, and nuts shall be steel as indicated herein. Threads on galvanized bolts and nuts shall be formed with suitable taps and dies such that they retain their normal clearance after hot-dip galvanizing. Except as otherwise indicated, steel for bolt material, anchor bolts and cap screws shall be in accordance with the following:
 - 1. Structural connections: ASTM A 307, Grade A or B, hot-dip galvanized.
Anchor Bolts: ASTM A 307, Grade A or B, or ASTM A 36, hot-dip galvanized.
 - 2. High strength bolts where indicated: ASTM A 325.
 - 3. Pipe and equipment flange bolts: ASTM A 193, Grade B-7.
- B. Corrosive Service: All bolts, nuts, and washers in the locations listed below shall be stainless steel as indicated below.
 - 1. All buried locations.
 - 2. All submerged locations.
 - 3. All locations subject to seasonal or occasional flooding.
 - 4. Inside hydraulic structures below the top of the structure.
 - 5. Inside buried vaults, manholes, and structures which do not drain through a gravity sewer or to a sump with a pump.
 - 6. All chemical handling areas.
 - 7. Inside trenches, containment walls, and curbed areas.
 - 8. Locations indicated by the Contract Documents or designated by the Engineer to be provided with stainless steel bolts.
- C. Unless otherwise indicated, stainless steel bolts, anchor bolts, nuts, and washers shall be Type 316 stainless steel, Class 2, conforming to ASTM A 193 for bolts and to ASTM A 194 for nuts. All threads on stainless steel bolts shall be protected with an antiseize lubricant suitable for

submerged stainless steel bolts, to meet government specification MIL-A-907E. Buried bolts in poorly drained soil shall be coated the same as the buried pipe.

1. Antiseize lubricant shall be classified as acceptable for potable water use by the NSF.
2. Antiseize lubricant shall be "PURE WHITE" by Anti-Seize Technology, Franklin Park, IL, 60131, AS-470 by Dixon Ticonderoga Company, Lakehurst, NJ, 08733, or equal.

D. Bolt Requirements

1. The bolt and nut material shall be free-cutting steel.
2. The nuts shall be capable of developing the full strength of the bolts. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads. All bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series.
3. Bolts and nuts shall be installed with washers fabricated of material matching the base material of bolts, except that hardened washers for high strength bolts shall conform to the requirements of the AISC Specification. Lock washers fabricated of material matching the bolts shall be installed where indicated.
4. The length of each bolt shall be such that after the joint is made up, the bolt extends through the entire nut, but in no case more than 1/2-inch beyond the nut.

E. Adhesive Anchors: Unless otherwise indicated, all drilled, concrete or masonry anchors shall be adhesive anchors. No substitutions will be considered unless accompanied with ICBO report verifying strength and material equivalency.

1. Epoxy adhesive anchors are required for drilled anchors for indoor installations, in submerged, wet, splash, overhead, and corrosive conditions, and for anchoring handrails and reinforcing bars. Epoxy shall comply with Section 03315 - Grout. Threaded rod shall be galvanized for general purpose applications and stainless steel Type 316 for corrosive applications. Epoxy anchors shall not be permitted in areas where the concrete temperature is in excess of 100 degrees F or higher than the limiting temperature recommended by the manufacturer, whichever is lower. Epoxy anchors shall not be used when anchors are subject to vibration or fire. Embedment depth shall be as the manufacturer recommends for the load to be supported.
2. Unless otherwise indicated, glass capsule, polyester resin adhesive anchors will be permitted in locations not included above and shall be Hilti HVA or Cobra Anchors. Threaded rod shall be galvanized steel.

F. Expanding-Type Anchors: Expanding-type anchors if indicated or permitted, shall be galvanized steel expansion type ITW Ramset/Redhead "Trubolt" anchors; McCulloch Industries "Kwick-Bolt;" or equal. Lead caulking anchors will not be permitted. Size shall be as indicated. Embedment depth shall be as the manufacturer recommends for the load to be supported. Expansion type anchors which are to be embedded in grout may be steel. Non-embedded buried or submerged anchors shall be stainless steel.

G. Non-Shrink Grouted Anchors: Anchors, if indicated or permitted, shall be grouted with a non-shrink cementitious grout in accordance with the manufacturer's recommendation. Embedment depth shall be as the manufacturer recommends for the load to be supported. Non-shrink grout material shall be Class B or C in accordance with Section 03600 – Precision Grouting.

2.6 POWDER-DRIVEN PINS

- A. Materials: Powder-driven pins for installation in concrete or steel shall be heat-treated steel alloy. If the pins are not inherently sufficiently corrosion-resistant for the conditions to which they are to be exposed, they shall be protected in an acceptable manner. Pins shall have capped or threaded heads capable of transmitting the loads the shanks are required to support. Pins that are connected to steel shall have longitudinal serrations around the circumference of the shank.

2.7 IMPACT ANCHOR

- A. Impact anchors shall be an expansion type anchor in which a nail type pin is driven to produce the expansive force. The pin shall have a zinc sleeve with a mushroom style head and stainless steel nail pin. Anchors shall be Metal Hit Anchors, manufactured by Hilti, Inc., Rawl Zamac Nailin, manufactured by the Rawlplug Company; or equal.

PART 3 - EXECUTION

3.1 FABRICATION AND INSTALLATION REQUIREMENTS

- A. Fabrication and Erection: Except as otherwise indicated, the fabrication and erection of structural steel shall conform to the requirements of the American Institute of Steel Construction "Manual of Steel Construction."
- B. Aluminum Railings: Aluminum railing fabrication and installation shall be performed by craftsmen experienced in the fabrication of architectural metalwork. Exposed surfaces shall be free from defects or other surface blemishes. Dimensions and conditions shall be verified in the field. All joints, junctions, miters and butting sections shall be precision fitted with no gaps occurring between sections, and with all surfaces flush and aligned. Electrolysis protection of materials shall be provided.
- C. Powder-Driven Pins: Powder-driven pins shall be installed by a craftsperson certified by the manufacturer as being qualified to install the manufacturer's pins. Pins shall be driven in one initial movement by an instantaneous force that has been carefully selected to attain the required penetration. Driven pins shall conform to the following requirements where "D" = pin's shank diameter:

Material Penetrated by Pin	Material Minimum Thickness	Pin Shank Penetration in Supporting Material	Minimum Space From Pin's CL to Edge of Penetrated Material	Minimum Pin Spacing
Concrete	16D	6D minimum	14D	20D
Steel	1/4-inch	Steel thickness	4D	7D

3.2 WELDING

- A. Method: Welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards governing same.
- B. Quality: In assembly and during welding, the component parts shall be adequately clamped, supported, and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as indicated by the AWS Code. Upon completion of welding, weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. Ground all sharp corners of material which is to be painted or coated to a minimum of 1/32-inch on the flat.

3.3 GALVANIZING

- A. Structural steel plates shapes, bars, and fabricated assemblies required to be galvanized shall, after the steel has been thoroughly cleaned of rust and scale, be galvanized in accordance with the requirements of ASTM A 123. Any galvanized part that becomes warped during the galvanizing operation shall be straightened. Bolts, anchor bolts, nuts and similar threaded fasteners, after being properly cleaned, shall be galvanized in accordance with the requirements of ASTM A 153.
- B. Field repairs to damaged galvanizing shall be made by preparing the surface and applying a coating.
 - 1. Surface preparation shall consist of removing oil, grease, soil, and soluble material by cleaning with water and detergent (SSPC SP1) followed by brush off blast cleaning (SSPC SP7), over an area extending at least 4-inches in all directions into the undamaged area.
 - 2. Coating shall be applied to at least 3 mils dry film thickness. Use Zinc-Clad XI by Sherwin-Williams, Galvax by Alvin Products, or ZRC by ZRC Worldwide.

3.4 DRILLED ANCHORS

- A. Drilled anchors and reinforcing bars shall be installed in strict accordance with the manufacturer's instructions. Holes shall be roughened with a brush on a power drill, cleaned and dry. Drilled anchors shall not be installed until the concrete has reached the required 28-day compressive strength. Adhesive anchors shall not be loaded until the adhesive has reached its indicated strength in accordance with the manufacturer's instructions.

END OF SECTION 055000

SECTION 055202 – ALUMINUM HANDRAILS AND RAILINGS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Extent and dimensions of handrails and railings are indicated on Drawings and include miscellaneous handrails and railing systems not included in other Sections of these Specifications.
- B. Type of handrails and railing systems in this Section is aluminum pipe handrails and railing systems.
- C. Products furnished but not installed under this Section include inserts and anchors preset in masonry and concrete for anchorage of hand rails and railing systems.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to Work of this Section.
- B. Division 5 - Metals
- C. Structural Steel: Section 051200

1.3 SUBMITTALS

- A. Product Data: Manufacturer's technical data for products and processes used in handrails and railing systems, including finishes and grout.
- B. Shop Drawings: Shop details of fabrication and installation for each type and material of handrail and railing system required including plans, elevations, sections, profiles of rails, fittings, connections, and anchors.
- C. Samples: Prepare samples of each type of metal finish required on metal of same thickness and alloy indicated for final work. Where finish involves normal color and texture variations, include sample sets composed of two (2) or more units showing limits of such variations expected in completed work. Include 6" long samples of each distinctly different railing member including handrails, top rails, posts, and samples of fittings and brackets.

1.4 DEFINITIONS

- A. Definitions in ASTM E 985 for railing-related terms apply to this Section.

1.5 SYSTEM DESCRIPTION

- A. Structural Performance of Handrails and Railing Systems: Design, engineer, fabricate, and install handrails and railing systems to withstand the following structural loads without exceeding the allowable design working stress of the materials for handrails, railing systems, anchors, and connections. Apply each load to produce the maximum stress in each of the respective components comprising handrails and railing systems.
 - 1. Top Rail of Guardrail Systems: Concentrated load of 200 lbf (890 N) applied at any point and in any direction and a uniform load of 50 lbf per linear foot (730 N/m) applied horizontally and concurrently with a uniform load of 100 lbf per linear foot (1460 N/m) applied vertically downward. Concentrated and uniform loads need not be assumed to act concurrently.
 - 2. Handrails Not Serving as Top Rails: Concentrated load of 200 lbf (890 N) applied at any point and in any direction and a uniform load of 50 lbf per linear foot (730 N/m) applied in any direction. Concentrated and uniform loads need not be assumed to act concurrently.
 - 3. Infill Area of Guardrail Systems: Horizontal concentrated load of 200 lbf (890 N) applied to 1 sq. ft. (0.09 sq. m) at any point in the system including gates, panels, intermediate rails, balusters, or other elements composing the infill area. Loads on infill area need not be assumed to act concurrently with loads on top rails.
- B. Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
- C. Material for rails and gates shall be a minimum of 1-1/2" diameter Schedule 40 and for posts, a minimum of Schedule 80.

1.6 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain handrails and railing systems of each type and material from a single manufacturer.
- B. Design Responsibility: Engage a qualified professional engineer to prepare or supervise the preparation of structural computations for handrails and railing systems to determine compliance with structural performance requirements indicated.

1.7 STORAGE

- A. Store handrails and railing systems in clean, dry location, away from uncured concrete and masonry, protected against damage of any kind. Cover with waterproof paper, tarpaulin, or polyethylene sheeting; allow for air circulation inside the covering.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide handrails and railing systems of one of the following, or an approved equal. Handrail System shall be equal to "TUFRAIL" as manufactured by Thompson Fabricating Company.
1. Thompson Fabricating Company, Inc., Birmingham, Alabama.
 2. Superior Railing Company
 3. Alumaguard

2.2 METALS

- A. General: Comply with standards indicated for forms and types of metals indicated or required for handrail and railing system components.
- B. Aluminum: Provide alloy and temper recommended by aluminum producer or finisher for type of use and finish indicated, and with not less than the strength and durability properties of the alloy and temper designated below for each aluminum form required.
1. Extruded Bar and Shapes: ASTM B 221, 6063-T6.
 2. Extruded Pipe and Tube: ASTM B 429, 6063-T6.
 3. Plate and Sheet: ASTM B 209, 6061-T6.
 4. Die and Hand Forgings: ASTM B 247, 6061-T6.
 5. Castings: ASTM B 26, 356-T6.

2.3 MISCELLANEOUS MATERIALS

- A. Nonshrink Nonmetallic Grout: Pre-mixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD C621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this Section.
- B. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded, complying with applicable AWS Specifications, and as required for color match, strength, and compatibility in fabricated items.
- C. Fasteners: Use fasteners of stainless steel for aluminum components, unless otherwise indicated. Do not use metals which are corrosive or incompatible with materials joined.
- D. Provide concealed fasteners for interconnection of handrail and railing components and for their attachment to other work except where exposed fasteners are unavoidable or are the standard fastening method for handrail and railing system indicated.
- E. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.
- F. Anchors and Inserts: Provide anchors of type, size, and material required for type of loading and installation condition shown, as recommended by manufacturer, unless otherwise indicated. Use nonferrous metal of hot-dipped galvanized anchors and inserts for exterior locations and

elsewhere as required for corrosion resistance. Use toothed steel or expansion bolt devices for drilled-in-place anchors.

- G. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel: Sherwin-Williams Zinc-Clad Galvanizing Compound #143-0255 or equal.
- H. Bituminous Paint: SSPC-Paint 12 (cold-applied asphalt mastic).
- I. Zinc Chromate Primer for Galvanized Metals: Sherwin-Williams Galvite, B50W3 or equal; for Ferrous Metals: Sherwin-Williams KemKromik Universal, B50Z Series or equal.

2.4 FABRICATION

- A. General: Fabricate handrails and railing systems to design, dimensions and details shown. Provide handrail and railing members in sizes and profiles indicated, with supporting posts and brackets of size and spacing shown, but not less than required to comply with requirements indicated for structural performance. Handrail systems which use fittings which are glued or pop-riveted will not be acceptable.
- B. Shop Assembly: Pre-assemble items in 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.
- C. Nonwelded Connections: Fabricate railing systems and handrails for interconnection of members by means of railing manufacturer's standard concealed mechanical fasteners and fittings unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
- D. Welded Connections for Aluminum Pipe: Fabricate aluminum pipe handrails and railing systems for interconnection of members by concealed internal welds, which eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
- E. Form changes in direction of railing members by bending members, insertion of prefabricated elbow fittings, radius bends, or by mitering.
- F. For handrails and railing systems with nonwelded connections which are exposed to exterior or to moisture from condensation or other sources, provide weepholes or other means for evacuation of entrapped water in hollow sections of railing members.
- G. Toe Boards: Where required by O.S.H.A. and where indicated on the Drawings, provide toe boards at railing systems around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details shown or, if not shown, use manufacturer's standard detail. Toe boards shall be 4" high.
- H. Brackets, Flanges, Fittings and Anchors: Provide manufacturer's standard wall brackets, flanges, hinges, miscellaneous fittings and anchors for interconnection of handrail and railing members to other work, unless otherwise indicated.
- I. Furnish inserts and other anchorage devices for connecting handrails and railing systems to concrete or masonry work. Fabricate anchorage devices which are capable of withstanding

loadings imposed by handrails and railing systems. Coordinate anchorage devices with supporting structure.

- J. For railing posts set in concrete provide preset sleeves of steel, not less than 6" long and inside dimensions not less than 2" greater than outside dimensions of post, with steel plate forming bottom closure.
- K. Provide slip-fit metal sockets to receive removable railing posts. Fabricate sockets for a close fit with posts and to limit deflection of post without lateral load, measured at top, not to exceed 1/12 of post height. Design and fabricate socket covers to resist accidental dislodgement.
- L. Gates: Provide gates of equal structural properties of railing system, with toe board. Hinges shall be capable of providing a swing of 180 degrees. Provide positive latching device which shall be operable from both sides of gate.

2.5 METAL FINISHES, GENERAL

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations and designations of finishes, except as otherwise indicated.
- B. Class I Clear Anodized Finish: AA-M10C22A41 (medium satin directional textured mechanical finish; chemical etch, medium matte; 0.7 mil min. thick clear anodic coating) complying with AAMA 607.1.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors, which are to be embedded in concrete as masonry construction. Coordinate delivery of such items to project site.
- B. Field Measurements: Take field measurements prior to fabrication.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections accurately together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installation of handrails and railing systems. Set work accurately in location, alignment, and elevation, plumb, level, true, and free of rack, measured from established lines and levels. Do not weld, cut or abrade surfaces of handrails and railing components which have been coated or finished after fabrication, and are intended for field connection by mechanical means without further cutting or fitting.
- C. Field Welding: Comply with applicable AWS Specification for procedures of manual shielded metal-arc welding, for appearance and quality, of welds made, and for methods used in

correcting welding work. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed welded joints smooth and restore finish to match finish of adjacent rail surfaces.

- D. Corrosion Protection: Coat concealed surfaces of aluminum, which will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint or zinc chromate primer.
- E. Adjust handrails and railing systems prior to anchoring to ensure matching alignment at abutting joints. Space posts at 5'-0" o.c. MAX but not more than that required by design loadings.

3.3 ANCHORING POSTS

- A. Anchor aluminum handrail posts to concrete with manufacturer's base flange assembly (3 anchors per base) for top and side mount brackets recommended for meeting the design criteria. Base flanges and side mount brackets will not be welded to the post but will be mechanically fastened so as to achieve a rigid construction without annealing the post. All connections to concrete will be made using stainless steel wedge anchors, which are to be sized and furnished by the handrail manufacturer as an integral part of their handrail system. Anchor post on new concrete shall be side mounted except where shown otherwise on the drawings.
- B. Anchor posts to metal surfaces with manufacturer's standard fittings designed for this purpose unless otherwise indicated.
- C. Provide removable railing sections as indicated, using slip-fit metal sockets. Accurately locate sockets to match post spacing.

3.4 RAILING CONNECTIONS

- A. Nonwelded Connections: Use manufacturer's standard mechanical joints for permanently connecting railing components. Components that are glued or pop riveted at the joints will not be acceptable. All components must be mechanically fastened with stainless steel hardware. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic filler cement colored to match finish of handrails and railing systems.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components by welding. Cope or butt components to provide 100 percent contact or use manufacturer's standard fittings designed for this purpose.

3.5 ANCHORING RAILING ENDS

- A. Anchor railing ends into concrete or masonry with manufacturer's standard fittings designed for this purpose, unless otherwise indicated.
- B. Anchor railing ends to metal surfaces with manufacturer's standard fittings using concealed fasteners, unless otherwise indicated.

- C. Expansion Joints: Provide expansion joints at locations indicated or, if not indicated, at intervals not to exceed 40 feet. Provide slip-joint internal sleeve extending 2" beyond joint on either side; fasten internal sleeve securely to one side, locate joint within 6" of post.

3.6 ATTACHMENT OF HANDRAILS TO WALLS

- A. General: Secure handrails to walls with manufacturer's standard wall brackets and end fittings, unless otherwise indicated.
- B. For concrete and solid masonry, use drilled-in expansion shields and concealed hanger bolts, unless otherwise indicated.
- C. For hollow masonry anchorage, use toggle bolts with square heads, unless otherwise indicated.

3.7 PROTECTION

- A. Protect finishes of railing systems and handrails from damage during construction period by use of temporary protective coverings approved by railing manufacturer. Remove protective covering at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items which cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units as required.

END OF SECTION 055202

SECTION 055300 – ALUMINUM GRATING

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Provide all labor, materials, equipment and services required to furnish and install metal bar grating in accordance with the Drawings and specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to the work of this section.
- B. Miscellaneous Metals and Fasteners are included in Division 05.

1.3 SUBMITTALS

Comply with Section 01 33 23 as well as the requirements specified herein.

- A. Submit shop drawings to the Engineer for review before fabrication.
- B. Indicate areas to receive grating, grating details and dimensions, and material specifications.
- C. Show anchorage details and locations.
- D. Indicate coordination with equipment suppliers where openings for such equipment are required.

1.4 REFERENCE STANDARDS

- A. Design, fabrication and installation of grating shall be in accordance with Standard Specifications and Voluntary Code of Practice in Metal Bar Grating Manual, 1979 Edition, published by National Association of Architectural Metal Manufacturers, Chicago, Illinois (ANSI A 202.1).

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

- A. Gratings shall meet or exceed the following design criteria:
- B. Support uniform live load of 100 psf.

- C. Deflection not to exceed span of bearing bars (in inches) divided by 360.
- D. Maximum fiber stress: 12,000 psi.

2.2 BASIC DESIGN

The basic design requirements are listed below:

- A. Shape: Rectangular.
- B. Type Construction: Pressure locked.
- C. Bar Sizes, unless otherwise shown on the Drawings:
 - 1. Bearing Bars: 1-1/2" x 3/16".
 - 2. Cross Bars: 1" x 1/8".
- D. Maximum Bar Spacing:
 - 1. Bearing Bars: 1-3/16" c-c.
 - 2. Cross Bars: 4" c-c.
- E. Banding Bars:
 - 1. Same thickness as bearing bars to which they are attached.
 - 2. At free ends: Same depth as bearing bars.
 - 3. At supported ends: 1/8" less in depth than bearing bars.
- F. Bearing and crossbars shall be flush at surface.
- G. All free and supported bar ends around perimeter and around cutouts shall be banded.
- H. Provide removable sections of grating with suitable end bearing where noted on the Drawings or otherwise required.

2.3 MATERIALS

- A. Aluminum Grating:

The materials of construction shall meet the following requirements:

- 1. Bearing Bars: ASTM B 221, 6061-T6 or 6063-T6, aluminum.
- 2. Cross Bars: ASTM B 221 (extruded) or ASTM B 210 (drawn) aluminum.
- 3. All steel fasteners used with aluminum grating shall be galvanized.
- 4. Finish: Aluminum mill finish (as fabricated).
- 5. Anchors: Saddle clips of manufacturer's standard design, galvanized.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Grating shall be fabricated as indicated by shop drawings which have been revised to reflect actual field measurements.
- B. Grating shall be set with full and uniform end bearing to preclude rocking; do not use wedges or shims.
- C. Provide 1-inch minimum bearing with maximum erection clearance of 1/4-inch all around.
- D. Anchor grating with saddle clips in accordance with manufacturer's recommendations or as detailed on the Drawings.
- E. Provide cutouts for the passage of pipe, valve and equipment operators, conduit, stems and similar work; cutouts for circular obstructions shall be at least 2" larger in diameter than the obstruction.
- F. Protect all surfaces of angles and frames to be in contact with concrete or dissimilar metals with two (2) coats of Fed. Spec. TT-V-51F Asphalt Varnish.

END OF SECTION 055300

SECTION 056000 – PORTABLE HOIST SYSTEM MAST SLEEVE DAVIT BASES

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Furnish all labor, materials, equipment, and service required to furnish and install portable hoist system mast sleeve davit bases according to the layout shown on the Contract Drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete: Division 3

1.3 ACCEPTABLE MANUFACTURERS

- A. Portable hoist system mast sleeve davit bases supplied under this section shall be DBI Sala or approved equal.

1.4 SUBMITTALS

- A. Submit manufacturer's data and shop drawings for the materials specified herein.
- B. Descriptive literature, catalog cuts, and dimensional prints clearly indicating all dimensions and materials of construction, shall be submitted on all items specified herein to the Engineer for review before ordering.
- C. At the time of submission, the Contractor shall, in writing, call the Engineer's attention to any deviations that the submittals may have from the requirements of the Engineer's Contract Drawings and Specifications.

PART 2 - PRODUCTS

2.1 PORTABLE HOIST SYSTEM MAST SLEEVE DAVIT BASES

- A. Unit must be able to withstand, without failure, a drop test consisting of a 500-lb weight dropping 18 inches.
- B. Welded stainless steel sleeve, wall-mount design, with anchors for new concrete construction. DBI Sala UCL wall-mounted sleeve davit base model number 8518348, or approved equal.

- C. All sleeve davit bases must be compatible with the Owner's existing DBI Sala UCL advanced series hoist model number 8518040 mast.
- D. Stainless steel cap required for each sleeve to be in place when sleeve is not in use.
- E. All sleeve davit bases must allow for 360 degree mast rotation and be rated for a 450-lb working load.

PART 3 - EXECUTION

3.1 GENERAL

- A. Installation shall be in accordance with manufacturer's instructions.

END OF SECTION 056000

DIVISION 09

FINISHES

SECTION 099600 - HIGH PERFORMANCE PAINTS AND COATINGS – WATER PLANT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Provide all labor, materials, equipment and services for furnishing and installing the finishes as indicated on drawings and schedules, and as herein specified.
- B. Work includes painting and finishing of interior and exterior exposed items and surfaces throughout project, except as otherwise indicated. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.
- C. Work includes field painting of exposed bare and covered pipes and ducts (including color coding), and of hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work, except as otherwise indicated. In addition, the Contractor shall provide for the use of deep tone colors to be applied in selected areas as wall graphics, stripes and visual accents. The areas and colors shall be selected by the Architect-Engineer and shall not exceed 15% of the total wall surface area to be painted.
- D. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.
- E. Surfaces to be Painted: Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces whether or not colors are designated in "schedules". Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect-Engineer will select these from standard colors or finishes available.
- F. Following categories of work are not included as part of field- applied finish work.
 - 1. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer-finishing is specified for such items as (but not limited to) toilet enclosures, prefinished partition systems, acoustic materials, architectural woodwork and casework, and finish mechanical and electrical equipment, including light fixtures, switchgear, and distribution cabinets.
 - 2. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, furred areas, pipe spaces, and duct shafts.
 - 3. Finished Metal Surfaces: Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting.
 - 4. Operating Parts: Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting.
- G. Following categories of work are included under other sections of these specifications.

1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, metal fabrications, hollow metal work and similar items.
 2. Unless otherwise specified, shop priming of fabricated components such as architectural woodwork, wood casework and shop-fabricated or factory-built mechanical and electrical equipment or accessories is included under other sections of these Specifications.
- H. Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.
- I. PVC plastic process piping shall not be painted, but shall be stenciled and labeled or tagged for identification surfaces. Each type of process piping using PVC pipe shall be installed using the same color pipe.
- J. Repainting of existing structures, tanks, piping, and all other existing items shall not be part of this Contract unless otherwise noted. Areas that have been directly altered or damaged by construction shall be repainted to match existing conditions using the appropriate painting system.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to Work of this Section.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use.
- B. Samples: Prior to beginning work, submit color chips for surfaces to be painted. Use representative colors when preparing samples for review. Submit samples for Architect-Engineer's review of color and texture only. Provide a listing of material and application for each coat of each finish sample.
- C. Submit manufacturer's data and shop drawings for the materials specified herein. Comply with all requirements of Section 013323.
- D. Descriptive literature, catalog cuts, and dimensional prints clearly indicating all dimensions and materials of construction shall be submitted on all items specified herein to the Engineer for review before ordering.
- E. At the time of submission, the Contractor shall, in writing, call the Engineer's attention to any deviations that the submittals may have from the requirements of the Engineer's Contract Drawings and Specifications.
- F. In accordance with the requirements of the General and Special Conditions and this Section, the following table includes, but is not limited to, the items required to be submitted:

Item Description	Shop Drawings	Product Data	Schedules	Installation Data	Parts Lists	Wiring Diagram	Samples	O & M Manual	Certificates	Warranty	Report	Other
Coatings	X	X		X			X		X	X		

1.4 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.
- B. Coordination of Work: Review other sections of these Specifications in which prime paints are to be provided to ensure compatibility of total coatings systems for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use to ensure compatible prime coats are used.

1.5 DELIVERY AND STORAGE

- A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:
 - 1. Name or title of material.
 - 2. Fed. Spec. number, if applicable.
 - 3. Manufacturer's stock number, batch number, and date of manufacturer.
 - 4. Manufacturer's name.
 - 5. Contents by volume, for major pigment and vehicle constituents.
 - 6. Thinning instructions.
 - 7. Application instructions.
 - 8. Color name and number.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue. Protect from freezing where necessary. Keep storage area neat and orderly. Remove oily rags and waste daily. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

1.6 JOB CONDITIONS

- A. Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F (10 degrees C) and 90 degrees F (32 degrees C), unless otherwise permitted or restricted by paint manufacturer's printed instructions.

- B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F (7 degrees C) and 95 degrees F (35 degrees C), unless otherwise permitted or restricted by paint manufacturer's printed instructions.
- C. Do not apply paint in snow, rain, fog or mist, or when relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted or restricted by paint manufacturer's printed instructions. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.
- D. Paint only when the surface temperature is at least 5 degrees F above the dew point, unless otherwise permitted by paint manufacturer's printed instructions.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - 1. Tnemec Company, Inc. (Tnemec)
 - 2. The Sherwin-Williams Company
 - 3. Carboline

2.2 MATERIALS

- A. Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.
- B. Proprietary names used to designate colors or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers.
- C. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.
 - 1. Lead content in pigment, if any, is limited to contain not more than 0.06% lead, as lead metal based on the total non-volatile (dry-film) of paint by weight.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner

acceptable to Applicator.

- B. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.
- C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.2 SURFACE PREPARATION

- A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.
 - 1. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify Architect-Engineer in writing of any anticipated problems in using the specified coating systems with substrates primed by others.
 - 2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.
 - 3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning per SSPC SP-1. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.
 - 4. Abrasives for blasting shall be sharp, washed, salt free, angular, and free from feldspar or other constituents that tend to breakdown and remain on the surface.
 - 5. Concrete floors shall be dry as indicated by testing in accordance with ASTM D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
- B. Cementitious Materials: Per ASTM D4261, Standard Practice for Surface Cleaning Concrete Unit Masonry for Coating, prepare cementitious surfaces of concrete block to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze. Per ASTM D4262, Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces, determine alkalinity of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Test the surface for moisture and do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.
- C. Wood: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.
 - 1. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.
 - 2. When transparent finish is required, use spar varnish for backpriming.

- D. Ferrous Metals: Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, and other foreign substances by solvent cleaning per SSPC SP-1. Mechanical cleaning shall be in accordance with SSPC-SP6 Commercial Blast Cleaning specifications for non-immersion surfaces and SSPC-SP10 Near White Metal Blast Cleaning for immersion in potable or non-potable water.
- E. Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent. For immersion service, clean in accordance with SSPC-SP16 Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.
- F. Shop Primed Surfaces: Prepare shop-applied prime coats wherever damaged or bare as required by other sections of these Specifications. Clean and touch-up with same type shop primer.

3.3 MATERIALS PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's directions.
- B. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3.4 APPLICATION

- A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
 1. Painting requirements, surface treatments, and finishes, are indicated in "schedules" of the contract documents and as noted in Paragraph 3.11 hereinafter.
 2. Provide finish coats which are compatible with prime paints used.
 3. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only before final installation of equipment.
 5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
 6. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.
 7. Finish exterior doors on tops, bottoms and side edges same as exterior faces, unless otherwise indicated.
 8. Sand lightly between each succeeding enamel or varnish coat.
 9. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.

- B. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- C. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.
- D. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to those items exposed in mechanical equipment rooms and in occupied spaces.
 - 1. Mechanical items to be painted include, but are not limited to, the following:
 - a. Piping, pipe hangers, supplementary steel and supports except galvanized surfaces.
 - b. Heat exchangers.
 - c. Tanks.
 - d. Ductwork, insulation.
 - e. Motor, mechanical equipment, and supports.
 - f. Accessory items.
 - 2. Electrical items to be painted include, but are not limited to, the following:
 - a. Conduits and fittings except galvanized surfaces.
 - b. Switchgear (touch up only).
 - c. Hanger and support except galvanized surfaces.
- E. Prime Coats: Apply prime coat of material which is required to be painted or finished, and which has not been prime coated by others. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- F. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable. Holiday test coated steel in immersion areas in accordance with NACE International SP0188-2007 Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.
- G. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections. Provide satin finish for final coats, unless otherwise indicated.
- H. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.5 FIELD QUALITY CONTROL

- A. The right is reserved by Owner to invoke the following material testing procedure at any time, and any number of times during period of field painting:
 - 1. Engage services of an independent testing laboratory to sample paint being used. Samples of materials delivered to project site will be taken, identified and sealed, and certified in presence of Contractor.
 - 2. Testing laboratory will perform appropriate tests for any or all of following characteristics: Abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance and quantitative materials analysis.
- B. If test results show that material being used does not comply with specified requirements, Contractor may be directed to stop painting work, and remove non-complying paint; pay for testing; repaint surfaces coated with rejected paint; remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are non-compatible.

3.6 CLEAN-UP AND PROTECTION

- A. Clean-Up: During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day.
- B. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- C. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect-Engineer. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations. At completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

3.7 PAINTING SYSTEMS

- A. Ferrous Metals, Structural, Tanks, Pipe, and Equipment
 - 1. Exterior, Non-Immersion

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	SSPC-SP6 Commercial Blast Cleaning		SSPC-SP6 Commercial Blast Cleaning		SSPC-SP6 Commercial Blast Cleaning	
1st Coat	91H20	2.5 – 3.5	Corothane I Galvapac or Macropoxy 5500	2.5 – 3.5	Carbozinc 859	2.5 – 3.5
2nd Coat	N69 High-Build Epoxoline	4.0 – 6.0	Macropoxy 646	4.0 – 6.0	Carboguard 60	4.0 – 6.0
3rd Coat	1074 Endura -Shield	2.0 – 3.0	Acrolon 218 HS	2.0 – 3.0	Carbothane 134 HG	2.0 – 3.0

2. Interior, Non-Immersion

	Themec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	SSPC-SP6 Commercial Blast Cleaning		SSPC-SP6 Commercial Blast Cleaning		SSPC-SP6 Commercial Blast Cleaning	
1st Coat	91H20	2.5 – 3.5	Corothane I Galvapac or Macropoxy 5500	2.5 – 3.5	Carbozinc 859	2.0 – 3.0
2nd Coat	N69 High-Build Epoxoline	4.0 – 6.0	Macropoxy 646	4.0 – 6.0	Carboguard 60	4.0 – 6.0
3rd Coat	N69 High-Build Epoxoline	2.0 – 3.0	Macropoxy 646	2.0 – 3.0	Carboguard 60	2.0 – 3.0

3. Immersion, Potable or Non-Potable Water

	Themec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	SSPC-SP10 Near-White Blast Cleaning		SSPC-SP10 Near-White Blast Cleaning		SSPC-SP10 Near-White Blast Cleaning	
1st Coat	N140	4.0 – 6.0	Macropoxy 646 PW or 5500	4.0 – 6.0	Carboguard 61	4.0 – 6.0
2nd Coat	N140	4.0 – 6.0	Macropoxy 646 PW or 5500	4.0 – 6.0	Carboguard 61	4.0 – 6.0
3rd Coat	N140	4.0 – 6.0	Macropoxy 646 PW or 5500	4.0 – 6.0	Carboguard 61	4.0 – 6.0

4. Factory Primed Interior (Refer to Piping Specifications)

	Themec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	Surface Shall be Clean / Dry		Surface Shall be Clean / Dry		Surface Shall be Clean / Dry	
Touch up	N69 High-Build Epoxoline		Macropoxy 646		Carboguard 60	
1st Coat	N69 High-Build Epoxoline	4.0 – 6.0	Macropoxy 646	4.0 – 6.0	Carboguard 60	4.0 – 6.0
2nd Coat	N69 High-Build Epoxoline	4.0 – 6.0	Macropoxy 646	4.0 – 6.0	Carboguard 60	4.0 – 6.0

5. Factory Primed, Exterior (Refer to Piping Specifications)

	Themec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	Surface Shall be Clean / Dry		Surface Shall be Clean / Dry		Surface Shall be Clean / Dry	
Touch up	N69 Hi-Build Epoxoline		Macropoxy 646		Carboguard 60	
1st Coat	N69 Hi-Build Epoxoline	4.0 – 6.0	Macropoxy 646	4.0 – 6.0	Carboguard 60	4.0 – 6.0
2nd Coat	1074 Endura -Shield	2.0 – 3.0	Acrolon 218 HS, B65 Series	2.0 – 3.0	Carbothane 134 HG	2.0 – 3.0

6. Primed Steel (Doors, Frames, etc.) – Exterior

	Themec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	Surface Shall be Clean / Dry		Surface Shall be Clean / Dry		Surface Shall be Clean / Dry	
Touch-up	N69 High-Build Epoxoline		Macropoxy 646		Carboguard 60	
1st Coat	N 69 High-Build Epoxoline	4.0 – 6.0	Macropoxy 646	2.0 – 3.0	Carboguard 60	4.0 – 6.0
2nd Coat	1074 Endura -Shield	2.0 – 3.0	Acrolon 218 HS	2.0 – 3.0	Carbothane 134 HG	2.0 – 3.0

7. Buried

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	SSPC-SP6 Commercial Blast Cleaning		SSPC-SP6 Commercial Blast Cleaning		SSPC-SP6 Commercial Blast Cleaning	
1st Coat	Hi-Build Tneme-Tar	16.0 – 20.0	Hi-Mil Sher-Tar Epoxy	16.0 – 24.0	Bitumastic 300M	16.0 – 24.0

B. Galvanized Steel - Pipe and Miscellaneous Fabrications

1. Exterior, Non-Immersion

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	SSPC-SP1 Solvent Cleaning		SSPC-SP1 Solvent Cleaning		SSPC-SP1 Solvent Cleaning	
1st Coat	N69 Hi-Build Epoxoline	4.0 – 6.0	Macropoxy 646	2.0 – 3.0	Carboguard 60	4.0 – 6.0
2nd Coat	1074 Endura -Shield	2.0 – 3.0	Acrolon 218 HS	2.0 – 3.0	Carbothane 134 HG	2.0 – 3.0

2. Interior, Non-Immersion (Doors, Frames, etc.)

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	SSPC-SP1 Solvent Cleaning		SSPC-SP1 Solvent Cleaning		SSPC-SP1 Solvent Cleaning	
1st Coat	N69 Hi-Build Epoxoline	4.0 – 6.0	Macropoxy 646	2.0 – 3.0	Carboguard 60	4.0 – 6.0
2nd Coat	N69 Hi-Build Epoxoline	4.0 – 6.0	Macropoxy 646	2.0 – 3.0	Carboguard 60	2.0 – 3.0

3. Immersion, Potable or Non-Potable Water

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	SSPC-SP16 Brush-Off Blast Cleaning		SSPC-SP16 Brush-Off Blast Cleaning		SSPC-SP16 Brush-Off Blast Cleaning	
1st Coat	20-1255 Potapox	4.0 – 6.0	Macropoxy 646 PW or 5500	4.0 – 6.0	Carboguard 61	4.0 – 6.0
2nd Coat	20-11 WH Potapox	4.0 – 6.0	Macropoxy 646 PW or 5500	4.0 – 6.0	Carboguard 61	4.0 – 6.0

C. Porous Masonry - Concrete Masonry Units

1. Interior

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	Surface Shall be Clean / Dry		Surface Shall be Clean / Dry		Surface Shall be Clean / Dry	
1st Coat	130 Envirofill (Spray and Back Roll to Fill Porosity)	80 - 100 sf/gal.	Heavy Duty Block Filler or Cement-Plex 875	80-100 sf/gal	Carboline Sanitile 100	80 - 100 sf/gal
2nd Coat	113 H.B. Tneme-Tufcoat	2.0 – 3.0	Pro-Industrial Water Based Catalyzed Epoxy	2.0–3.0	Sanitile 255	2.0 – 3.0
3rd Coat	113 H.B. Tneme-Tufcoat	2.0 – 3.0	Pro-Industrial Water Based Catalyzed Epoxy	2.0–3.0	Sanitile 255	2.0 – 3.0

2. Exterior

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	Surface Shall be Clean / Dry		Surface Shall be Clean / Dry		Surface Shall be Clean / Dry	
1st Coat	Series 156 Enviro-Crete	6.0 – 8.0*	Loxon XP	6.0-8.0*	Flexxide Elastomer	6.0 - 8.0*
2nd Coat	Series 156 Enviro-Crete	6.0 – 8.0*	Loxon XP	6.0-8.0*	Flexxide Elastomer	6.0 – 8.0*

*Coats must be sufficient to fill the porosity of the block face and create a pinhole-free surface.

D. Cast-In-Place Concrete

1. Concrete Walls & Precast Concrete Ceilings (Interior)

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	SSPC-SP13 Abrasive Blast		SSPC-SP13 Abrasive Blast		SSPC-SP13 Abrasive Blast	
1st Coat	113 H.B. Tneme Tuf-coat	4.0-6.0	Pro-Industrial Water Based Catalyzed Epoxy	2.0 – 4.0	Sanitile 255	2.0 – 3.0
2nd Coat	113 H.B. Tneme Tuf-coat	4.0-6.0	Pro-Industrial Water Based Catalyzed Epoxy	2.0 – 4.0	Sanitile 255	2.0 – 3.0

2. Concrete Walls, Exterior & Non-Potable

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	Surface Shall be Clean / Dry		Surface Shall be Clean / Dry		Surface Shall be Clean / Dry	
1st Coat	Series 156 Enviro-Crete	125 sf/gal	Loxon Masonry Primer	125 sf/gal	Flexxide Elastomere	125 sf/gal
2nd Coat	Series 156 Enviro-Crete	200 sf/gal	Loxon Masonry Coating	200 sf/gal	Flexxide Elastomere	200 sf/gal

3. Concrete Floors

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	Pressure Wash					
1st Coat	ChemProbe CT Densifyer Series 629 or 617		H&C Waterbased Solid Color Stain or Rextthane Clear			
2nd Coat	ChemProbe CT Densifyer Series 629 or 617		H&C Waterbased Solid Color Stain or Rextthane Clear			

4. Concrete Tanks & Basins

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	SSPC-SP13, Severe Service Abrasive Blast		SSPC-SP13, Severe Service Abrasive Blast		SSPC-SP13, Severe Service Abrasive Blast	
1st Coat	N140	4.0 – 6.0	Macropoxy 646 PW or 5500	4.0 – 6.0	Carboguard 61	4.0 – 6.0
2nd Coat	N140	4.0 – 6.0	Macropoxy 646PW or 5500	4.0 – 6.0	Carboguard 61	4.0 – 6.0
3rd Coat	N140	4.0 – 6.0	Macropoxy 646PW or 5500	4.0 – 6.0	Carboguard 61	4.0 – 6.0

5. Chemical Storage Areas - Chlorine Exposure

		Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep					SSPC-SP13, Severe Service Abrasive Blast	
1st Coat					Semstone 800 Vinyl Ester Primer	8.0 – 10.0
2nd Coat					Semstone 870 Vinyl Ester (aggregate-filled)	25.0 – 30.0
3rd Coat					Semstone 870 Vinyl Ester	15.0 – 20.0

6. Chemical Containment Areas - Other

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	SSPC-SP13, Severe Service Abrasive Blast		SSPC-SP13, Severe Service Abrasive Blast		SSPC-SP13, Severe Service Abrasive Blast	
1st Coat	201 Epoxoprime	6.0 – 8.0	CoroBond 100	6.0 – 8.0	Semstone 110	8.0 – 10.0
2nd Coat	275 Stranlock	25.0 – 40.0	CorCote HCR Flake-Filled	15.0 – 20.0	Semstone 145 SL	25 mils (Broadcast Silica)
3rd Coat	282 Tneme-Glaze	8.0 – 12.0	CorCote HCR	15.0 – 20.0	Semstone 145 SL	15.0 – 25.0

E. Wood

1. Interior or Exterior

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	Surface Shall be Clean / Dry		Surface Shall be Clean / Dry		Surface Shall be Clean / Dry	
1st Coat	151-1051 Elasto-Grip FC	1.0 – 1.5	Multi-Purpose Latex Primer	1.0 – 1.5	Carbocrylic 120	1.0 – 2.0
2nd Coat	1029 Tufcryl	2.0–3.0 - 3.5	Pro Industrial DTM Acrylic Coating	2.0 – 3.0	Carbocrylic 3359 DTM	2.0 – 3.0
3rd Coat	1029 Tufcryl	2.0 – 3.0	Pro Industrial DTM Acrylic Coating	2.0 – 3.0	Carbocrylic 3359 DTM	2.0 – 3.0

F. Insulated Pipe

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	Surface Shall be Clean / Dry		Surface Shall be Clean / Dry		Surface Shall be Clean / Dry	
1st Coat	1029Tneme-Cryl	2.0 – 3.0	DTM Primer/Finish, B66W1	2.0 – 3.0	Carbocrylic 120	1.0 – 2.0
2nd Coat	1029 Tneme-Cryl	2.0 – 3.0	DTM Primer/Finish, B66W1	2.0 – 3.0	Carbocrylic 3359 DTM	2.0 – 3.0

G. Gypsum Board

1. Interior Drywall – Architectural

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	Surface Shall be Clean / Dry		Surface Shall be Clean / Dry		Surface Shall be Clean / Dry	
1st Coat	151-1051 Elasto-Grip FC	1.0 – 1.5	Promar 200 Printer	1.0 – 1.5	Carbocrylic 120	1.0 – 2.0
2nd Coat	6-Color Tneme-Cryl	2.0 – 3.0	ProMar 200 F, SF, EgShel	1.0 – 1.5	Carbocrylic 3359 DTM	2.0 – 3.0

2. Interior Drywall - Severe Exposure

	Tnemec	Dry Mils	Sherwin Williams	Dry Mils	Carboline	Dry Mils
Surface Prep	Surface Shall be Clean / Dry		Surface Shall be Clean / Dry		Surface Shall be Clean / Dry	
Prime Coat	151-1051 Elasto-Grip FC	1.0 – 1.5	Promar 200 Primer	1.0 – 1.5	Sanitile 120	1.0 – 2.0
1st Coat	113 H.B. Tneme-Tufcoat	2.0 – 3.0	Pro-Industrial Water Based Catalyzed Epoxy	2.0 – 3.0	Carboline Sanitile 255	2.0 – 3.0
2nd Coat	113 H.B. Tneme-Tufcoat	2.0 – 3.0	Pro-Industrial Water Based Catalyzed Epoxy	2.0 – 3.0	Carboline Sanitile 255	2.0 – 3.0

H. Aluminum Windows, Doors, Handrails & Grating – Do Not Paint

J. Fiberglass Reinforced Plastic Doors & Windows – Do Not Paint

3.8 PIPING COLOR CODE

A. To facilitate identification of piping in plants and pumping stations it is recommended that the following color scheme be utilized:

WATER LINES

Raw Water	Olive Green
Settled Water	Light Blue
Filtered, Finished or Potable Water	Dark Blue

CHEMICAL LINES

Alum or Primary Coagulant	Orange
Ammonia	White
Carbon Slurry	Black
Caustic	Yellow w/ green band
Chlorine	Yellow
Lime Slurry	Light Green
Fluoride	Light Blue w/ red band
Polymers or Coagulant Aid	Orange w/ green band
Potassium Permanganate	Violet
Soda Ash	Light Green w/ orange band
Sulfur Dioxide	Light Green w/yellow band

WASTE LINES

Backwash Waste	Light Brown
Sewer (Sanitary or Other)	Dark Gray
Sludge	Dark Brown

OTHER

Compressed Air	Dark Green
Gas	Red
Other Lines	Light Gray

3.9 STENCILING

- A. The Contractor shall supply all materials and labor necessary for stenciling of legends on pipes. The legend shall show the name of the contents. Review by the Architect-Engineer of legends will be required. Names shall be "plainly visible". Arrows showing direction of flow shall also be stenciled on pipes. The legends shall be located not more than 10 feet apart and, in general, at each valve and piece of equipment. The size and location of the legend shall be in general accordance with ANSI A13.1-1981 "Scheme for the Identification of Piping Systems". All visible piping 6" in diameter and larger shall be color-coded and stenciled. "Stick-on" labels are not acceptable.

3.10 PLASTIC IDENTIFICATION MARKERS

- A. All visible piping 3/4" and greater and less than 6" which is accessible for maintenance operations shall be color-coded and identified with semi-rigid plastic identification markers equal to SETMARK Pipe Markers as manufactured by Seton Name Plate Corporation, New Haven, Conn.; T & B/Westline, Los Angeles, California; or equal. Direction of flow arrows are to be included on each marker, unless otherwise specified.
- B. Each marker background is to be appropriately color coded with a clearly printed legend to identify the contents of the pipe in conformance with the "Scheme for the Identification of Piping Systems" (ANSI A 13.1 - 1981).
- C. For pipes under 3/4" O.D. (too small for color bands and legends), brass identification tags 1-1/2" in diameter with depressed 1/4" high black-filled letters above 1/3" blackfilled numbers shall be fastened securely at specified locations.
- D. All electrical conduits, which are accessible for maintenance operations, shall be identified with semi-rigid identification markers similar to those specified above.
- E. Each marker background is to be color-coded with a clearly printed legend to identify the conductor. Size of markers and sizes of lettering to generally conform with the "Scheme for Identification of Piping Systems" (ANSI A 13.1 - 1981)
- F. Locations for pipe and electrical markers to be as follows:
1. Adjacent to each valve and fitting (except on plumbing fixtures and equipment).
 2. At each branch and riser take-off.

3. At each pipe passage through wall, floor and ceiling construction.
4. At each pipe passage to underground.
5. On all horizontal pipe runs-marked every 25 feet.

3.11 PAINT SCHEDULE

All items at the Project site shall be painted in accordance with these Specifications and Drawings. The following paint schedule is provided only to assist the Owner and Contractor in selection of the appropriate paint system and is not intended to be a complete list of items to be painted.

A. Paint Application Schedule

<u>Location and/or Description</u>	<u>System</u>
1. Piping and Pipe Fittings Inside Basins 1 & 4	3.7, A.3
2. Basin 1 & 4 Clarifier Access Walkways/Bridges Support Beams and Stair Stringers	3.7, A.3
3. Sodium Hypochlorite Pump Room Floor (see drawings M-05-101 & M-05-102)	3.7, D.5
4. Finish coats on steel support trusses for plate settlers unless support trusses provided are stainless steel in which case no coating is necessary. Contractor shall coordinate prime coating of painted steel trusses at factory with plate settler manufacturer. See Specification Section 464300.	
5. PVC Piping – Paint 1-½” PVC carrier pipe for 12.5% sodium hypochlorite yellow. Paint the 2-inch PVC casing pipe which houses the flexible PVC sodium hypochlorite tubing yellow. Sand surface of PVC pipe before painting to provide a rough surface. Apply prime and surface coat of yellow paint.	
6. Touch up any paint that is damaged on the factory coated clarifier drives, rapid mix drive, flocculator drives, 8-inch sludge valves, clarifier rake mechanisms, and clarifier center columns.	

END OF SECTION 099600

DIVISION 10
SPECIALTIES

SECTION 107450 - FIBERGLASS LADDERS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Fiberglass ladders shall be furnished with all necessary accessories for a complete installation in a drinking water treatment basin, including but not limited to ladders, fasteners and all appurtenances necessary for an operational system. All ladder materials and appurtenances shall be NSF 61 approved.

1.2 SUBMITTALS

- A. Descriptive literature, catalog cuts, and dimensional prints clearly indicating all dimensions and materials of construction, shall be submitted on all items specified herein. Shop drawings shall comply with the requirements of Section 013323.

PART 2 - PRODUCTS

2.1 DESIGN

- A. Fixed ladders shall comply with OSHA PP 1910.27 when installed to the suppliers specifications. Products will be designed with a 3 to 1 safety factor.
- B. Ladders shall be all fiberglass with the exception of stainless steel fasteners to secure support brackets and splices.
- C. Rungs will be solid 1" round with a black grit safety surface. Side rails will be 1 3/4" x 1/4" square tubes. Cages will be fabricated sheet strip secured with plastic or stainless steel fasteners.
- D. Ladders and cages will be supported on 4 ft. to 6 ft. maximum intervals with stainless steel stand-off clips and brackets.

2.2 STRUCTURAL

- A. Material will be pultruded structured fiberglass shapes colored throughout. Shapes will include ultra-violet inhibitors and meet ASTM-E-84 Class 1 flame spread rate.
- B. Material will be yellow PF, or yellow VF.
- C. Fiberglass pultruded structural shapes shall meet or exceed the following physical characteristics:

- 1. Ultimate Tensile 30,000 psi

- | | | |
|----|-----------------------|-----------------------|
| 2. | Ultimate Compressive | 30,000 psi |
| 3. | Modulus of Elasticity | 2.8×10^6 psi |

2.3 STANDARD PRODUCTION PRACTICE

- A. Installation drawings shall be submitted for customer approval prior to fabrication.
- B. Ladders will be supplied assembled and ready for erection unless otherwise specified.

Notes:

- 1. All structurals are fiberglass reinforced plastic with NSF 61 approval.
- 2. Normal standoff clip spacing 6" C/C.
- 3. Fasteners are stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fiberglass Ladders shall be installed in accordance with the manufacturer's recommendations.

END OF SECTION 107450

DIVISION 26
ELECTRICAL

SECTION 260000 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 CONTRACTOR'S UNDERSTANDING

- A. Contractors bidding work under this Contract shall read and understand Division 00 and Division 01 - General Requirements. If any discrepancies are discovered between the Basic Electrical Materials and Methods and General Requirements, the above mentioned documents shall overrule this section. The Basic Electrical Materials and Methods are intended as a supplement to the above mentioned documents.
- B. The Contractor shall bid as outlined in the above mentioned Specifications and shall be governed by any alternates or unit prices called for in the form of proposal.
- C. Each Contractor bidding on the work included in these Specifications shall view the building site and carefully examine the contract Drawings and Specifications, so that he/she may fully understand what is to be done, and to document existing conditions.
- D. The electrical design depicted in the Contract Drawings, is a concept. As the Contractor and Subcontractors layout the job in the field and submit Shop Drawings, it is likely that minor changes will need to be made to the layout, field control wiring, or branch circuits/feeders, from what is shown on the Contract Drawings. These changes will be indicated by Engineer review comments on Shop Drawings or issuance of field orders. It is the Contractors job to coordinate these changes among Subcontractors and equipment vendors, to assure a complete and fully operational electrical system at completion of construction. The Contractor shall not layout the job from the Contract Drawings, but rather from accepted Shop Drawings. Electrical rough-in shall be done based on templates provided from the electrical switchgear and MCC manufacturers showing allowable conduit entry locations. Do not submit electrical panelboard Shop Drawings, Motor Control Center Shop Drawings, Switchboard or Switchgear Shop Drawings until all utilization equipment submittals have been made and accepted. Short Circuit, Coordination and Arc Flash studies must be accepted prior to submittal of Shop Drawings for panelboards, MCC's, switchboards or switchgear.
- E. The Contractor shall perform the work of this contract in a "neat and workmanlike manner" as required by NEC Article 110.12, and further delineated in ANSI/NECA 1, latest edition, "Standard for Good Workmanship in Electrical Construction".

1.2 SCOPE OF WORK

- A. Work included in this section of the Specifications shall include the furnishing of all labor, material, tools, approvals, utility connection fees, excavation, backfill, and other equipment necessary to install the electrical system as shown on the Contract Drawings and as specified herein.
- B. It also includes installation and connection of all electrical utilization equipment included in this Contract but furnished by other contractors or suppliers.

- C. It is the general intent that all motors shall be furnished with the particular object of equipment it drives, except where a new motor is to be provided for an item of existing equipment (a replacement motor), then it shall be provided under this Division of the Specifications.
- D. The Contractor shall furnish and install all conduit, wire, disconnect switches and miscellaneous material to make all electrical connections to all items of utilization equipment or wiring devices except as otherwise specified.
- E. Equipment connections shall be made with flexible or rigid conduit as required. Controllers for motors, disconnect switches, and all control, protective and signal devices for motor circuits, except where such apparatus is furnished mounted and connected integrally with the motor driven equipment, shall be installed, connected and left in operating condition. The number and size of conductors between motors and control or protective apparatus shall be as required to obtain the operation described in these Specifications, and/or by the Contract Documents, and/or as shown in manufacturer furnished, Engineer reviewed Shop Drawings.
- F. All devices and items of electrical equipment, including those shown on the Contract Drawings but not specifically mentioned in the Specifications or those mentioned in the Specifications but not shown on the Contract Drawings, are to be furnished under this section of the specifications. Any such device or item of equipment, if not defined in quality, shall be equal to similar Equipment and/or devices specified herein.
- G. All devices and items of equipment mentioned in this section of the Specifications whether electrical or not or whether furnished under this or other Division of the Specifications, shall be installed under this Division of the Specifications, unless specifically indicated otherwise.
- H. Where wiring diagrams are not shown on the Contract Drawings, they are to be provided by the supplier of the equipment served and such diagrams shall be adhered to except as herein modified.
- I. The following is a list of items that may not be defined clearly on the Contract Drawings or in other parts of these Specifications. The list is meant to be an aid to the Contractor and is not necessarily a complete list of all work to be performed under this Contract:
 - 1. Connect all motors and accessories furnished by equipment suppliers.
 - 2. Furnish, install, and connect all motor controls.
 - 3. Furnish, install, and connect power and signal lines to all instrumentation equipment, and accessories.
 - 4. Furnish, install, and connect all electrical conduit, duct and cables.
 - 5. Furnish, install, and connect all power distribution equipment.
 - 6. Abandon and remove all existing wiring and materials not to be reused in the renovated plant, as shown on the Contract Drawings.
 - 7. Furnish and install all fiber optic system cables, conduits and accessories.
- J. All raceways and wiring shall be fire stopped where required by code and/or indicated in the Contract Drawings, as specified in Section 078400.

1.3 SHOP DRAWINGS, DESCRIPTIVE LITERATURE, INSTALLATION, OPERATION AND MAINTENANCE INFORMATION

- A. Shop Drawings including descriptive literature and/or installation, operation and maintenance instructions shall be submitted for this Division.
- B. Shop Drawings shall be submitted on the following materials specified in this Division:
 - 1. Conduit - all types and sizes, including liquid-tight flexible.
 - 2. Boxes - all types and sizes.
 - 3. Coal tar epoxy paint.
 - 4. Wiring devices.
 - 5. Device plates.
 - 6. Metal framing system (Strut type channel).
 - 7. Conduit fittings, expansion joints, support hardware.
 - 8. Motor control equipment - including individually mounted items and pole top items.
 - 9. Power distribution equipment - including individually mounted items.
 - 10. Adjustable speed equipment and accessories.
 - 11. Miscellaneous spare parts and hardware, i.e., explosion-proof hand lamps, terminators, lugs, stress cones, etc.
 - 12. Wire - all types and sizes.
 - 13. Wire markers, signs and labels.
 - 14. Lightning/transient suppressors.
 - 15. Motors
- C. The Engineer reserves the right to make modifications to motor control and power distribution equipment ratings after Shop Drawing review, if the Shop Drawings are submitted prematurely (prematurely meaning submitted before all utilization equipment has been reviewed and accepted). Cost of modifications shall be the Contractor's responsibility.

1.4 SYMBOLS AND ABBREVIATIONS

- A. The symbols and abbreviations generally follow standard electrical and architectural practice; however, exceptions to this shall be as shown on the Contract Drawings.

1.5 COORDINATION WITH OTHER TRADES

- A. The Contractor shall coordinate the electrical work with that of other trades to ensure proper final location of all electrical equipment and/or connections. The Contractor shall verify door swings to see that light switches are located properly.

1.6 CODES

- A. The minimum standard for all work shall be the latest revision of the Kentucky Building Code (KBC) and the National Electrical Code (NEC). Whenever and wherever state and/or local laws or ordinances and/or regulations and/or the Engineer's design require a higher standard than the current NEC or KBC, then these laws and/or regulations and/or the design shall be followed.

B. Following is a list of other applicable Standards and Codes:

1.	Kentucky Building Code	KBC
2.	National Electrical Code	NEC
3.	National Electrical Safety Code	NESC
4.	Underwriters Laboratories, Inc.	UL
5.	Factory Mutual System	FM
6.	National Fire Protection Association	NFPA
7.	National Electrical Manufacturers Association	NEMA
8.	Occupational Safety and Health Administration	OSHA
9.	Insulated Cable Engineers Association, Inc.	ICEA
10.	Illuminating Engineering Society of North America	IES
11.	Instrument Society of America	ISA
12.	Institute of Electrical and Electronic Engineers, Inc.	IEEE
13.	Certified Ballast Manufacturers Association	CBM
14.	American National Standards Institute, Inc.	ANSI
15.	Anti-Friction Bearing Manufacturers Association, Inc.	AFBMA
16.	Joint Industry Council	JIC
17.	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.	ASHRAE
18.	Federal Communications Commission	FCC
19.	American Society for Testing and Materials	ASTM
20.	American Wood Preservers Association	AWPA
21.	Rural Electrification Association	REA

1.7 INSPECTIONS AND PERMITS

- A. Inspection of the electrical system on all construction projects is required. If the local government has appointed a state licensed inspector, the Contractor shall be required to use that person to perform the inspections. If a locally mandated inspector does not exist, the Contractor shall select and hire a state licensed inspector, who has jurisdiction before any work is concealed. The Contractor shall notify the electrical inspector in writing, immediately upon notice to proceed, and a copy of the notice shall be submitted to the Engineer.
- B. At the time of completion of the project, there shall be furnished to the Owner a certificate of compliance, from the agency having jurisdiction pursuant to all electrical work performed. The Engineer shall also receive a copy.
- C. All costs incurred by the Contractor to execute the above mentioned requirements shall be paid by the Contractor at no extra cost to the Owner.
- D. All permits necessary for the complete electrical system shall be obtained by the Contractor from the authorities governing such work. For further information, see Division 01.

1.8 STORAGE

- A. All work, equipment, and materials shall be protected against dirt, water, or other injury during the period of construction.
- B. Sensitive electrical equipment such as light fixtures, motor starters, controls, and panel boards, delivered to the job site, shall be protected against injury or corrosion due to atmospheric conditions or physical damage by other means. Protection is interpreted to mean that equipment shall be stored under roof, in a structure properly heated in cold weather and ventilated in hot weather. Provision shall be made to control the humidity in the storage area to 50 percent relative. The stored equipment shall be inspected periodically, and if it is found that the protection is inadequate, further protective measures shall be employed. Electrical equipment other than boxes and conduit shall not be installed until the structure is under roof with doors and windows installed.

1.9 MATERIALS

- A. All materials used shall be new and at least meet the minimum standards as established by the NEC and/or National Electrical Manufacturers Association (NEMA). All materials shall be UL listed for the application, where a listing exists. Additional requirements are found in Division 01. All equipment shall meet applicable FCC requirements and restrictions.
- B. The material and equipment described herein has been specified according to a particular trade name or make to set quality standards. However, each Contractor has the right to substitute other material and equipment in lieu of that specified, other than those specifically mentioned at matching or for standardization, providing such material and equipment meets all of the requirements of those specified and is accepted, in writing by the Engineer.
- C. The reuse of salvaged electrical equipment and/or wiring will not be permitted unless specified herein or indicated on the Contract Drawings.
- D. All salvaged or abandoned electrical materials shall become the property of the {Owner} Contractor and shall be removed from the job site upon completion of the project, unless otherwise noted on the Contract Drawings or specified herein.

1.10 ERRORS, CORRECTIONS, AND/OR OMISSIONS

- A. Should a piece of utilization equipment be supplied of a different size or horsepower than shown on the Contract Drawings, the Contractor shall be responsible for installing the proper size wiring, conduit, starters, circuit breakers, etc., for proper operation of that unit and the complete electrical system at no extra cost to the Owner.
- B. It is the intent of these Specifications to provide for an electrical system installation complete in every respect, to operate in the manner and under conditions as shown in these Specifications and on the Contract Drawings. The Contractor shall notify the Engineer, in writing, of any omission or error at least 10 days prior to opening of bids. In the event of the Contractor's failure to give such notice, he/she may be required to correct work and/or furnish items omitted without additional cost. Further requirements on this subject may be found in the General Requirements, Division 01.

- C. Necessary changes or revisions in electrical work to meet any code or power company requirement shall be made by the Contractor without additional charge.

1.11 GUARANTEES AND WARRANTIES

- A. The Contractor shall guarantee all work including equipment, materials, and workmanship. This guarantee shall be against all defects of any of the above and shall run for a period of 1 year from the date of acceptance of the work, concurrent with the one year guarantee period designated for the general construction contract under which electrical work is performed. Date of acceptance shall be considered to be the date on which all "punch list" items are completed ("punch list" is defined to be the written listing of work that is incomplete or deficient that must be finished or replaced/repared before the Contractor receives final payment).
- B. Repair and maintenance for the guarantee period is the responsibility of the Contractor and shall include all repairs and maintenance other than that which is considered as routine. (That is oiling, greasing, etc.) The Engineer shall be the judge of what shall be considered as routine maintenance.

1.12 TESTING

- A. After the wiring system is complete, and at such time as the Engineer may direct, the Contractor shall conduct an operating test for acceptance. The equipment shall be demonstrated to operate in accordance with the requirements of these Specifications and the Contract Drawings. The test shall be performed in the presence of the Engineer or his authorized representative. The Contractor shall furnish all instruments and personnel required for the tests, as well as the necessary electrical power.
- B. Before energizing the system, the Contractor shall check all connections and set all relays and instruments for proper operation. He shall obtain all necessary clearances, approvals, and instructions from the serving utility company and/or equipment manufacturers prior to placing power on the equipment.
- C. Tests may be performed by the Engineer to determine integrity of insulation on wiring circuits selected by the Engineer at random.

1.13 CLEANUP

- A. Cleanup shall be completed as soon as possible after the electrical installation is complete. All light fixtures, outlets, switches, starters, motor control centers, disconnect switches and other electrical equipment shall be free of shipping tags, stickers, etc. All painted equipment shall be left free of scratches or other blemishes, such as splattered or blistered paint, etc. All light fixture diffusers shall be clean and the interior of all motor controls, etc., shall be free of dust, dirt, wire strippings, etc. Surplus material, rubbish and equipment resulting from the work shall be removed from the job site by the Contractor upon completion of the work.
- B. During construction, cover all Owner equipment and furnishings subject to mechanical damage or contamination in any way.

1.14 CUTTING AND PATCHING

- A. Cutting and patching shall be held to an absolute minimum and such work shall be done only under the direction of the Engineer or Owner. The Contractor shall be responsible for and shall pay for all openings that may be required in the floors or walls, and he shall be responsible for putting said surfaces back in their original condition. Every attempt shall be made to avoid cutting reinforcing steel bars when an opening is required in a reinforced concrete wall or floor slab.

1.15 EXCAVATION AND BACKFILL

A. Excavation

- 1. Excavation for conduits shall be of sufficient width to allow for proper jointing and alignment of the type conduit used. Conduit shall be bedded on original ground. Where conduit is in solid rock, a 6 inch earth cushion must be provided. Conduit shall be laid in straight lines between pull boxes and/or structures unless otherwise noted on the Contract Drawings. The cost of solid rock excavation shall be included in the lump sum bid with no extra pay allowed (unclassified).

B. Backfill

- 1. Backfill shall be hand placed, loose granular earth for a height of 6 inches above the top of the largest conduit. This material shall be free of rocks over 2 inches in diameter. Above this, large rocks may be included but must be mixed with sufficient earth to fill all voids.

1.16 SLEEVES, CHASES AND OPENINGS

- A. Sleeves shall be required at all points where exposed conduits pass through new concrete walls, slabs, or masonry walls. Sleeves that must be installed below grade or where subject to high water conditions must be installed watertight.
- B. Wiring chases shall be provided where shown on the Contract Drawings. The Contractor shall have the option of installing chases below surface mounted panel boards provided all structural requirements are met.
- C. It is the Contractor's responsibility to leave openings to allow installation of the complete, operational electrical system. Openings required but not left shall be cut as outlined under cutting and patching. The Contractor shall coordinate all holes and other openings with necessary diameters for proper fire stopping.

1.17 OVERCURRENT PROTECTION

- A. Circuit breakers or fused switches shall be the size and type as written herein and shown on the Contract Drawings. Any additional overcurrent protection required to maintain an equipment listing by an authority having jurisdiction shall be installed by the Contractor at no extra cost to the Owner.

- B. The Contractor shall submit to the Engineer actual nameplate data from motors shipped to the site, stating motor identification as well as characteristics. Overload relay thermal unit selection tables shall accompany the motor data. The Engineer will select thermal unit sizes from this data for use by the Contractor in ordering proper thermal units.

1.18 TRAINING

- A. All manufacturers supplying equipment for this division shall provide the Owner’s operations staff with training in the operation and maintenance on the equipment being furnished. The training shall be conducted at the project site by a qualified representative of the manufacturer.
- B. The cost of this training shall be included in the bid price.
- C. The required training shall consist of both classroom and hands-on situation. Classroom training shall include instruction on how the equipment works its relationship to all accessories and other related units, detailed review of shop drawings, detailed presentation of written O & M instructions, troubleshooting and record-keeping recommendations. Hands-on-training shall include a review of the manufacturer’s O & M instructions, check out of each operator to identifying key elements of the equipment, tear down as appropriate, calibration, adjustment, greasing and oiling points, and operating manipulations of all electrical and mechanical controls.
- D. The training shall be scheduled through the Contractor with the Owner. The timing of the training shall closely coincide with startup of the equipment, but no training shall be conducted until the equipment is operational.
- E. The minimum number of hours to be provided by manufacturers supplying equipment on this project shall be in accordance with the following table:

Item	Training Hours	
	Classroom	Hands-on
Variable Speed Systems	3	3
Motor Control	2	2

- F. At least 60 days prior to the training the manufacturer shall submit through the Contractor to the Engineer an outline of the training proposed for the Engineer’s review and concurrence.
- G. The Owner reserves the right to record all training sessions.

1.19 AS BUILT DRAWINGS

- A. The Contractor shall maintain 1 set of the Contract Drawings on the job in good condition for examination at all times. The Contractor’s qualified representative shall enter upon these drawings, from day to day, the actual “as-built” record of construction and/or alteration progress. Entries and notes shall be made in a neat and legible manner and these drawings delivered to the Engineer after completion of the construction, for use in preparation of Record Drawings.

1.20 MAINTAINING CONTINUOUS ELECTRICAL SYSTEM AND SERVICE

- A. Existing service(s) continuity shall be maintained at all times. In no way shall the installation and/or alteration of the electrical work interfere with or stop the normal operation of the existing facilities, except where prior arrangements have been made
- B. When additions and taps to existing service(s) require electrical outages of any duration, arrangements shall be made in advance for such outages. All outages shall be held to an acceptable minimum with none exceeding 8 hours continuous duration. If necessary, cuts shall be performed on premium time. If performed at night, requiring a general outage, the Contractor shall furnish an auxiliary source of light and power as required. Under no circumstances shall an electrical outage of any duration be initiated until the Owner and Engineer have concurred, and as far as possible in advance.

1.21 GROUNDING AND BONDING

- A. All metallic conduit, cabinets, equipment, and service shall be grounded in accordance with the latest issue of the National Electrical Code. All supporting framework and other metal or metal clad equipment or materials which are in contact with electrical conduit, cable and/or enclosures shall be properly grounded to meet the code requirements.

1.22 RELATED SPECIFICATION DIVISIONS

- A. The following divisions contain Specifications on utilization equipment, equipment accessories, and procedures related to execution of the electrical work, and are included here for the Contractor's information. Bids shall still be based on complete Contract Documents.

Division 00 – Procurement and Contracting Requirements

Division 01 – General Requirements

Division 02 – Existing Conditions

Division 03 – Concrete

Division 05 – Metals

Division 09 – Finishes

Division 10 – Specialties

Division 40 – Process Integration

Division 46 – Water and Wastewater Equipment

1.23 CONTRACTOR LICENSING

- A. The Contractor performing the electrical work on this project shall be locally licensed, if required by local law or ordinance. If the Contractor has passed the State test, it may not be necessary to meet local testing requirements. It shall be the Contractor's responsibility to investigate these requirements and comply with same.

1.24 ANCHORING/MOUNTING

- A. Electrical conduits and/or equipment shall be rigidly supported. Anchors used shall be metallic expansion type, or if appropriate to prevent spalling concrete, epoxy set type. Plastic or explosive type anchors are prohibited.
- B. Seismic Anchorage & Qualification of Electrical Components
 - 1. Refer to the structural drawings for seismic design criteria, including seismic design accelerations, Seismic Design Category and structure Risk Category.
 - 2. All electrical components shall be anchored to resist seismic forces in buildings with seismic design category D, E, or F except when ALL of the conditions exist:
 - a. The component is not required for life safety.
 - b. The component is not needed for continuing operation of a Risk Category IV structure.
 - c. The component is positively attached to the structure.
 - d. The component is flexibly connected to associated conduit and is one of the following:
 - 1) The component weighs less than 400 lb and has a center of mass less than 48 in above the adjacent floor level OR
 - 2) The component weighs less than 20 lb or less than 5 lb/s.f. if distributed.
 - 3. All electrical components required for life safety shall be anchored to resist seismic forces in buildings with Seismic Design Category C, D, E or F.
 - 4. All electrical components required for continued operation of a Risk Category IV structure shall be anchored to resist seismic forces in buildings regardless of the Seismic Design Category.
 - 5. Where anchorage to resist seismic forces is required, the following shall be submitted:
 - a. Designs of all connections of electrical components to the structure, either supplied and certified by the manufacturer; or by a licensed professional engineer qualified and experienced in such design – FOR APPROVAL prior to installation.
 - b. Certifications by manufacturers of electrical equipment in accordance with 13.2.2.1 of ASCE 7 – FOR APPROVAL prior to purchase.
 - c. Special Inspection Reports verifying that the electrical components were installed in accordance with the seismic anchorage designs – FOR RECORD after installation.

1.25 ELECTRICAL COMPONENT MOUNTING HEIGHTS

- A. Unless otherwise indicated, mounting height for components shall be as defined herein. In cases of conflicts with architectural or structural aspects, the components may be relocated. If an indicated height conflicts with a code requirement, the code shall govern.

- B. Mounting heights are given from finished floor elevation to the centerline of the component, unless otherwise noted.

	Component	Height	Comments
1.	Low wall outlet (power, TV, Comm)	16"	To bottom
2.	Push-button or control stations	4'-0"	
3.	Top of panelboards or control panels	6'-6"	Maximum (except for handicapped areas)
4.	Top of switch handle on motor control center	6'-6"	Maximum
5.	Top of local motor controller	6'-0"	Maximum
6.	Top of local disconnect switch	6'-0"	Maximum

In situations where there appears to be a conflict with Americans with Disabilities Act (ADA) legislation, utilize the ADA requirements.

1.26 RECEIPTS

- A. Some sections of the Specifications call for equipment, materials, accessories, etc. to be provided and “turned over to the Owner” or like requirements. The Contractor shall obtain a receipt for each item turned over, signed by the Owner or his representative. A copy of this receipt shall be transmitted to the Engineer.
- B. When a question arises concerning whether items have been turned over to the Owner, and there is no signed receipt, it may be assumed that the items were not provided.

1.27 BUY AMERICAN

- A. The Contractor is responsible for compliance with any “Buy American” legislation that may apply to this project due to State, Federal, and local laws or funding agency requirements. Necessary certifications of the sourcing of materials shall be part of the submittals.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 260000

SECTION 260100 - ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Furnish all labor, equipment, materials, and supplies necessary for and reasonably incidental to demolition of work hereinafter specified, indicated on drawings, required or intended for completion of the work.
- B. Major items included under demolition work include, but are not limited to:
 - 1. Interior electrical systems in the existing facility.
 - 2. Site raceways, conductors, and electrical equipment associated with Basin No. 1 and No. 4.
 - 3. Power and control conductors for removed equipment.
- C. Repair those areas damaged under demolition work once new services and systems have been installed.

1.2 SUBMITTALS

- A. No submittals are anticipated under this Section.

1.3 JOB CONDITIONS

- A. Provide adequate protection to persons and property. Execute work in such a manner as to avoid interference with required operations and use of or passage to and from adjoining buildings and facilities.
- B. Demolition work of equipment necessary for the operation of the power and communication systems to be coordinated with the installation of new equipment. The demolition and installation work is to be done as quickly as possible to minimize any burdens on the Owner.

1.4 CONDITION OF EXISTING FACILITIES

- A. Contractor shall verify the areas, conditions, and features necessary to tie new work into existing construction. This verification shall be done prior to submittal of shop drawings, fabrication or erection, construction or installation. The Contractor shall be responsible for the accurate tie-in of the new work to existing facilities.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SCHEDULES

- A. Schedule all demolition work as to cause minimal interference with existing facility operations. Refer to Specification Divisions 0 and Division 01 for additional requirements.
- B. Obtain prior approval of the Owner at least seven days in advance before starting demolition of any equipment. Under no circumstances will demolition work be approved until new equipment is ready for installation.

3.2 PREPARATION

- A. Disconnect or arrange for disconnection of utility service connections to equipment and areas to be demolished before starting demolition.
- B. Preserve in operating condition all active utilities transversing the project site. Protect all equipment that remains (electrical and mechanical) during demolition, and repair all damage caused by this work to satisfaction of Engineer.

3.3 APPLICATION

- A. Maintain the continuity of the existing branch circuits serving all existing light fixtures that are to remain, whether indicated or not on the drawings.
- B. All existing walls, ceilings, floor slabs, etc., being cut or damaged under this Contract shall be patched back to match existing by General Contractor.
- C. All existing switchgear, lighting fixtures, receptacles, control equipment, and switches being removed shall be disposed of by the Contractor. Refer to 260000 for more details.
- D. Remove exposed ground conductor back to source or point of contact with slab. Cut conductor off below slab and abandon with hole being patched back to match existing surface (floor, wall or ceiling). If reusable, simply disconnect ground conductor.
- E. Conduits, wire and wood products that are not salvageable shall be disposed of legally.
- F. Primary work shall be completed with all facilities kept in service or with short periods of scheduled momentary outages.
- G. Holes in slabs or into classified areas to be patched to provide a gas, vapor, and watertight barrier.

3.4 STORAGE AND HANDLING

- A. The Owner reserves the right to save materials that are a part of the demolition work, and the Contractor shall turn over and store any such materials at the Owner's direction.
- B. All materials not turned over to Owner shall become property of Contractor and removed promptly from project site at no additional cost to the Owner. Any permits or fees for disposal shall be the responsibility of the Contractor.

3.5 CLEANUP

- A. Burn no materials or debris on premises.
- B. Remove from site rubbish and debris found thereon and, except as otherwise specified, materials and debris resulting from work of demolition. Leave site in safe and clean condition.

END OF SECTION 260100

SECTION 260519 - CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. All wire and cable shall conform to the latest requirements of the NEC and shall meet all ASTM/UL specifications. Wire and cable shall be new; shall have size, grade of insulation, voltage rating, and manufacturer's name permanently marked on the outer covering at regular intervals. Complete descriptive literature shall be submitted to the Engineer for review and acceptance prior to installation.
- B. Building wire #12 - #1 shall be applied based on a 60 degrees C temperature rise. Building wire larger than #1 may be applied at its 75 degrees C temperature rise.

1.2 DELIVERY, STORAGE AND HANDLING

- A. Wire and cable shall be suitably protected from weather and damage during storage and handling and shall be in first class condition when installed.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Building Wire (types THWN and THW-cu.) – American, Carol, or Collyer, Rome, equal.
- B. Flexible Cords and Cables (Types SO (600V) SJO - 300V) – American, Carol, Collyer, or equal.
- C. Control Cables (Shielded or unshielded) 600V max. – Belden, Eaton-Dekoron, Okonite, or equal.
- D. Instrumentation Cables (Shielded) 600V mx. – American, Belden, Eaton-Dekoron, Manhattan, Okonite, or equal.

2.2 MATERIALS

- A. General
 - 1. In general, all conductors shall be 98 percent conductive, annealed copper unless otherwise noted on the Contract Drawings.
 - 2. Conductors shall be type THW or THWN insulation. Conductor size shall be AWG (American Wire Gauge) Standard. Minimum conductor size shall be AWG number 12 except branch circuits in excess of 75 feet from panel to first outlet not smaller than no. 10 AWG. Minimum voltage rating shall be 600 volts. Conductors for small power may be solid (i.e. lighting, receptacles), but conductors for control work shall be stranded.

3. Conductors with high temperature rated insulations and special construction shall be used where required in connecting to light fixtures or appliances that have special requirements.

PART 3 - EXECUTION

3.1 INSTALLATION/APPLICATION/ERECTION

A. General

1. Conductors shall be continuous from outlet to outlet and no splices shall be made except accessible in junction or outlet boxes. Wire connectors of insulating material or solderless pressure connectors, properly taped, shall be used for all splices in wiring, wherever possible.
2. Conductors shall be color coded in accordance with the following schedule:

	208/240V 3 Phase
Phase A	Black
Phase B	Red
Phase C	Blue
Neutral (Grounded)	White or Light Gray
3-Way Tracers	
Grounding	Green
Remote Energized Conductors (Control)	
Control	Per NFPA 79

3. Conductors shall be pulled into raceways in strict accordance with manufacturer's recommendations.
4. Ample slack conductors shall be allowed at each terminal point, and pull or junction box, to permit installation with ease and without crowding.
5. All conductors terminating at terminal blocks shall be identified with numbers and/or letters identical to circuit or control identification.
6. No conductors shall be drawn into conduits until all work which may cause wire or cable damage is completed. Wire pulling shall be accomplished utilizing machinery and accessories intended for the purpose.
7. All connections and splices shall be made in accordance with conductor manufacturer's recommendations, and as written herein.

8. If the size and number of conductors in a conduit on the Drawings is not shown, then it shall be assumed to be 3 #12, 3/4 inch.
9. In general, feeder sizes shown are based on no more than three current carrying conductors in a conduit. Multiple small branch circuit feeders may be combined in a common conduit, provided conductors are derated in accordance with NEC article 310-15.
10. Unless otherwise specifically indicated, neutrals may not be shared.

B. Low Voltage Feeders

1. All low voltage feeders shall be 208 volt as noted in the Contract Drawings. Three phase, 4 wire for power. The Contractor shall furnish and install all feeders from the distribution center(s) to each of the other structures/subpanels as shown on the Contract Drawings.
2. Wire shall be factory color coded for each phase and neutral, with green used for the ground conductor. As far as practical, all feeders shall be continuous from origin to panel termination without running splices in intermediate pull boxes.

C. Control Cable

1. Control cable shall be the size and have the number of conductors shown on the control system drawings. Control cable shall be used for motor controls and monitoring only. Color coding shall be ICEA, Method 1. Control cables between buildings shall be underground in conduit of the size shown in the control system schematic. Cabling shall provide a minimum of 25 percent spare conductors. Voltage rating shall be 600 volts.

D. Instrument Cable

1. General

- a. All signal lines should be constructed of individually twisted pairs (6 to 10 twists per foot), including thermocouple extension leads. Cables should be made of twisted pairs, with all lays and pairs twisted in the same direction for maximum flexibility.
- b. Wire size is #16 AWG minimum for single pair runs under 5,000 feet in length. Wire size shall be #16 - #20 AWG for multi-pair cable runs under 5,000 feet in length.
- c. Stranded tinned copper conductor shall be used for all wiring other than thermocouple extension leads.
- d. Insulation resistance at 68 degrees Fahrenheit between conductors and between conductors and ground should be at least 500 megohms per 1,000 feet.
- e. Multi-pair cable should be jacketed with poly-vinyl-chloride, polyethylene or Teflon at least 0.045 inch thick. Voltage rating shall be 600 volts.

2. Signal Wiring

- a. Low level analog (less than 500 millivolt d-c). Use twisted pairs which may be cabled with other pairs carrying similar voltage levels. Foil wraps or equivalent shielding is required for each cable with the shield insulated from ground.
- b. High level analog (greater than 500 millivolts d-c). Use twisted pairs which may be cabled with other pairs carrying similar voltage levels and current levels less than 100 ma. Shielding is required.

- c. Analog outputs (normally 0-4 d-c or 4-20 ma). Same as b.
 - d. Contact inputs - use twisted pairs and run in separate conduit.
 - e. Contact outputs - same as d.
 - f. Pulse inputs - same as d.
3. Signal and Shield Grounding
- a. All shields must be grounded at one point only as close as possible to the signal source.
 - b. Thermocouples may be grounded or ungrounded.
 - c. Analog signals, if grounded, should be grounded as near the signal source as possible.
 - d. Resistance bulbs should not be grounded.
4. Signal and Wiring Separation
- a. High level analog signals may share the same conduit or run with contact or pulse signals.
 - b. Thermocouple and low level signals should be run in a separate conduit.
 - c. A minimum separation of 12 inches between analog signal leads and a-c power leads should be maintained. For a-c power leads carrying 100 amps or greater, a 24 inch separation should be maintained. Parallel runs should be limited to less than 500 feet. Perpendicular runs may be as close as 6 inches.

END OF SECTION 260519

SECTION 260526 - SECONDARY GROUNDING

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Grounding shall be done in accordance with the NEC, as described in these Specifications, and as shown on the Contract Documents.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Grounding equipment shall be Thomas and Betts Blackburn, or equal.

PART 3 - EXECUTION

3.1 INSTALLATION/APPLICATION/ERECTION

- A. The ground system shall be continuous with all structures on a common ground. This can be accomplished by bonding all conduits together and bonding to the ground bus at each equipment enclosure. Bonding jumpers shall be required at all pull boxes, and at all motor casings. A separate grounding conductor shall be pulled in all conduits in addition to wire counts shown on Drawings.
- B. All equipment grounding conductors shall be as required by NEC Article 250.

END OF SECTION 260526

SECTION 260529 – SUPPORTING DEVICES AND HANGERS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Provide a system of supporting devices and hangers to ensure secure support or bracing for conduit, electrical equipment, including safety switches, fixtures, panelboards, outlet boxes, junction boxes, cabinets, etc.
- B. All electrical equipment shall be rigidly mounted, and installed using supporting devices as indicated, required by the work, or as described herein.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Provide appropriate supporting devices and hangers as manufactured by Erico Products, Inc., Steel City, Rayco, or equal:
 - 1. Vertical flange clamps (beam clamps).
 - 2. “Z” purlin clips.
 - 3. Conduit clips.
 - 4. Universal clamps (Beam clamps).
 - 5. Beam clamps (set screw type).
 - 6. Combination push-in conduit clips.
 - 7. Combination conduit hanger clamps.
 - 8. Flexible conduit clips.
 - 9. Special combination conduit clips.
 - 10. One hole steel straps.
 - 11. Minerallac conduit hangers.
- B. Strut type channel shall be Unistrut, Kindorf, or equal.

2.2 MATERIALS

- A. All mounting brackets and strut used outside shall be aluminum. Fasteners used to mount equipment outside shall be stainless steel. The only exception to the above shall be anchor bolts for area light poles which shall be allowed to have galvanized threads and galvanized nuts.
- B. All mounting brackets and strut used inside shall be galvanized or aluminum. If galvanized is used, then the cut ends shall be cold galvanized. Fasteners used inside to mount equipment into concrete shall be stainless steel. Ungalvanized strut is prohibited.
- C. Stainless steel (non-magnetic) or fiberglass resin strut shall be used in chemical areas and areas exposed to chlorine gas.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Secure conduits to within 3' of each outlet box, junction box, cabinet, fitting, etc., and at intervals not to exceed ten feet (10') for EMT conduit and in accordance with Table 344.30 (B) (2) for Rigid Steel conduit.
- B. Install clamps secured to structure for feeder and other conduits routed against the structure. Use drop rods and hangers or racks to support conduits run apart from the structure.
- C. Furnish and install suitable angle iron, channel iron or steel metal framing with accessories to support or brace electrical equipment including safety switches, fixtures, panelboards, outlet boxes, etc.
- D. Fasteners used to mount equipment into concrete shall be stainless steel.
- E. All freestanding equipment shall be anchored to its foundation using stainless steel expansion bolts of the type, size, and number recommended by the equipment manufacturer.
- F. Paint all supporting metal not otherwise protected, with rust inhibiting primer and then with a finish coat if appropriate to match the surrounding metal surfaces. (Prepainted or galvanized support material is not required to be painted or repainted.)
- G. Use of chains, perforated iron, bailing wire, or tie wire for supporting conduit runs will not be permitted.
- H. All ends of strut (cut or not) shall have safety cap installed.

END OF SECTION 260529

SECTION 260533 - RACEWAYS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This section of the Technical Specifications includes all raceways for accommodation of electrical conductors, communications conductors, and sleeves for underground electrical installations, conduit stubs for future installations, fittings, and accessories.
- B. All raceways shall be marked with the manufacturer's name or trademark as well as type of raceway and size. This marking shall appear at least once every 10 feet and shall be of sufficient durability to withstand the environment involved. All raceways shall be furnished and installed as outlined under Part 3 of this Specification.
- C. All raceways and fittings shall be painted to match existing or surrounding surfaces except in mechanical spaces.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Tubular Raceways
 - 1. Steel, Galvanized, Rigid, Heavy-Wall, Threaded – Allied Tube & Conduit Corp., Triangle, Wheatland Tube Co., or equal.
 - 2. Steel, Galvanized, Thin-Wall, Electric-Metallic-Tubing (EMT) – Allied Tube & Conduit Corp., Triangle, VAW, or equal.
 - 3. Aluminum, Rigid, Heavy-Wall, Threaded – Alcoa, Reynolds, VAW, or equal.
 - 4. Plastic (PVC); Type A (Thin Wall); Type 40 (or Schedule 40); Type 80 (or Schedule 80) (Heavy -Wall) – Carlon, Robin-Tech, or equal.
 - 5. Flexible Metal Conduit – AFC, Alflex, or equal.
 - 6. Liquidtight Flexible Metal Conduit – Carol Cable Co., Inc., OZ Gedney, Superflex, or equal.
 - 7. PVC Coated Rigid Steel – Korkap, Robroy, or equal.
- B. Wireways
 - 1. Hoffman, Square-D, or equal.
- C. Raceway Fittings
 - 1. Conduit fittings – Appleton, Crouse-Hinds, OZ Gedney, or equal.
 - 2. Non-metallic conduit fittings – Carlon, Robin-Tech, Scepter, or equal.
 - 3. Flexible conduit fittings – OZ Gedney, Raco, T & B, or equal.

2.2 MATERIALS

A. Aluminum Conduit

1. Aluminum conduit shall be extruded from alloy 6063 and shall be the rigid type, non-toxic, corrosion resistant, and non-staining. It shall be manufactured per UL standards as well as listed/labeled by same.
2. Fittings, boxes, and accessories used in conjunction with aluminum conduit shall be die cast, copper free type. They shall be resistant to both chemical and galvanic corrosion. All covers shall have neoprene gaskets.
3. Aluminum conduit shall not be used in underground applications.

B. Rigid Steel Conduit

1. Rigid steel conduit and fittings shall be of mild steel piping, galvanized inside and out, and shall conform to UL standards. The conduit and fittings shall be listed and labeled by UL as well. The galvanized coating of zinc shall be of uniform thickness applied by the hot-dipped process, and shall be applied also to the threads. It shall be further dipped in a chromic acid bath so as to chemically form a corrosion resistant protective coating of zinc chromate which has a characteristic yellow-green color. Each piece of conduit shall be straight, free from blisters and other defects, cut square and taper reamed. It shall be delivered with plastic protectors on the threads.

C. Polyvinylchloride (PVC) Conduit

1. PVC conduit and fittings shall be Schedule 40, 80 heavy wall, or thinwall, as indicated in these Specifications manufactured to conform to UL standards. It shall be listed and labeled by UL. It shall have at least the same temperature rating as the conductor insulation. Expansion joints shall be used as recommended by the manufacturer in published literature. PVC systems shall be 90 degrees C minimum UL rated, have a tensile strength of 7,000 psi @ 73.4 degrees F, flexural strength of 11,000 psi and compressive strength of 8,000 psi.

D. Electrical Metallic Tubing (EMT)

1. EMT shall be high grade steel with an exterior galvanized coating of zinc applied uniformly by the electro-galvanized process. The interior surface shall be uniformly coated with aluminum lacquer or enamel. After galvanizing, it shall be dipped in a chromic acid bath to chemically form a protective coating of zinc chromate. The conduit shall conform to UL standards and be listed as well as labeled by UL.

E. Flexible Conduit

1. Flexible metallic conduit shall be constructed from flexibly or spirally wound electro-galvanized steel. Connections shall be by means of galvanized malleable iron squeeze type fittings, or tomic twist-in type in sizes not exceeding 3/4 inch. Liquidtight conduit shall be light gray in color and have sealtight fittings, type UA.

- F. PVC coated rigid conduit shall be hot dip galvanized prior to PVC coating. All threads shall be galvanized. The exterior galvanized surface shall be coated with a primer prior to PVC coating to insure adhesion. The bond on conduit and fittings shall be greater than the tensile strength of

the plastic coating. The PVC coating on the exterior of the conduits shall be applied by a plastisol dip method to a nominal thickness of 40 mils, minimum. The interior of the conduit and fittings, and threads shall be painted with a urethane coating. The coating shall allow flexibility for field bending without cracking. PVC sleeves shall be formed at each female opening, with the inside diameter of the sleeve matching the outside of the conduit.

G. Conduit Fittings

1. Rigid Steel Conduit Fittings

- a. Standard threaded couplings, locknuts, bushings, and elbows made only of steel or malleable iron are acceptable.
- b. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
- c. Bushings: Metallic insulating type, consisting of an insulating insert molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.
- d. Erickson (union-type) and set screw type couplings: Approved for use in concrete are permitted or use to complete a conduit run where conduit is installed in concrete. Use set screws of case hardened steel with hex head and cup point to firmly seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.
- e. Sealing fittings: Threaded cast iron type. Use continuous drain type sealing fittings to prevent passage of water vapor. In concealed work, installed fittings in flush steel boxes with blank coverplates having the same finishes as that of other electrical plates in the room.
- f. Fittings for PVC coated rigid conduit shall be manufactured by the maker of the conduit.

2. Rigid Aluminum Conduit Fittings

- a. Standard threaded couplings, locknuts, bushings, and elbows: Malleable iron, steel or aluminum alloy materials. Zinc or cadmium plate iron or steel fittings. Aluminum fittings containing more than 0.4 percent copper are prohibited.
- b. Locknuts and bushings: As specified for rigid steel and IMC conduit.
- c. Set screw fittings: Not permitted for use with aluminum conduit.

3. Electrical Metallic Tubing Fittings

- a. Only material of steel or malleable iron is acceptable.
- b. Couplings and connectors: Concrete tight and rain tight, with connectors having insulated throats. Use gland and ring compression type couplings and connectors for conduit sizes 2-inches and smaller. Use set screw type couplings with four set screws each for conduit sizes over 2-inches. Use set screws of case hardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding.
- c. Indent type connectors or couplings are prohibited.
- d. Die-cast or pressure-cast zinc-alloy fittings or fittings made of pot metal are prohibited.

4. Expansion and Deflection Couplings

- a. Accommodate 1.9 cm (0.75 inch) deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
- b. Include internal flexible metal braid sized to guarantee conduit ground continuity and fault currents in accordance with UL, and the NEC code tables for ground conductors.
- c. Watertight, seismically qualified, corrosion-resistant, threaded for and compatible with rigid or intermediate metal conduit.
- d. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber material and stainless steel jacket clamps.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Exterior underground metallic conduits shall be degreased, pretreated, and coated with 2 coats of Carboline 888 epoxy, or equal. Other finishes may be acceptable upon the Engineer's review.

3.2 INSTALLATION

A. Conduit

- 1. All conduit shall be installed in a first class workmanship manner. It shall be installed in horizontal and vertical runs in such a manner as to ensure against trouble from the collection of trapped condensation and shall be arranged so as to be devoid of traps wherever possible. Special care shall be used in assuring that exposed conduit runs are parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceilings. No open wiring is allowed.
- 2. Fittings or symmetrical bends shall be required wherever right angle turns are made in exposed work. Bends and offsets shall be avoided wherever possible, but where necessary, they shall be made with an approved conduit bending machine. All conduit joints shall be cut square, reamed smooth and drawn up tight, using couplings intended for the purpose.
- 3. Conduits shall be securely fastened to all sheet metal outlets, junction and pull boxes with double galvanized locknuts and insulating-grounding bushings as required by the NEC. Conduit crossings in insulating roof fill will require both conduits to be secured to the roof deck, and these crossings can only be made where the insulating fill is a minimum of 3 inches deep. Runs of exposed conduit shall be supported in accordance with the NEC using cast aluminum or malleable iron one hole pipe straps with spacers to provide an air space behind the conduit. Stainless steel minerallac, one piece conduit clamps shall be acceptable where located such that building occupants are not in danger of inadvertent contact, since this type fitting has several sharp edges. In general terms, they may be considered in areas such as on or above ceilings, or high on walls. All conduit in walls and slabs shall be securely braced, capped (wooden plugs are prohibited), and fastened to the forms to prevent dislodgement during vibration and pouring of concrete.
- 4. During construction, all conduit work shall be protected to prevent lodgement of dirt, plaster or trash in conduits, fittings or boxes. Conduits which have been plugged shall be entirely freed of accumulations or be replaced. All conduits in floors or below grade shall

be swabbed free of debris and moisture before wires are pulled. Crushed or deformed conduit shall not be permitted.

5. All open conduit work through new walls or slabs shall be run through sleeves that shall be made watertight. These sleeves shall be PVC of suitable diameter to permit the passage of the conduit used.
6. Where GRS conduit penetrates a floor slab the conduit shall be painted with 2 coats of Koppers Bitumastic 300-M or equal to a point 6 inches above the penetration.
7. The final section of conduit connecting each motor or piece of utilization equipment subject to vibration shall be of the flexible type. Type UA shall be used in all process areas and in outdoor or wet locations. Flexible conduit to space heaters shall be long enough to allow swivel action.
8. All underground conduits entering a building shall be sealed against water/condensate entering around the conductors. Sealant may be silicone rubber based caulk.
9. In certain situations, conduit expansion joints shall be required to ensure against conduit and/or cable damage due to settling or thermal expansion and contraction. These expansion joints shall be required where required by the manufacturer or the Contract Drawings and shall be installed per manufacturer's instructions.
10. Motor control centers, switchgear, etc., mounted in a building with a basement or pipe gallery below, shall have the conduit opening left in the slab sealed to prevent moisture, dust, etc., from entering the panel. The type of seal to be used shall be silicone elastomer foam, as manufactured by Dow-Corning, Chase-foam as manufactured by Chase Technology Corporation, T & B, or equal.
11. All conduit to be added to an existing structure shall be exposed in unfinished and process areas. Where new devices are shown in existing walls in finished spaces, every attempt shall be made to conceal the conduit, by fishing flexible conduit through walls from ceiling cavities.
12. All conduit work in the finished space of each new structure shall be concealed except for conduits to lighting fixtures in buildings with precast roof slabs, open joist ceilings, or excepted as noted on the Contract Drawings. All conduit work below ground floor level in each structure shall be exposed. Conduits entering from underground into buildings shall be watertight through the wall, both inside and outside.
13. PVC conduit installed underground for low voltage application shall be schedule 80 without encasement, except service entrance conduits shall be schedule 40 PVC, thin wall PVC, or Fibre Duct, and shall be concrete encased. Where PVC conduit is installed, transition shall be made to GRS conduit at bends where wire pulling could cut conduit. For medium voltage underground conduit requirements see Section 260513.
14. Aluminum conduit shall not be used underground, in chlorine storage/feed areas, or placed in concrete slabs, unless it is UL listed for the purpose and factory pre-coated.
15. Conduit stubs, for future use, extended through outside walls shall be capped with threaded pipe caps and coated to prevent corrosion. Stubs shall extend 5 feet beyond the walls from which they are stubbed unless otherwise indicated on the Contract Drawings.
16. All metal raceway systems shall be grounding conductive solidly bonded throughout and grounded in accordance with NEC requirements and/or as noted on the Contract Drawings. In addition, all raceway systems shall be provided with separate grounding conductors.
17. Minimum conduit size shall be 3/4 inch. The following table shows the minimum burial depth required for all exterior conduit or cable:

Rigid Metal Conduit	18
Schedule 80 PVC	30

18. Wire pulling shall be facilitated by the use of a UL approved pulling compound in pulls over 30 feet in length or where there are 2 or more 90 degree bends. Only polypropylene, nylon, or manila pulling ropes will be permitted. Standard industry recognized wire pulling equipment shall be used.
19. All conduits entering and leaving instrument enclosures shall be sealed around the wires with silicone caulk.
20. All conduits for emergency lighting systems shall be separate from other building power conduits.
21. Areas of use for each type of conduit:

<u>Buildings – Interior</u>	<u>Schedule 40 PVC</u>	<u>Schedule 80 PVC</u>	<u>EMT</u>	<u>GRS</u>	<u>Aluminum</u>
Process Building Floors Below Grade (Exposed Only)					X
Process Building Floors Above Grade (Exposed)				X	X
Process Building Floors Above Grade (Concealed)	X	X		X	X
Non Process Building Floors Below Grade (Exposed)				X	X
Non Process Building Floors Above Grade (Exposed)				X	X
Non Process Building Floors Above Grade (Concealed)	X	X	X	X	X
Non Process Building Floors Below Grade (Concealed)	X	X	X	X	X
Chlorine Rooms (Concealed)	X				X**
Chlorine Rooms (Exposed)		X			X**
Building Interior (Concealed)	X	X	X	X	X
Building Interior (Exposed)			X	X	X
(See Note 1)					
<u>Exterior Underground</u>					
Low Voltage	X	X		X	X**
<u>Exterior Exposed</u>					
Low Voltage					X

*For additional conduit types for this application see Section 260513.

**Aluminum conduit for this application must be factory pre-coated and UL listed for the application.

Note 1: PVC conduit is not allowed in assembly areas such as gyms, theaters, etc.

22. Underground raceways (conduit) shall be provided with steel sleeves where they pass over or under obstructions, such as: sidewalks; roadways; piping; etc.
23. All conduit shall have an insulated ground wire pulled to all equipment and receptacles.
24. EMT conduit fittings shall be compression type.
25. All raceway runs are shown diagrammatically to outline the general routing of the raceway. The installation shall be made to avoid interference with pipes, ducts, structural members or other equipment. Should structural or other interference prevent the installation of the raceways, or setting of boxes, cabinets, or the electrical equipment, as indicated in the Drawings, deviations must be approved by the Owner and after approval, shall be made without additional charges and shown on the Record Drawings.
26. Fire Stop: Where conduits, wireways, and other electrical raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases, with rock wool fiber or silicone foam sealant only. Completely fill and seal clearances between raceways and openings with the fire stop material. See Section 078400 for complete fire stop requirements.
27. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
28. No conduit shall be run exposed across roofs without first obtaining permission from the Engineer.
29. Conduit may be run inside concrete slabs as long as the slab is at least 6-inches thick and conduit will have at least 1-1/2-inches of cover on both sides.
30. Flexible conduit used in mechanical rooms shall be liquid tight.
31. Runs of flexible conduit above accessible ceilings shall be limited to 10 ft. Runs of exposed flexible conduit shall be limited to 5 feet. All runs of flexible conduit shall be supported in accordance with NEC requirements.
32. Where called out as a tamperproof area on the Drawings, all box fittings, box hardware and conduit supports shall have tamper proof fasteners.

END OF SECTION 260533

SECTION 260534 - BOXES

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Outlet and junction boxes shall be furnished and installed where indicated on the Contract Drawings, and/or as required by the work in accordance with the NEC.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Boxes – Appleton, Bauers, Carlon, Cloud Concrete Products, Crouse-Hinds, Hoffman, Queen, Raco, Robroy Industries, Sedco, Spring City, Wiegmann, or equal.

2.2 GENERAL

- A. All junction and/or pull boxes for dry (non-corrosive) areas shall be of code gauge sheet metal construction, of the inside dimensions as required by code, with covers.
- B. Junction and/or pull boxes for wet or damp locations shall be cast metal, rust and corrosion resistant (NEMA 4X), with at least 5 1/2 full threads for each (bossed) conduit opening, and shall be suitable for flush or surface mounting as required with drilled external, cast mounting extensions (bossed to provide at least 1/8 inch between back of box and mounting surface for drainage). Box covers shall be hinged or cap screw retained as required, of the same material as the box and provided with stainless steel (rustproof) hardware.
- C. Junction boxes for out-of-doors use, not mounted in concrete may be sheet metal (NEMA 4X), waterproof, rustproof, rain and sleetproof, with hinged covers and latches and provided means of locking by means of keyed locks, tamper-resistant screws or padlocking as required and with clamping cap-screws top and bottom door edges to provide firm contact with gasketing. All gaskets shall be molded (unbroken) neoprene or butyl rubber.
- D. NEMA 4X junction and/or pull boxes may be stainless steel, if called for on the Contract Drawings; or non-metallic or cast aluminum.
- E. Underground junction or pull boxes shall be constructed of reinforced concrete cast-in-place or pre-fabricated as detailed on the Contract Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION, APPLICATION, AND ERECTION

A. General

1. Outlets shall be installed in the locations shown on the Contract Drawings. The Contractor shall study the general building plans in relation to the space surrounding each outlet, in order that his work may fit the other work required by these Specifications. When necessary, the Contractor shall relocate outlets so that when fixtures or other fittings are installed, they will be symmetrically located according to room layout and will not interfere with other work or equipment.
2. All supports for outlet boxes shall be furnished and installed by the electrical trades.

B. Concealed Work

1. All outlet boxes shall be standard galvanized steel type at least 1 1/2 inches deep, single or gang type of size to accommodate devices shown. Exceptions shall be noted on the Contract Drawings.
2. Standard deep type outlet boxes (concrete rings with appropriate covers) shall be used in floor slab construction so concealed conduits entering sides of boxes can clear reinforcing rods.
3. Outlet boxes for concealed telephone and signaling systems shall be the 4-inch square type, unless otherwise noted or required by the telephone company.
4. Boxes for use in masonry construction shall be 2 1/2 inches deep for 4-inch block and 3 1/2 inches deep for 6- and 8-inch block. Through wall boxes are prohibited for outlets opposite each other.

C. Exposed Work

1. Outlet or junction boxes for use with exposed steel conduit shall be cast steel. In dry areas sheet steel with rounded corners, made for the purpose.
2. Outlet or junction boxes for use with exposed aluminum conduit shall be copper free, cast aluminum type.
3. Outlet or junction boxes for use with exposed PVC conduit shall be PVC.

D. Pull Boxes

1. Pull boxes for exterior underground work is shown on the Contract Drawings and are the minimum number required. Others may be added at the Contractor's option, but no extra pay shall be allowed. Interior pull boxes are not shown but shall be used as needed. Pull box types are as follows:

Exterior Per detail on the Contract Drawings.

Interior Interior pull boxes in dry areas shall be of code gauge steel of not less than the minimum required by the NEC and shall be provided with hinged covers. In wet areas or pipe galleries, they shall be rated watertight, of stainless steel, cast aluminum, PVC, fiberglass, or equal. Hardware shall be stainless steel.

E. Openings in Electrical Boxes

1. All openings in electrical equipment, enclosures, cabinets, outlet and junction boxes shall be by means of welded bosses, standard knockouts, or shall be sawed, drilled, or punched with tools specially made for the purpose. The use of a cutting torch is prohibited. Unused openings shall be plugged per the NEC.

END OF SECTION 260534

SECTION 260553 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 EQUIPMENT LABELING

- A. All starters, feeder units in panelboards, switchboards, disconnects, instruments, etc., shall be marked to indicate the motor, outlet, circuit they control, or variable monitored. Marking is to be done with engraved laminated nameplates and shall bear the designation shown on the Contract Drawings where this information is given. Nameplates shall be fastened to equipment with stainless steel screws, minimum of one each side. In no way shall the installation of mounting screws void the NEMA enclosure rating of the equipment in which they are installed. If there are more than one identical unit, they shall be given consecutive numbers or other descriptions as designated by the Engineer. Nameplate background color shall be white, with black engraved letters, unless otherwise noted.
- B. Branch circuits in panelboards shall be typed on a card suitable for the card frame furnished with the panel. The card shall bear the panel designation listed on the Contract Drawings where this information is given, as well as indicate what each circuit controls.
- C. Motor control centers, individual wall mounted starters, panelboards, and disconnect switch shall be labeled with vinyl self-adhesive signs that warn of "High Voltage" (state the specific voltage). Main service entrance conduits to a building, where exposed, shall be labeled with the voltage of the service they carry. Other major equipment such as transformers, transfer switches, generator sets, pump control panels, etc., shall be labeled as such. The type of labels to be used shall have orange as the basic color to conform to OSHA requirements, letters shall be black. The labels shall be of proper size to fit flatly on the surface of the enclosure to make for a neat appearance and not interfere with the operating function of the device it is attached to. These labels shall be as manufactured by the Brady Identification Systems Division, Safety Sign Company, Westline Products Company, or equal.
- D. Furnish and install a maximum available fault current sign with date calculated on each structure main service device.

1.2 LOCATING UNDERGROUND UTILITIES

- A. Plastic tape bearing the general notation of "buried electric service" or "buried high voltage cable" shall be placed in trenches with backfill about 12 inches below finished grade on all medium voltage underground conduit runs, and on others as indicated on the Contract Drawings.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 260553

SECTION 260573 – ELECTRICAL STUDIES AND CALCULATIONS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Switchgear manufacturer shall provide detailed computer-based, fault-current and overcurrent protective device coordination studies, and the setting of these devices. This shall apply to new work at existing facilities as well as new facilities.
- B. As part of the short circuit study above, the manufacturer shall provide an Arc Flash Analysis.

1.2 SUBMITTALS

- A. Provide Fault-Current Study as detailed in IEEE standards during design review submittals.
- B. Submit an Over Current Protective Device Coordination Study and Arc Flash Analysis prepared in accordance with IEEE standards at the time of shop drawing submittals. The study shall show and include the following:
 - 1. That each over current protective device in the project is applied within its fault current rating.
 - 2. The coordination study shall include time current curves plotted on log-log graph paper for all over current devices. Curves for adjustable devices shall be shown adjusted to afford maximum coordination with upstream and downstream devices, including devices provided on the primary of service transformers.
 - 3. The interrupting capacity of all over current devices shall equal or exceed the maximum fault current level where they are installed in the system. The system shall be fully rated in that the ability of the device to interrupt a fault at its terminals and shall not depend on the characteristics of an over current device upstream. Series rated devices shall not be acceptable.
 - 4. A schedule of all adjustable devices indicating proper dial and tap settings to achieve the plotted characteristics. A schedule of Arc Flash values and corresponding boundary distances and PPE requirements.

1.3 QUALITY ASSURANCE

- A. Coordination-Study Specialist Qualifications: An entity experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
 - 1. Professional engineer, licensed in the state where project is located, shall be responsible for the study. All elements of the study shall be performed under the direct supervision and control of engineer.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 INSTALLATION/APPLICATION/ERECTION

- A. Manufacturer's Field Service: Engage a factory-authorized service representative of electrical distribution equipment being set and adjusted to assist in the setting of overcurrent protective devices within equipment.
- B. Overcurrent devices are to be visually inspected to verify that settings determined from the final Over Current Protection Coordination Devices Study have been programmed and/or set.
- C. Labels shall be applied to all enclosures, with appropriate site specific Arc Flash warnings, PPE requirements, and boundaries. Boundaries shall be painted on the floor in front of switchgear, switchboards, panelboards, and MCC's.
- D. Each building main service device shall be provided with a permanent nameplate stating the maximum fault current available and the date it was calculated.

END OF SECTION 260573

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This section of the Technical Specifications includes furnishing all labor, materials, equipment, and incidentals required for the installation of all lighting and distribution panelboards as hereinafter specified and as shown on the Contract Drawings.
- B. The panelboards for installation under this Contract shall be selected from the following types with the panel voltage and main sizes the determining factors. All panelboards shall be by the same manufacturer.
- C. Circuit breakers of size and type shown on Contract Drawings and described herein shall be provided with the panelboards.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Eaton, General Electric, Square D, or equal.

2.2 EQUIPMENT

- A. Rating
 - 1. Panelboard ratings shall be as shown on the Contract Drawings. All panelboards shall be rated for the intended voltage.
- B. Standards
 - 1. Panelboards shall be in accordance with the Underwriter Laboratories, Inc. "Standard for Panelboards" and "Standard for Cabinets and Boxes" and shall be so labeled where procedures exist. Panelboards shall also comply with NEMA Standard for Panelboards and the National Electrical Code.
- C. Panelboard Construction
 - 1. Interiors
 - a. All interiors shall be completely factory assembled with circuit breakers, wire connectors, etc. All wire connectors, except screw terminals, shall be of the anti-turn solderless type and all shall be suitable for copper or aluminum wire of the sizes indicated.

- b. Interiors shall be so designed that circuit breakers can be replaced without disturbing adjacent units and without removing the main bus connectors and shall be so designed that circuits may be changed without machining, drilling or tapping.
 - c. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated. Branch circuits shall be numbered by the manufacturer.
 - d. A nameplate shall be provided listing panel type, number of circuit breakers and ratings.
2. Bussing
- a. Bus-bars for the mains shall be of copper. Full size neutral bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Bussing shall be braced throughout to conform to industry standard practice governing short circuit stresses in panelboards. Phase bussing shall be full height without reduction. Cross connectors shall be copper.
 - b. Neutral bussing shall have a suitable lug for each outgoing feeder requiring a neutral connection. Neutrals shall be rated 200 percent for panelboards supplying non-linear loads (fed from K rated transformers).
 - c. Spaces for future circuit breakers shall be bussed for the maximum device that can be fitted into them.
 - d. Separate neutral and ground bus shall be provided, insulated and isolated from each other. For isolated ground application, provide another insulated and isolated ground bus.
3. Boxes
- a. Surface mounted boxes shall have an internal and external finish as hereinafter specified. Surface mounted boxes shall be field punched for conduit entrances.
 - b. At least 4 interior mounting studs shall be provided.
 - c. Panelboard enclosures shall be NEMA 250, Type 4X boxes.
4. Trims
- a. Hinged doors covering all circuit-breaker handles shall be included in all panel trims.
 - b. Doors shall have semi flush type cylinder lock and catch, except that doors over 43 inches in height shall have a vault handle and 3-point catch complete with lock, arranged to fasten door at top, bottom and center. Door hinges shall be concealed. Two keys shall be supplied for each lock. All locks shall be keyed alike; directory frame and card having a transparent cover shall be furnished on each door.
 - c. The trims shall be fabricated from code gauge sheet steel.
 - d. All exterior and interior steel surfaces of the panelboard shall be properly cleaned and finished with manufacturer's standard gray paint over a rust-inhibiting phosphatized coating. The finish paint shall be of a type to which field applied paint will adhere without cracking or peeling.
 - e. Trims for flush panels shall overlap the box by at least 3/4 inch all around. Surface trims shall have the same width and height as the box. Trims shall be fastened with quarter turn clamps.

D. Overcurrent Protective Devices (Circuit Breakers)

1. Panelboards shall be equipped with circuit breakers with frame size and trip settings as shown on the Contract Drawings.
2. Circuit-breakers shall be molded case, bolt-in, thermal-magnetic trip.
3. Circuit-breakers used in 120/240-volt panelboards shall have an interrupting capacity of not less than 10,000 amperes, RMS symmetrical, unless otherwise shown in the panelboard schedule or Contract Drawings.
4. Circuit-breakers used in 480-volt panelboards shall have an interrupting capacity of not less than 14,000 amperes, RMS symmetrical, unless otherwise shown in the panelboard schedule or Contract Drawings.
5. GFCI (ground fault circuit interrupter) shall be provided for circuits where indicated on the Contract Drawings. GFCI units shall be 1-pole, 120 volt, molded case, bolt-on circuit breakers, incorporating a solid-state ground fault interrupter circuit insulated and isolated from the circuit-breaker mechanism. The unit shall be UL listed Class A Group I device (5 milliamp sensitivity, 25 millisecond trip time), and an interrupting capacity of 10,000 amperes RMS.
6. Trip elements of multi-pole breakers shall be effectively insulated from one another. Multi-pole breakers shall be designed so that an overload on any pole shall open all poles simultaneously.
7. The breaker operating mechanism shall be the quick-make, quick-break type and shall be entirely trip free to prevent the contacts being held in a closed position against a short circuit.
8. Breakers shall have a thermal bimetallic element for time delayed overload protection and a magnetic element for short circuit protection.
9. The breaker shall be trip indicating with the trip position midway between the "On" and "Off" positions.
10. Breakers for power distribution panels shall be F frame or larger. All breakers rated above 225 amps shall have interchangeable magnetic trip elements.
11. All breakers shall be UL listed, and conform to requirements of NEMA Standards.
12. Breakers for HVAC equipment shall be HACR rated.
13. Breakers as called out in panel schedules shall be arc fault circuit interrupting type.

PART 3 - EXECUTION

3.1 INSTALLATION/APPLICATION/ERECTION

- A. Boxes for surface mounted panelboards shall be mounted so there is at least 1/2-inch air space between the box and the mounting surface.
- B. Circuit directories shall be typed giving location and nature of load served.
- C. Each panelboard shall be nameplated with plastic engraved nameplates stating the panel's name, voltage, and the name of panel serving the panel. Nameplates shall be secured by use of stainless steel screws. All panels that are a part of an emergency system shall have an additional red nameplate titled "EMERGENCY."

END OF SECTION 262416

SECTION 262419 - MOTOR CONTROL CENTERS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Contractor shall furnish and install Motor Control Centers as specified herein and as shown on the Drawings.

1.2 SUBMITTALS

- A. Motor Control Centers shall be new and the equipment of one manufacturer. Each component is specified by a particular trade name; however, this does not relieve the Contractor of the responsibility of submitting descriptive literature and Shop Drawings for review of all components. Motor control shall be the same brand as power distribution equipment on projects with both.
- B. Shop drawings, including layout drawings, complete schematic and composite wiring diagrams, control circuit wiring diagrams and descriptive literature shall be submitted to the Engineer for review. Service manuals shall be submitted on all equipment and shall be bound in 3-ring loose-leaf binders. The manuals shall also include information on accessories such as timers, etc., built in the controls.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Control Equipment
 - 1. Allen Bradley, Schneider, Eaton, ABB, or equal.
- B. Timers
 - 1. Intermatic, Paragon, Tork, or equal.

2.2 MOTOR CONTROL CENTERS (MCC) –Existing to remain.

- A. General
 - 1. Existing motor control center is a Square D Model 5.
 - 2. Units
 - a. Combination starter units shall consist of Size 1 minimum full voltage magnetic starters, autotransformer reduced voltage starters, molded case magnetic-only circuit breakers, and auxiliary control devices, as required and/or shown on the one-line and elementary diagrams. Pilot light assemblies (push-to-test) shall be

transformer type. All auxiliary equipment, except that which is specified for mounting on the door, shall be mounted within the compartment. All units shall be provided with unit doors, unit support pans, unit saddles and unit disconnect operators as outlined in this Specification. Each unit compartment shall be enclosed and isolated from adjacent units, buses and wireways except for openings for conductor entrance into units. Units shall be designed and constructed so that any fault will be localized within the compartment. All units shall be UL listed for minimum of 22,000 amperes RMS symmetrical fault withstand ability.

- b. Plug-on combination starter units of the same NEMA size and branch feeder units of the same trip size shall be readily interchangeable with each other. It shall be possible to withdraw each plug-on unit to a de-energized position with the unit still being supported by the structure. It shall be possible to lock the unit in this position with one padlock.
- c. Full voltage non-reversing combination starter units shall have the following minimum space factor requirements, shall be provided with plug-on connections and shall be provided with ample space for customer wiring room:

	Circuit Breaker Space Factor
Size 1	1
Size 2	1
Size 3	1-1/2
Size 4	2

3. Unit Plug-On

- a. For convenient unit connection to bus bars, unit plug-on contacts shall be provided on the following units:
 - 1) For circuit breaker type units; full voltage starters, size 4 and smaller; auto-transformer reduced voltage starters, size 4 and smaller; part winding reduced voltage starters, size 4PW and smaller; branch circuit units, 225 ampere and smaller.
- b. The plug-on connection for each phase shall be of a high quality two-point connection and shall be designed to tighten around the vertical bus bar during a heavy current surge. For trouble-free connections, the plug-on fingers shall be silver plated and coated with a compound to assure a low resistance connection. Contact fingers shall be of a floating and self-aligning design to allow solid seating onto the vertical bus bars.
- c. Starters NEMA size 4 and larger shall bolt directly to the vertical bus bars, circuit breakers rated higher than 225 amps shall also bolt directly to the bus bars.

4. Unit Doors

- a. Each unit shall have a door securely mounted with rugged concealed-type hinges which allow the door to swing open a minimum of 112° for unit maintenance and withdrawal. Doors shall be fastened to the structure so that they remain in place when a unit is withdrawn and may be closed to cover the unit space when the unit has been temporarily removed. Doors shall be held closed with captive type screws which engage self-aligning cage nuts. These screws shall provide at least two

threads of engagement to hold doors closed under fault conditions. Each unit door shall be interlocked with its disconnect mechanism to prevent the door from opening when the unit is energized. A def eater mechanism shall be provided for defeating this interlock by authorized personnel. Removable door panels held with captive type screws shall be provided on starter unit doors for mounting push buttons, selector switches or pilot lights. Blank door panels capable of accepting future pilot devices shall be furnished when pilot devices are not originally specified for starter units. Each starter unit door shall house an external low-profile overload reset button for resetting the overload relay in the event of tripping.

5. Unit Support Pan

- a. Each plug-on unit shall be supported and guided by a tilt and lift-out removable pan so that unit rearrangement can be easily accomplished. For easy unit installation and rearrangement, transfer of this unit support pan from one location to another shall be accomplished with ease after the control unit and door have been removed.

6. Unit Saddles

- a. Each plug-on unit shall have a saddle of 14 gauge hot rolled steel designed and constructed to physically isolate the unit from the bus compartment and adjacent units. Saddles shall be equipped with captive, self-aligning mounting screws which shall hold the unit securely in place during shipment. Flanged edges shall be provided on each saddle to facilitate unit removal.

7. Disconnect Operators

- a. An external operator handle shall be supplied for each switch or breaker. This mechanism shall be engaged with the switch or breaker at all times regardless of unit door position to prevent false circuit indication. The operator handle shall be color coded to display red in the "ON" position and black in the "OFF" position. The operator handle shall have a conventional up-down motion and shall be designed so that the down position will indicate the unit is "OFF". For added safety it shall be possible to lock this handle in the "OFF" position with up to three padlocks. The operator handle shall be interlocked with the unit door to prevent switching the unit to "ON" while the unit door is open. A def eater mechanism shall be provided for the purpose of defeating this interlock by a deliberate act of an electrician should he desire to observe the operation of the operator handle assembly or the unit components. Operators shall not be higher than 6'-6" above finished floor elevation, as installed.

8. Wiring

- a. The motor control center wiring shall be NEMA Class II, Type B.
- b. All wiring to the terminal strips from outside the MCC shall be made with spade type terminals of the proper size and rating for the wire used. Pull apart terminal blocks shall be provided in unit spaces of motor starters that contain field wiring energized from a remote source to comply with NEC Article 430-74.
- c. Optional sleeve type wire markers shall be provided throughout, tagged to agree with reviewed shop drawing wiring schematics.

9. Finish
 - a. The finish shall be manufacturer's standard gray enamel applied over a rust inhibiting phosphate primer.
10. Optional Modifications and Accessories
 - a. Additional modifications and accessories shall be as listed and specified on the Contract Drawings.
11. Identification
 - a. A control center identification nameplate describing section catalog numbers and characteristics shall be fastened on the vertical wire trough door of every section. Each control center unit shall have its own identification nameplate fastened to the unit saddle. These nameplates shall have suitable references to factory records for efficient communication with supplier. Each control center unit shall also have an engraved Bakelite nameplate fastened to the outside of each unit door inscribed as written on the Contract Drawings for ease in identification and for making changes when regrouping units. An overall structure nameplate is also required.

B. Starters and Overcurrent Protective Devices

1. Magnetic Starters
 - a. Magnetic starters shall be furnished in all combination starter units unless otherwise indicated on Contract Drawings. Starter Sizes 1 through 4 shall employ the use of a bell-crank lever design to transform vertical action of the armature into horizontal action of the contact carriers and thus minimize contact bounce and produce extra long contact life. Thermal overload relays on starters shall be ambient temperature compensated solid state type with manual reset.
2. Circuit Breakers
 - a. Type FA, KA, LA, MA and PA molded case circuit breakers shall be furnished in all starter and branch feeder units using circuit breakers as a disconnect means. All circuit breakers will have a push-to-trip test feature for testing and exercising the circuit breaker trip mechanism.
 - b. Where the highest continuous current trip setting for which the actual overcurrent device installed in a circuit breaker is rated or can be adjusted is 1200A provide Alternate Maintenance Setting (AMS) switch and Restraint Interface Module (RIM) to provide energy reducing maintenance switching in accordance with section 240.87 of the 2014 NEC. Provide local status indication. AMS switch shall set the circuit breaker trip to "no intentional delay" to reduce clearing time while worker is working within the arc-flash boundary.
3. Control Devices
 - a. Provide selector switches, push buttons, relays, timers, etc., as shown in the control circuits in the Drawings.
 - b. Provide properly sized control transformer.

- c. Pilot light assemblies shall be LED type.

PART 3 - EXECUTION

3.1 INSTALLATION/APPLICATION/ERECTION

- A. Provide new plastic engraved nameplates for new devices. Nameplates shall be secured by use of stainless steel screws.

3.2 EXTRA STOCK/SPARE PARTS

- A. Provide the following spare parts:

- 10 fuses of each type/amperage used
- 1 LED pilot light for each five (5) pilot light assemblies provided
- 1 control transformer for each size utilized

END OF SECTION 262419

SECTION 262700 - WIRE CONNECTIONS AND CONNECTING DEVICES

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Wire connection and connecting devices shall be as herein specified.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Connectors, Lugs, etc. - Anderson, Burndy, T & B, or equal.
- B. Ties and Servings - Panduit, T & B, or equal.
- C. Termination and splice connectors - 3M Scotchlok, Anderson, Burndy, T & B, or equal.

2.2 MATERIALS

- A. Wire Splicing and Terminations (600 Volts and Below)
 - 1. Electrical Terminal and Splice Connectors (#22 - #4 AWG)
 - a. Terminals and splice connectors from #22 - #4 AWG shall be compression types with barrels to provide maximum conductor contact and tensile strength. Performance, construction, and materials shall be in conformance with UL standards for wire connectors and rated for 600 volts and 105 degrees Celsius.
 - b. Connectors shall be manufactured from high conductivity copper and entirely tin plated. Terminal barrels shall be serrated on the inside surface and have a chamfered conductor entry. Terminals shall have funnel entry construction to prevent strand fold-back. All barrels shall be brazed seam or seamless construction.
 - c. Spade type terminals shall be sized for the appropriate stud and shall be locking type that snap firmly onto studs with a close fit for maximum retention. Spade type terminals shall be insulated with an insulation suitable for maintaining a high dielectric strength when crimped and be made from nylon, PVC, or equal.
 - 2. Electrical Lugs and Connectors (#6 AWG - 1000 Kcmil)
 - a. Lugs and splice connectors from #6 AWG - 1000 Kcmil shall be compression types with barrels to provide maximum conductor contact and tensile strength. They shall be manufactured from high conductivity copper and entirely tin plated. They shall be crimped with standard industry tooling. The lugs and connectors must have a current carrying capacity equal to the conductors for which they are rated and must also meet all UL requirements. All lugs above 4/0 AWG shall be 2 hole lugs with NEMA spacing. The lugs shall be rated for operation through 35

KV. The lugs shall be of closed end construction to exclude moisture migration into the cable conductor.

3. Twist-on Wire Connectors (#22 AWG - #10 AWG)
 - a. All twist-on wire connectors must have a corrosion resistant spring that is free to expand within a steel jacket. The steel jacket must be insulated with a flexible vinyl jacket capable of withstanding 105 degrees Celsius ambient temperatures and of sufficient length to cover wires that are inadvertently overstripped.
 - b. Each connector size must be listed by UL for the intended purpose and color coded to assure that the proper size is used on the wire combinations to be spliced. The connectors must be compatible with all common rubber and thermoplastic wire insulations.
4. Solderless/re-usable lugs shall be used only when furnished with equipment such as control panels, furnished by others, where specification of compression type lugs is beyond the Contractor's control. In the event their use is necessary, the Contractor shall be responsible for assuring that they are manufactured to NEMA standards, with proper number and spacing of holes and set screws.

PART 3 - EXECUTION

3.1 INSTALLATION, APPLICATION, & ERECTION

A. Insulation of Splices and Connections

1. Connections/splices with a smooth even contour shall be insulated with a conformable 7 mil thick vinyl plastic insulating tape which can be applied under all weather conditions and is designed to perform in a continuous temperature environment up to 105 degrees Celsius. The tape shall have excellent resistance to abrasion, moisture, alkalis, acids, corrosion, and varying weather conditions (including sunlight). The tape shall be equal to Scotch 33+ and shall be applied in conformance with manufacturer's recommendations. In addition, it shall be applied in successive half-lapped layers with sufficient tension to reduce its width to 5/8 of its original width. The last inch of the wrap shall not be stretched.
2. Connections/splices with irregular shapes or sharp edges protruding shall be first wrapped with 30 mil rubber tape to smooth the contour of the joint before being insulated with 33+ insulating tape specified in the previous paragraph. The rubber tape shall be high voltage (69 KV) corona-resistant based on self-fusing ethylene propylene rubber and be capable of operation at 130 degrees Celsius under emergency conditions. The tape must be capable of being applied in either the stretched or unstretched condition without any loss in either physical or electrical properties. The tape must not split, crack, slip, or flag when exposed to various environments. The tape must be compatible with all synthetic cable insulations. The tape must have a dissipation factor of less than 5 percent at 130 degrees Celsius, be non-vulcanizing, and have a shelf life of at least 5 years. The rubber tape shall be applied in successive, half-lapped wound layers and shall be highly elongated to eliminate voids. Other manufacturer's recommendations on installation shall be adhered to. The rubber tape shall be equal to Scotch 23 or 130C electrical splicing tape.

3. Splices made in wet or damp locations shall be made submersible and watertight with special kits made for the application and compatible with type of cables employed.

B. Connection Make-up

1. Connections of lugs to bus bars, etc., shall be made up with corrosion resistant steel bolts having non-magnetic properties with matching nuts, and shall utilize a Belleville spring washer (stainless steel) to maintain connection integrity. Connections shall be torqued to the proper limits. Prior to bolting up the connection, electrical joint compound shall be brushed on the contact faces of the electrical joint.
2. All motor lead connections shall be made up to match the type of lead furnished on the motor. If the lead is not lugged, then twist-on wire connectors may be used. To prevent possible vibration problems, twist-on connectors shall be taped after installation.
3. All lugged motor lead connections (excluding motors over 200 horsepower) shall be made up using ring tongue compression lugs with proper size stainless steel nuts and bolts. Belleville type spring shall be used to maintain tension on the connections. The connections shall then be insulated using the procedure described for irregular shapes, utilizing rubber tape in conjunction with vinyl electrical tape.
4. At the time of final inspection, the Engineer may request the Contractor to disassemble 3 randomly selected motor lead connections in the Engineer's presence, to assure conformance with these Specifications.
5. The Contractor shall include all necessary tools, materials, and labor in his bid for disassembly of the connections and for remaking them with new insulating materials after inspection.

END OF SECTION 262700

SECTION 262716 – CONTROLS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Equipment control panels and enclosures shall be as specified herein and shown on the Contract Drawings. Legends for starter nameplates shall be taken from the one line diagram in the Contract Drawings.

1.2 CUSTOM CONTROL PANELS

A. General

1. All control panels furnished under this Contract shall be manufactured in accordance with industry standards and as herein specified. Some control panels are specified to be furnished with the equipment controlled and others are to be furnished by the Contractor, as written elsewhere.
2. Control panels shall be as manufactured by Adgo, Inc., Control Works, Inc., or other panel vendor. Panel construction shall comply with OSHA and other code requirements as applicable, and may be attested to by UL listing the panels as an assembly. Otherwise, panel modifications as required by the Electrical Inspector shall be performed by the supplier at no extra cost to the Owner.
3. Control panels to be furnished on this project shall be wired to function according to schematics shown on the contract Drawings. In addition to the requirements shown on the Contract Drawings, the panels shall adhere to additional requirements as written herein, and in the utilization equipment specifications. All motor starters shall be U.S. NEMA sized, field rebuildable. IEC duty rated devices are unacceptable.
4. Enclosures shall be dead front with all operators' devices accessible without opening the enclosure door. All relays, timers, terminal strips, etc., shall be mounted to a subpanel inside the enclosure. All wiring must be stranded and sized to be protected by a 20A/1P circuit breaker. Supplemental overcurrent protection may be used in lieu of oversized wiring. All panels mounted outside shall have operators devices mounted on an inner door with an outdoor door that is blank.
5. All terminal strips and lugs shall be of a type UL listed to terminate the size and quantity of wires encountered. Where conduits enter the boxes, if they are NEMA 4 or 3R, sealing locknuts or hubs must be used to maintain the box rating.
6. Certain equipment starters contain non-resettable elapsed time meters as shown in the Contract Drawings. Also, certain motor starters have remote control devices and require connections to operate these control devices as shown on starter schematics (control circuits).
7. All starters contain red "on" lights, control transformers, and auxiliary contacts to operate as defined on the control circuits of the Contract Drawings. Reset pushbuttons shall also be provided for overloads built into the starters.
8. Enclosures shall be provided with a locking hasp or latch handle with provision for padlocking and any exterior hardware shall be stainless steel or other corrosion resistant material. Enclosures for interior use in dry areas shall be NEMA 12 enclosed, unless otherwise indicated.

9. Elementary control schematics and connection diagrams showing the spatial relationship of components and wiring shall be submitted for review. Also, a bill of materials, drawing of device arrangement on front, and enclosure fabrication drawings shall be submitted. Further, descriptive literature is required on all components. A copy of the shop drawings shall be furnished and stored in a pocket inside the enclosure.
10. Provide metal data pocket, with white enamel finish, on interior of door.
11. Sleeve type wire markers or other "permanent" type marker shall be installed on all wires, keynoted back to the elementary schematic or the connection diagram, and all terminals identified.
12. Environmental Suitability: Indoor and outdoor control panels and enclosures shall be suitable for operation in the ambient conditions associated with the locations designated in the Contract Documents. Heating, cooling, and dehumidifying devices shall be provided in order to maintain all devices within the minimums and maximums of their rated environmental operating ranges. The Contractor shall provide all power wiring for these devices. Enclosures suitable for the environment shall be provided. Enclosures in hazardous areas shall be suitable for use in the particular hazardous or classified location in which it is to be installed.
13. The control panel controls shall be 120 VAC. Where the electrical power supply to the control panel is 240 VAC single-phase or 480 VAC 3-phase, the control panel shall be provided with a control panel transformer. Control conductors shall be provided in accordance with the indicated requirements.
14. Control panels shall be freestanding, floor-mounted, pedestal-mounted or wall-mounted, as indicated. Internal control components shall be mounted on an internal back-panel or side-panel as required.
15. Adequately support and restrain all devices and components mounted on or within the panel to prevent any movement.
16. Provide subpanels for installation of all internally mounted components. All freestanding control panels shall include full height rear and side subpanels, where enclosure layout permits. All wall, pedestal, and floor-mounted enclosures shall include full height rear subpanels.
17. Freestanding and floor-mounted panels shall be provided with switched fluorescent back-of-panel lights. One light shall be provided for every 4-feet of panel width and shall be mounted inside and in the top of the back-of-panel area.
18. Freestanding and floor-mounted panels shall be provided with a 15 amp, 120 volt, service outlet circuit within the back-of-panel area. The circuit shall be provided with 3 wire, 120 volt, 20 ampere, GFI type duplex receptacle, one for every 4-feet of panel width (one minimum per panel), spaced evenly along the back-of-panel area.
19. Wall mounted or pedestal mounted panels shall be so sized as to adequately dissipate heat generated by equipment mounted in or on the panel.
20. Panels mounted outside or in unshaded areas shall be provided with thermostatically controlled heaters that maintain inside temperature above 40 degrees F.
21. Provide a hand switch controlled fluorescent light and a breaker protected 120 volt, 20 amp GFI type duplex receptacle within each wall mounted or pedestal mounted panel larger than 4 cubic feet volume.
22. Provide enclosure mounting supports, bases, or legs as required for floor, pedestal, or wall mounting and for free standing enclosures.

B. Construction Features

1. Control panel enclosure sizing shall be by supplier in accordance with appropriate standards and codes.

2. Panels and enclosures shall meet the NEMA requirements for the type specified and/or as shown on the drawings.
3. Provide lifting eye bolts to facilitate handling of the enclosures, where required.
4. External welds shall be made by using the Heliarc welding method, whereas internal welds will be made by the wire welding method. All welds shall be neatly formed and free of cracks, blow holes and other irregularities.
5. All inside and outside edges of the panel shall be free of burrs.
6. The panel door or doors shall be a minimum of 80 percent of the front surface area and shall be hinged on the left side when facing the cabinet (right and left outside edges for double door enclosures).
7. Main feeder disconnects shall have a door-mounted handle unless otherwise indicated.

C. Control Panels Located in Dry Non-Corrosive Areas (NEMA 12)

1. The enclosure(s) will meet or exceed the requirements of a NEMA 12 rating and shall be UL listed.
2. Panels shall be minimum 14-gauge steel for wall or pedestal-mount and minimum 12-gauge for floor-mount or freestanding enclosures.
3. Floor-mount enclosures shall be provided with 12-gauge steel floor stand kits bolted to the bottom of the enclosure and sealed and gasketed to maintain NEMA 12 rating. Floor stands shall be mounted on concrete housekeeping pads using anchor bolts and/or expansion anchors.
4. Freestanding enclosures shall be constructed with an integral fully enclosed solid bottom section at least 6-inches in height. Enclosure shall be mounted on concrete housekeeping pads using anchor bolts and/or expansion anchors.
5. Panels shall be provided with 3-point latching mechanism operated by oil-tight key-locking handle. Latch rods shall be provided with rollers for ease of use. The latch handle shall have a provision for padlocking in the closed position.
6. Panels smaller than 24"H x 20"W x 6"D shall be provided with fast-operating door clamps and hasp and staple for padlocking.
7. Panels shall be provided with oil-resistant gasket attached with oil-resistant adhesive.
8. Enclosures shall be thoroughly cleaned and sand blasted per Society for Protective Coatings SP 6 (Commercial Blast) after which surfaces shall receive a prime coat of Amercoat 185 or equal, 3-mils DFT, for a total thickness of the prime plus finish system of 6 mils. The finished color of the outside surfaces shall be ANSI 61 gray, lacquer or enamel. Interior of the control panel, back-panel, and side panels shall have a white enamel finish coat.
9. Wall and pedestal-mount enclosures shall be constructed with rolled flanges around three sides of door and all sides of enclosure opening prevent infiltration of liquid or contaminants.
10. Freestanding and floor-mount enclosures shall be provided with body flange trough collar to prevent infiltration of liquid or contaminants.
11. Hinges shall be continuous with stainless steel hinge pins. The hinge pin shall be capped top and bottom by weld to render it tamper proof.
12. Light and/or alarm brackets shall be provided where indicated.

D. Equipment Mounting

1. Adjustable Channels

- a. The enclosure shall be equipped with two adjustable “C” mounting channels on both side walls and back wall of the enclosure, allowing versatile positioning of shelves or panels.
 - b. The mounting channels shall provide infinite vertical and horizontal adjustment and not limit the positioning of shelves or panels. All mounting hardware will be furnished.
2. Shelves
- a. If equipment is to be shelf mounted, the enclosure shall be provided with shelves fabricated from 5052-H32 aluminum having a thickness of 0.125 inch.
 - b. The shelf depth shall be a minimum of 10.5 inches. The enclosure will have provision for positioning shelves or panels to within 4 inches of the bottom and to within 8 inches of the top of the enclosure.
3. Aluminum Back Panel
- a. If the equipment is to be panel mounted, the enclosure shall be provided with a 5052-H32 aluminum back panel having a thickness of 0.125 inch.
 - b. The panel shall be natural finish. All mounting hardware will be furnished.
4. Print Storage Pocket
- a. A control panel shop drawing storage pocket shall be provided inside the enclosure at a convenient location.
- E. Cabinet Mounting
1. Pad Mounted Enclosure
- a. A solid plate shall be bolted and gasketed in place on the bottom of the enclosure to provide a weathertight seal.
- F. Thermal Management
1. Indoor Panels
- a. The following panel accessories shall be provided where shown on Contract Drawings or where required to maintain an interior panel environment suitable for interior panel mounted components. Panel manufacturer shall size required temperature control equipment per their panel design.
 - 1) Provide thermostatically controlled heaters of sufficient size to maintain temperature inside each enclosure to prevent interior condensation. Heaters shall be fan-driven, with all components mounted in an anodized aluminum housing for sub panel mounting. The heaters shall be powered from 115VAC from a dedicated circuit breaker. Heater shall be Hoffman DAH series, or equal.
 - 2) Provide thermostatically controlled closed loop heat exchangers or air conditioners with filtered inlets of sufficient size to maintain temperature within enclosure below maximum operating temperature rating of sensitive

panel mounted components. NEMA rating of panel shall be maintained. Units shall be powered from 115VAC from a dedicated circuit breaker. Heat exchangers and air conditioners shall be Hoffman XR and CR series respectively, or equal.

- 3) Provide cooling fans with exhaust grille and filter kits of sufficient size to maintain temperature within enclosure below maximum operating temperature rating of sensitive panel mounted components. Units shall be powered from 115VAC from a dedicated circuit breaker. Cooling fans shall be Hoffman series SF, or equal.

- b. Provide internal corrosion inhibitor devices, Hoffman HCI series or equal, for corrosion control inside each enclosure.

G. Surge Suppression

1. A surge protection device shall be installed on the power supply feed to each panel. The power surge protector shall be rated for 120VAC.
2. The power surge protection devices shall have the following performance characteristics:
 - a. Maximum Continuous Operating Voltage (MCOV): 150VAC
 - b. Maximum Discharge Current (8x20 μ s, I_{max}): 40kA
 - c. Nominal Discharge Current (8x20 μ s, I_n): 20kA
 - d. Protection Level (Up): 0.9KV
 - e. UL1449 Voltage Protection Rating (VPR): 700V
3. The power surge protection device shall provide (2) form C contacts for remote status indication.
4. The power surge protection device shall be Allen Bradley 4983 series or equal.

H. Power Supplies

1. Power supplies shall be provided for all DC powered panel components. Power supplies shall be single output, regulated, plug-in type, 12 or 24V as required. Power supply shall be rated at 120VAC. Power supply shall be Allen Bradley 1606 series, or equal.

I. Uninterruptible Power Supply

1. A 1.5 KVA uninterruptible power supply, Liebert GTX3, or equal shall be provided where shown on Contract Drawings. UPS shall be provided with relay card for remote status indication.

J. Acceptable Manufacturers

1. Enclosures shall be as manufactured by Hoffman Enclosures, Inc., or a UL listed equivalent.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 262716

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Wiring devices shall be installed where indicated on the Contract Drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Flush floor boxes, surface fittings, and poke through devices are specified in Section 260534.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Bryant, Cooper, Hubbell, Intermatic, Leviton, P&S, Taymac, Wiremold, or equal.

2.2 RECEPTACLES AND SWITCHES

A. Receptacles

1. Twin-convenience - outlet (interior) – “Hubbell” cat. no. 5362, or equal.
2. Twin-convenience - outlet (exterior) – “Hubbell” cat. no. 5362 with Taymac Corporation or Intermatic, Inc. safety outlet enclosure.
3. Ground fault interrupting receptacles shall be required where shown on the Contract Drawings, and shall be indicated by the abbreviation “GFI” beside the circuit symbol on the Contract Drawings. They shall be rated 20 amps (125 volts) and shall be of the duplex, feed through type, capable of protecting all downstream receptacles on the same circuit. They shall be UL listed and interrupt the current between 4-6 milliamps of ground fault leakage. Appropriate plates shall be furnished and installed. The 20 ampere rating shall apply not only to device internals but to the faceplate as well. Receptacle shall be “Hubbell”, Cat. GF20LA or equal.
4. Weather-resistant type receptacles shall be required in all outdoor, damp, and wet locations or where shown on Contract Drawings. Receptacle type shall be indicated by the abbreviation “WR” beside the circuit symbol on the Contract Drawings. Receptacle shall be UL Listed. Weather-resistant receptacles shall be “Hubbell” Cat 5362WR or equal. Weather-resistant ground fault interrupting type receptacles shall be “Hubbell” Cat. GFTR20 or equal.

B. Plates and Covers

1. Furnish and install plates of the appropriate type and size for all wiring and control devices, signal and telephone outlets.
2. All plates on surface mounted boxes shall be of 302 stainless steel (nonmagnetic) with rounded or beveled edges, except in pump rooms, pipe galleries, and pipe trenches, then

weatherproof covers shall be installed. All plates on flush mounted boxes shall be gray nylon or non-breakable thermoplastic. All device plate screws shall be nylon or stainless steel with countersunk heads. Plates shall be installed vertically and with an alignment tolerance of 1/16 inch. Device plates shall be of the one-piece type, of suitable shape for the devices to be covered. Plates shall have a smooth finish with no crevices to collect dirt. Oversize plates are not acceptable.

3. Covers for boxes serving equipment where flexible conduit is to be tapped into cover plates shall be sheet metal drilled for conduit. Gaskets shall be required as well as all special adapters for mounting.
4. Weatherproof plates shall be Hubbell 5205/5206/CWP26H/CWP8H/WP26 as appropriate for the box utilized, vertical or horizontal mounting. Use the appropriate plate for the mounting.

C. Wall Switches (Tumbler Type)

1. Single pole (interior) – “Hubbell” cat. no. 1221, or equal.
2. Single pole (exterior) – “Hubbell” cat. no. 1222-gray, or equal, and Bryant 7420 or equal plate.

PART 3 - EXECUTION

3.1 INSTALLATION/APPLICATION/ERECTION

A. Wall Switches

1. Wall switches shall be mounted at a height as indicated in Section 260000, unless otherwise noted on the Contract Drawings.

B. Receptacles

1. Outlets shall be located as shown on the Contract Drawings. Where located in special interior finishes, they shall be properly centered. Boxes shall be of the type noted and accepted for the specific installation.
2. Furnish and install receptacle circuits where called for on the Contract Drawings and/or by these Specifications. Circuits shall be installed in conduit from panel to receptacle, with flush mounted boxes except as noted on the Contract Drawings.
3. Receptacles and lighting circuits shall not be combined on the same overcurrent device. For runs over 75 feet or for 30 amp receptacles, minimum wire size shall be AWG No. 10.
4. The minimum free length of conductor at each box for the connection of a fixture, switch, or receptacle shall be 8 inches. All connections shall be made mechanically and electrically secure.
5. Receptacles shall be duplex type, rated at 20 amps, 125 volts, gray colored, unless otherwise noted. Mounting height shall be as specified for low outlets in Section 260000, except in pipe galleries and pump rooms subject to floods, where they shall be medium height. All receptacles shall be of the grounding type.

END OF SECTION 262726

SECTION 262816 – SAFETY SWITCHES

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Provide horsepower-rated, quick-make, quick-break, safety switches provided with the number of poles and fuses as required.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/EQUIPMENT

- A. Safety switches shall be as manufactured by Eaton, General Electric, Square D Company, or equal.
- B. For 208- and 240-volt circuits, use general-duty type switches with Class R fuse clips. For 480-volt circuits, use heavy-duty type switches with Class R fuse clips.
- C. Switches shall have arc shields, shall be of enclosed construction and fusible or non-fusible as indicated. Switches shall be rated for either 250-volt AC or 600-volt AC service as required.
- D. All switches shall be capable of interrupting locked rotor current of motor which it serves.
- E. Enclosures shall be NEMA-1 for interior use and NEMA-4X for exterior use unless noted otherwise.
- F. Provide dual-element Bussman type FRN (250 volt) or type FRS (600 volt) fuses for any fusible safety switch serving a motor circuit.
- G. For non-motor loads, provide dual element Bussman type LPN (250 volt) or type LPS (600 volt).
- H. All switches shall be capable of being padlocked in either the “On” or “Off” position.
- I. Safety switches shall be provided with auxiliary contacts where indicated on Contract Drawings.
- J. Safety switches shall be UL listed and shall conform to NEMA Standards. NEMA 4X enclosed safety switches where called for shall be stainless steel, or fiberglass.
- K. NEMA 1 enclosed switches shall be phosphate coated as equivalent, code gauge steel with baked enamel finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide non-fusible switches at remote motor locations (raintight where required) as indicated on drawings.
- B. Mount switches to walls or to equipment enclosures with a minimum of 4 bolts using toggle anchors for masonry construction, Phillips “Red Head” anchors for poured concrete construction and bolts, jumbo washers, lock washers and nuts for equipment enclosure mounting.
- C. All safety switches to be identified with nameplates per Section 260553.

END OF SECTION 262816

SECTION 262923 - VARIABLE FREQUENCY DRIVES

PART 1 - GENERAL

1.1 REFERENCES

- A. The drive shall be designed to meet the following specifications:
1. NFPA 70 - US National Electrical Code
 2. NEMA ICS 3.1 - Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems
 3. NEMA 250 - Enclosures for Electrical Equipment
 4. UL 508C – Underwriter’s Laboratory
 5. CAN/CSA-C22 No. 14-M91 - Canadian Standards Association
 6. IEC 146 - International Electrical Code

1.2 REGULATORY REQUIREMENTS

- A. The drive shall conform to the following requirements:

1. FPA 70
2. IEC 146
3. EN Standard/CE marked for EMC directives

<u>Emissions</u>	<u>Immunity</u>
EN 50081-1	EN 50082-1
EN 50081-2	EN 50082-2
EN 55011 Class A	IEC 801-1,2,3,4,6,8
EN 55011 Class B	(per EN 50082-1,2)

4. EN Standard/CE marked for Low Voltage directives
EN 60204-1
PREN 50178
5. IEC 801
6. C-UL marking to provide an approved listing for both United States and Canadian users.
7. The Manufacturer will furnish the product as listed and classified by Underwriter’s Laboratories.

1.3 QUALIFICATIONS

- A. Manufacturer: The drive manufacturer shall have been in the drive business continuously for a minimum of 15 years and specialize in the design and manufacturing of PWM Adjustable Frequency Drives.

- B. Support: The drive manufacturer shall maintain factory trained and authorized service facilities for their drives within 100 miles of the project and have a demonstrated record of service for at least the previous three years. Full-time support personnel shall be employed by the drive manufacturer.
- C. Certification: All drives must be assembled at locations that are certified to the ISO-9001 Series of Quality Standards. This insures all quality and corrective action procedures are documented and implemented with a goal of Total Customer Satisfaction.
- D. Adjustable Frequency Drives shall be on the basis of Eaton SVX9000 Series, and constitute the type, product quality, material, and desired operating features.

1.4 COORDINATION

- A. The equipment provided under this Section shall operate the electric motor driver with the driven equipment as indicated under other equipment specifications. The Contractor's attention is specifically directed to the need for proper coordination of the work under this section and the work under the equipment section.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Eaton, Allen Bradley, Square D, or equal.

2.2 GENERAL

- A. The power supply shall be an adjustable frequency inverter designed to convert incoming 3 phase, 208 volt, 60 Hertz power to a DC voltage and then to adjustable frequency AC by use of a 3 phase inverter. The inverter shall be a voltage source design producing a pulse-width-modulated type output. The inverters shall be designed to operate 460 volt, 3 phase, 60 Hertz, NEMA-B, open drip-proof (1.15 SF) or TEFC (1.15 SF), squirrel-cage high efficiency inverter duty induction motors over the range of 20-100 percent of base speed without derating or requiring any motor modifications, inverters shall be capable of delivering nameplate horsepower exclusive of service factor without the need for mandatory thermostats or feedback tachometers. The VFD shall vary both the AC voltage and frequency simultaneously to operate the motor at required speeds. Current source inverters will not be acceptable. Inverters shall be sized to match the KVA and inrush characteristics of the motors actually furnished. The Contractor shall be responsible for matching the controller to the load (variable torque or constant torque) as well as the speed and current of the actual motor being controlled.

2.3 RATINGS

- A. Input Power: The drive is self-adjustable to accept an input voltage range between 200-240/380-480/500-600VAC, three phase +/-10%.

1. Displacement power factor shall range between 1.0 and 0.95, lagging, over the entire speed range (0.80 for 0.5-5hp/0.37-3.7kW, 200-480V drives). The efficiency of the drive shall be a minimum of 97% at full load and speed.
- B. Environment: Storage ambient temperature range: -40°C to 70°C (-40°F to 158°F). Operating ambient temperature range: 0°C to 40°C (0°F to 109°F) without derating. The relative humidity range is 5% to 95% non-condensing.
1. Operating elevation: up to 1000 Meters (3,300ft) without derating.
- C. Output Power: The output voltage is adjustable from 0 to rated input voltage. The output frequency range is adjustable from 0 to 400 Hz. The inverter section will produce a pulse width modulated (PWM) waveform using latest generation IGBTs.
- D. VFD shall be NEMA 4X enclosed.

2.4 DESIGN

- A. Hardware: The drive hardware shall employ the following power components:
1. Diode or fully gated bridge on the input.
 2. DC bus inductor on all ratings 5.5kW (7.5HP) or greater.
 3. Switching logic power supply operating from the DC bus.
 4. Phase to phase and phase to ground MOV protection.
 5. Gold plated plug-in connections on printed circuit boards.
 6. Microprocessor based inverter logic isolated from power circuits.
 7. Latest generation IGBT inverter section.
 8. Inverter section shall not require commutation capacitors.
 9. Customer Interface common for all horsepower ratings. Interface shall include an LCD digital display, programming keypad and operator keys option.
 10. Main Control Board common for 5.5kW (7.5HP) and up.
 11. Common control connection for all ratings.
 12. Optimized for 4kHz carrier frequency at 44kW (60HP) or less, and 2kHz at 55kW (75 HP) and larger.
 13. Peripheral Interface to enable attaching common options.
 14. Integral EMI/RFI filter as standard.
- B. Control Logic: The drive shall be programmable or self adjusting for operation under the following conditions:
1. Operate drive with motor disconnected.
 2. Controlled shut down, when properly fused, with no component failure in the event of an output phase to phase or phase to ground short circuit and annunciation of the fault condition.
 3. Adjustable PWM carrier frequency within a range of 2-8kHz.
 4. Selectable Sensorless Vector or V/Hz mode.
 5. Selectable for variable or constant torque loads. Selection of variable torque provides 115 percent of rated VT current for up to one minute. Selection of constant torque provides 150 percent of rated CT current for up to one minute.

6. Multiple programmable stop modes including - Ramp, Coast, DC-Brake, Ramp-to-Hold and S-curve.
 7. Multiple acceleration and deceleration rates.
 8. All adjustments to be made with the door closed.
 9. Adjustable output frequency up to 400Hz.
- C. Power Conditioning: The drive shall be designed to operate on an AC line which may contain line notching and up to 10 percent harmonic distortion. An input isolation transformer shall not be required for protection from normal line transients. If line conditions dictate the use of a transformer, the K factor shall be 4.0 or less.

2.5 FEATURES

- A. Interface: The drive shall provide a removable Human Interface Module with integral display to show drive operating conditions, adjustments and fault indications. The display shall be removable under power without causing a fault and is visible and operable without opening the enclosure door. The display shall consist of 2 lines of 16 character alphanumeric, backlit LCD with the display being configurable for simultaneously displaying two values using customized multi-lingual text and user scaled units. The module shall provide LED indication of drive direction and commanded direction. The display shall be capable of remote mounting by means of cable connection up to 10 meters (33ft) from the drive and is capable of being used as a hand-held terminal.
- B. Control Mode: Programming shall provide the ability to select sensorless vector or v/hz mode. The sensorless vector mode shall use motor nameplate data plus motor operating data, such as IR drop, nominal flux current and flux up time. The volts per hertz mode shall be able to be programmed for squared, cubed, straight line; pre programmed or full custom patterns.
- C. Current Limit: Programmable current limit shall be available from 20 percent to 160 percent of constant torque rating. Current limit shall be active for all drive states; accelerating, constant speed and decelerating. The drive shall employ PI regulation with an adjustable gain for smooth transition in and out of current limit.
- D. Acceleration/Deceleration: Accel/Decel settings shall provide separate adjustments to allow either setting to be adjusted from 0 seconds to 3600 seconds. A second set of remotely selectable Accel/Decel settings shall be accessible with Control Interface option. An adaptive current limit circuit shall be able to be disabled in programming for fast acceleration of low inertia loads.
- E. Speed Regulation: The programmable speed regulation modes shall include the following:
1. Open Loop
 2. Slip Compensation with 0.5 percent speed regulation
 3. Droop - Negative Slip Compensation with 0.5 percent speed regulation
 4. Traverse Function
 5. Closed loop encoder feedback with 0.1 percent speed regulation
 6. Process PI control

- F. Speed Profiles: Programming capability shall allow the user to produce speed profiles with linear acceleration/deceleration or S-Curve profiles that provide changing accel/decel rates. S-Curve profiles shall be selectable for fixed or adjustable values.
- G. Adjustments: The digital interface shall be provided for all set-up, operation and adjustment settings. All adjustments are shall be stored in nonvolatile memory (EEPROM). Potentiometer adjustments are not acceptable. The drive shall provide EEPROM memory for factory default values.
- H. Process PI Control: An internal process PI regulator shall have both proportional and integral gain adjustments as well as error inversion and output clamping functions. The feedback may be configured for normal or square root functions. If the feedback indicates that the process is moving away from the set point, the regulator will adjust the drive output until the feedback equals the reference. Process control shall be enabled or disabled with a hardwire input. Transitioning in and out of process control shall be able to be tuned for faster response by preloading the integrator. Protection shall be provided for a loss of feedback or reference signal.
- I. Fault Reset/Run: The drive shall have the ability to conduct up to nine automatic fault reset and restarts following a fault condition before locking out and requiring manual restart. The automatic mode is not applicable to a ground fault, shorted output faults and other internal microprocessor faults. The time between restarts shall be adjustable from 0.5 seconds to 30 seconds.
- J. Skip Frequencies: The drive shall contain three adjustable set points that lock out continuous operation at frequencies, which may produce mechanical resonance. The set points shall have a bandwidth adjustable from 0Hz to 15Hz.
- K. Run On Power Up: A user programmable restart function shall be provided to automatically restart the equipment after restoration of power after an outage. A maintained 2-wire start input is required for this function.
- L. Line Loss Restart: This programmable function shall be provided to select the reconnect mode of the drive after recovery from a line loss condition. The reconnect modes shall be B Last Speed, Speed Search, Track Volts, or Use Encoder. Disabling this feature shall force the drive to start from zero hertz.
- M. Fault Memory: The last four faults as well as operating frequency, drive status and power mode shall be stored at the time of fault. Information shall be maintained in the event of a power loss.
- N. Overload Protection: The drive shall provide Class 20 motor overload protection investigated by UL to comply with N.E.C. Article 430. Overload protection shall be speed sensitive and adjustable for motors with speed ranges of 2:1, 4:1 and 10:1. A viewable parameter shall store the overload usage in percent. An alarm bit can be used to adjust a process to eliminate an overload trip.
- O. Auto Economizer: This feature shall automatically reduce the output voltage when the drive is operating in an idle mode (drive output current less than programmed motor FLA). The voltage shall be reduced to minimize flux current in a lightly loaded motor thus reducing kW usage. If the load increases, the drive shall automatically return to normal operation.
- P. Terminal Blocks: Separate terminal blocks shall be provided for control and power wiring.

- Q. Flying Start: The drive is shall be capable of determining the speed and direction of a spinning motor and adjust its output to pick-up the motor at the rotating speed. The flying start feature shall be operable with or without encoder feedback.
- R. Ride Through: The control logic shall be capable of riding through a power outage of up to 2 seconds in duration.
- S. Analog Output: An output signal shall be provided and be jumper selectable for 0 - 10V DC or 0 - 20 mA which is user programmable such that it is proportional to one of 13 process parameters including output frequency, output current, encoder feedback, output power and others. A programmable offset shall be provided to allow modification of the analog output to obtain 2 - 10V DC or 4 - 20 mA. Programmable gain adjustments for both upper and lower settings shall allow for system calibration.
- T. Reference Signals: The drive shall be capable of the following input reference signals:
- | | |
|----------------------|-----------------------------|
| Digital pulse input | Digital MOP |
| Remote potentiometer | Serial |
| 10V DC | HIM (Program/Control panel) |
| 20 Ma | |
- U. Loss of Reference: In the event of loss of the 4 - 20 mA reference signal, the drive shall be user programmable to the following:
- Fault and stop
 - Alarm and maintain last reference within 10%
 - Alarm and go to preset speed
 - Alarm and go to minimum speed
 - Alarm and go to maximum speed
 - Active for Process PI reference or feedback
- V. Digital I/O: Contact output ratings shall be 115V AC/30V DC, 5.0 Amp resistive, 2.0 Amp inductive. All four contacts provided shall be programmable to 17 different conditions. Factory settings shall be as follows:
- Form A Run contact
 - Form C Fault contact
 - Form C Alarm contact
 - Form A at Speed contact
- W. Operator Devices, and Control Interface: Provide start and stop controls integrally with the drive. Also provide control interface cards as required to accommodate the external control deices shown in Control Circuits.
- X. Output Line Reactor: Provide output line reactor sized per the motor horsepower, where shown on the Contract Drawings.
- Y. Provide an Ethernet interface board for communication with the plant SCADA system.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Anchor all cabinetry firmly to the foundation.
- B. Comply with manufacturer's recommendations, except as modified herein.
- C. Drives shall be adjusted such that maximum speed is motor nameplate RPM, and minimum speed is just high enough to provide motor driven equipment cooling.

3.2 START-UP, TRAINING, AND TESTING

- A. The drive manufacturer shall provide factory authorized, trained service personnel for start-up and testing. Upon successful completion of installation and testing, training shall be provided in accordance with 260000.

3.3 TOOLS AND SPARE PARTS

- A. Any special tools required for normal operation and maintenance shall be provided by the equipment manufacturer.
- B. Furnish the following spare parts:
 - 1. Ten fuses for each type used.
 - 2. Ten lamps for each type used.

END OF SECTION 262923

SECTION 264313 – SURGE PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The specified unit(s) shall provide effective high energy surge suppression, surge current diversion, and high frequency noise attenuation in all electrical modes for equipment connected downstream from the SPD unit. The unit(s) shall be connected in parallel with the facility's wiring system.
- B. All products that are submitted according to these specifications will be required to meet this specification in its entirety. Any product that is submitted and does not comply with all parts of this specification will be subject to rejection.
- C. Instrumentation Transient Suppressors
 - 1. Transient suppressors are intended for use on all instrument control loops for power and signal protection on transmitters/receivers, etc., and shall be furnished and installed as specified in Division 40.
- D. Type 1 SPD (Secondary Power Arrestors) (480, 240, or 240/120 Volts)
 - 1. Type 1 Surge Protective Devices shall be furnished and installed on all control equipment supplied as outlined on the Contract Drawings.
- E. Type 2 SPD (Surge Protective Device) (480, 240, or 240/120 Volts)
 - 1. Type 2 Surge Protective Devices shall be furnished and installed in all Power Distribution Panels and on all equipment supplied having solid state components as the central control/monitoring device. These shall include, but not be limited to, computer systems, level control systems, and/or variable speed equipment. They shall be shown on the Drawings where required.
- F. Service entrance SPD's shall be listed to be used as part of a UL master labeled lightning protection system.

1.2 SUBMITTALS

- A. Provide UL1449 Fourth Edition listing documentation including Voltage Protection Ratings for all modes of protection, Short Circuit Current Rating (SCCR), Maximum Continuous Operating Voltage Rating (MCOV), and Nominal Discharge Current (I-n) Rating.
- B. Indicate the type of internal or external fusing that is incorporated in the SPD system and what impact the fusing has on the performance of the device with respect to surge capacity and clamping levels.

- C. Provide independent third party testing documentation demonstrating that the SPD is capable of surviving the specified maximum $8 \times 20^{\mu s}$ surge current pulse without suffering performance degradation or more than 10 percent.
- D. Submittals shall include shop drawings including manufacturer installation instruction manual and line drawings detailing dimensions and weight of enclosure, internal wiring diagram illustrating all modes of protection in each type of SPD required, wiring diagram showing all field connections and manufacturer's recommended wire and breaker sizes.

1.3 STANDARDS

- A. Underwriters laboratories 1449 - (UL 1449 4th edition or current safety standard for surge protection devices)
 - 1. Underwriters laboratories 1283 - (UL 1283 listed as an electromagnetic interference filter that provides noise attenuation)
 - 2. Underwriters laboratories 67 - (UL 67 internal integration of SPD in panelboard)
- B. National electrical code latest edition - (NEC article 285 SPD installation practice/NEC article 250 grounding)
 - 1. NFPA-780 and CSA - (National Fire Protection Association)
 - 2. ISO 9001:2000 - quality standard / military standards (mil-std 220a)
- C. IEEE (Institute of Electrical and Electronic Engineering Inc.) C62.41.1 and C62.41.2 – 2002 rev. - (system shall be designed to meet C62.41)
 - 1. IEEE C62.41.2-2002 section 7.2 long duration $10 \times 1,000 \mu\text{sec}$ test to be compliant if the device exhibits less than 10 percent deviation from initial readings. Units must be tested to withstand and pass the $10 \times 1,000 \mu\text{sec}$ test
 - 2. IEEE C62.45 – 2002 rev. - (system shall be tested to meet the C62.45)
 - 3. Category A & B - ($0.5 \mu\text{s} \times 100 \text{ kHz}$ ring wave)
 - 4. Category B3 bi-wave - ($8 \times 20 \mu\text{s}$ at 3,000 amperes and $1.2 \times 50 \mu\text{s}$ at 6,000 volts)
 - 5. Category C3 bi-wave - ($8 \times 20 \mu\text{s}$ at 10,000 amperes and $1.2 \times 50 \mu\text{s}$ at 20,000 volts)
- D. CBEMA (ITIC) and IEC - (Computer Business Equipment Manufacturers Association or Information Technology Industry Council and International Electrotechnical Commission define clamping voltage tolerance guidelines for sensitive equipment)
- E. All manufacturers must comply with above listed standards and any current revisions of industry standards. All products that do not comply with current industry standards will not be accepted.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Type 1 SPD (Secondary Power Arrestors)

1. Dale, General Electric, or equal.

B. Type 2 SPD (Surge Protection Devices)

1. Advanced Protection Technologies, Atlantic Scientific Corporation, Current Technology, LEA International, or equal.

2.2 EQUIPMENT

A. Type 1 SPD (Secondary Power Arrestors)

1. The arrestor shall be hermetically sealed with pre-ionized spark gap. The unit shall be capable of repeated overvoltages without significant change in breakdown level or insulation resistance. The arrestor shall be capable of mounting in any position and shall be capable of mounting through a box knockout with standard locknuts, and shall be weatherproof.
2. Capacitance shall be less than 50 picofarads, and insulation resistance shall be at least 100 megohms. Maximum arc-over with 10 KV/micro second rise time pulse applied shall be 1,500 volts. The arrestor shall be capable of withstanding repeated application of 10 kiloampere current surges and extinguish power-follow current in 2 cycle or less. Maximum voltage between terminals shall be 2,500 volts when conducting 10 kiloampere current surges.
3. Operating temperature range shall be -40 degrees Celsius to +75 degrees Celsius.

B. Type 2 SPD (Surge Protection Devices)

1. The nominal operating voltage and configuration shall be as indicated on the contract drawings.
2. Declared Maximum Continuous Operating Voltage (MCOV) shall be greater than 115 percent of the nominal system operating voltage and in compliance with test and evaluation procedures outlined in the nominal discharge surge current test of UL1449 4th Edition.
3. SPD shall be UL labeled with 20kA Inominal (I-n) for compliance to UL 96A Lightning Protection Master Label and NFPA 780.
4. The system shall provide a noise filtering system capable of attenuating noise levels produced by electromagnetic interference and radio frequency interference. The system's filtering characteristics shall be expressed in decibels (dB) of attenuation per NEMA LS1 publication. The noise filtering system shall also be UL 1283 listed as an Electromagnetic Interference Filter.
5. SPD shall be UL labeled with 200kA Short Circuit Current Rating (SCCR). Fuse ratings shall not be considered in lieu of demonstrated withstand testing of SPD, per NEC 285.6.
6. Unit shall have not more than 10 percent deterioration or degradation of the UL1449 3rd Edition Voltage Protective Rating (VPR) due to repeated surges.
7. The unit shall be UL 1449 4th Edition Listed. The UL 1449 3rd Edition voltage protection ratings (VPR) for the unit including integral disconnect shall be equal to or below the following values:

UL 1449 4th Edition Voltage Protection Ratings (VPR)				
System Voltage	Mode of Protection			
	L-N	L-G	N-G	L-L
120/240	700	700	700	1200
120/208	700	700	700	1200
277/480	1200	1200	1000	2000

8. The maximum single-pulse surge current capacity per mode shall be verified through testing at an independent third party testing facility and shall be conducted per NEMA LS-1-1992 (R2000), paragraphs 2.2.9 and 3.9. The unit shall be tested in all modes at rated surge currents and all tested modes shall be from the same test sample. This test shall include all components of the system, including disconnects (if applicable), fusing, and monitoring as a completed assembly. Individual component testing, module testing only, or subsystem testing of the unit for compliance with this section will not be acceptable. Testing that causes damage to the device, fuse operation, or voltage clamping performance degradation by more than 10 percent is not acceptable.
9. The fusing elements must be capable of allowing the suppressor's rated single impulse current to pass through the suppressor at least one time without failure. The system shall be tested to 1,000 sequential per C62.45-2002 section B.38 referencing C62.41.1 and C62.41.2 category C3 combination wave transients. The category C3 combination wave is defined as a 1.2 x 50 microsecond wave at 20,000 volt open circuit voltage waveform and 8 x 20 microsecond wave at 10,000 ampere short circuit current waveform. In addition, the system components shall be tested repetitively 1,000 times testing based on an IEEE C62.33 (MOV test) and C62.35 (SAD test) without failure or degradation exceeding ± 10 percent.
10. Service Entrance Suppressors
 - a. Equipment shall be a multi-stage parallel protector rated for 480Y/277. See one line diagram and panelboard schedule to confirm voltages. The equipment's minimum surge current capacity shall be 200kA per mode (L-N, L-G, L-L and N-G).
 - b. The system protection modules shall contain a technology that utilizes a symmetrical array of balanced metal oxide varistors (MOV). Each MOV will be individually coordinated to pass UL 1449.
 - c. All primary transient paths shall utilize copper wire, aluminum bus bar and lugs of equivalent capacity to provide equal impedance interconnection between phases. No plug-in module or components shall be used in surge carrying paths.
 - d. Each protection module shall have a visual indicator that signifies that the protection circuitry is on line. The unit shall not be taken off line to verify integrity of system. Redundant status indicators shall be mounted on the front of the door that monitors the system protection circuitry (or be visible through the enclosure front).
 - e. The system shall be modular with field replaceable modules. Modular units shall contain a minimum of one module per phase.
 - f. Equipment shall utilize a NEMA 1 enclosure.
11. Panelboard Suppressors & Auxiliary Panel Suppressors
 - a. Device shall meet all specification requirements for service entrance suppressors except as follows:

- 1) Equipment shall be a multi-stage parallel protector rated for 480Y/277 or 208Y/120. See one line diagram and panelboard schedule to confirm voltages. The equipment's minimum surge current capacity shall be 100kA per mode (L-N, L-G, L-L and N-G).
- 2) The system protection shall contain a technology that utilizes a symmetrical array of balanced metal oxide varistors (MOV). Each MOV will be individually coordinated to pass UL 1449. The unit shall be non-modular type.
- 3) Equipment shall utilize a NEMA 1 enclosure.

12. Accessories

a. Device Monitoring

- 1) As a minimum, device monitoring shall include: Audible alarm with alarm disable switch, surge counter, and two sets of Form C contacts for remote monitoring.

b. Integral Disconnect Switch

- 1) The unit shall include an integral safety interlocked disconnect located in the unit enclosure with an externally mounted manual operator. If fuses are included with this switch, the fusing shall not effectively lower the rating of the SPD unit.

PART 3 - EXECUTION

3.1 INSTALLATION/APPLICATION/ERECTION

- A. Where the SPD unit is not specified with an integral safety/disconnect switch an appropriately sized disconnect switch or thermal magnetic breaker shall be installed before and in-line with the SPD. It shall be capable of electrically isolating the SPD from the electrical service for repair without interrupting service to the building. If a safety/disconnect switch is utilized the switch shall be rated for 600VAC. If fuses are included with this switch, the fusing shall not effectively lower the rating of the SPD unit and shall have a minimum interrupt rating of 200kAIC. Connection means utilizing breakers shall be sized at 60A/3P and 30A/3P respectively for service entrance/switchboard/switchgear and branch panelboard units unless otherwise recommended by manufacturer.
- B. The specified SPD system shall be installed with #6 AWG minimum copper conductors tapped from the electrical power distribution system. The conductors are to be as short and straight as practically possible and shall not exceed 5 electrical feet from the power conductor(s) it is protecting for service entrance/switchboard/switchgear units and 1.5 electrical feet for branch panelboard units, and shall avoid any unnecessary or sharp bends. The input conductors are to be twisted together to reduce the SPD system inductance.
- C. The SPD shall be installed following the SPD manufacturer's recommended practices and in compliance with these specifications and all applicable codes.

3.2 WARRANTY

- A. Manufacturer shall provide a full 5-year limited warranty against failure or workmanship defects when installed in compliance to the manufacturer's written installation instructions, UL listing requirements and the National Electrical Code.

END OF SECTION 264313

SECTION 266013 - MOTORS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Motors are to be furnished with driven equipment except where otherwise noted on the Contract Drawings or elsewhere in this Division of the Specifications. All motors shall conform to the following Specifications and any special requirements of the driven equipment. Special requirements of the driven equipment shall take precedence over these Specifications should a discrepancy occur. Starting torque and slip ratings shall conform to the requirements of the driven equipment. All motors 15 horsepower and larger (230 volt) or 25 horsepower and larger (480 volt) shall be started via autotransformer reduced voltage starters unless otherwise noted on the Contract Drawings.
- B. Polyphase motors shall be of the squirrel cage induction type and single phase of the capacitor start-induction run type except as otherwise noted. Conduit boxes shall be tapped for the size conduit shown on the Contract Drawings.
- C. All motors shall be manufactured and installed in accordance with applicable NEMA standards and NEC provisions, latest revisions.
- D. Motors shall be Inverter Duty rated when operated on VFD's.

1.2 DELIVERY, STORAGE, & HANDLING

- A. All electrical motors shall be protected against the accumulation of moisture, dust and debris and physical damage during the course of installation of the job.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Motors – Baldor, Gould Century, Lincoln, Magnatek, Marathon, Reliance, Siemens, U.S. Motors, or equal.

2.2 EQUIPMENT

- A. Motors 200 Horsepower and Under for Service Under 600 Volts
 - 1. Ratings and Electrical Characteristics
 - a. Time: All motors shall be rated for continuous duty.
 - b. Temperature: Based on NEMA standards for a maximum ambient temperature of 40 degrees Celsius and an altitude of 3,300 feet or less, according to service factor and insulation class employed.

- c. Voltage: All single phase motors shall be rated 115/208/230 volts and all polyphase motors 208/230/460 volts. Submersible polyphase motors to be operated at 460 volts may take exception to the dual voltage requirement. All motors shall be capable of normal operation at balanced voltages in the range of +/-10 percent from rated winding voltage.
- d. Frequency: All a-c motors shall be rated for 60 Hz. operation. All motors shall be capable of normal operation at frequencies 5 percent above or below the nominal rating of 60 Hz.
- e. Horsepower: Horsepower of the motors shall be as given in the Specification Division on the driven equipment or as shown on the Contract Drawings. Submersible motors shall be allowed to be furnished even though the horsepower rating may not be in accordance with standard NEMA assignments. In many cases, the horsepower specified is a minimum requirement and certain alternate manufacturers may require larger horsepower motors. The larger motor shall be furnished at no extra cost to the Owner.
- f. Locked Rotor Current: Locked rotor current shall be in accordance with NEMA standards.
- g. Efficiency and Power Factor: Efficiency and power factor shall be given consideration during Shop Drawing review. The ratings at full and 2 load shall be compared to similar motors manufactured by acceptable suppliers listed in these Specifications. Excessive variation shall be considered grounds for rejection.
- h. Speed: Synchronous speed of motors shall correspond to standard NEMA ratings. Actual speed shall be as given in the Specification Division on the driven equipment. Slip shall not exceed 5 percent at full load.
- i. Service Factor: The service factor shall be 1.0 unless requirements of the driven load necessitate a higher service factor.
- j. Insulation Class: Insulation shall be NEMA Class B, except as otherwise noted. Submersible motors shall be Class F, and motors to be operated at variable speed shall be Class F. Class F insulated motors shall operate at a Class B rise at nameplate horsepower loading.
- k. Design Level: Motors shall be NEMA design B, except as otherwise noted.
- l. Enclosure: Motors for process equipment 2 HP and smaller shall be totally enclosed. All motors for process equipment larger than 2 HP shall be TEFC (totally enclosed fan cooled), suitable for use indoors or outdoors, except as otherwise noted. Totally enclosed non-ventilated (or air-over) motors may be used for ventilators and other auxiliary equipment that by virtue of the load are provided with more than adequate ventilation. ODP (open dripproof) motors may be used for ventilators where the motor is outside the air stream yet still protected from the weather. Division 23 of the Specifications and the HVAC Contract Drawings will detail the type of enclosure required for ventilators. Submersible motors shall be air or oil filled and of watertight construction. Motors used in classified atmospheres shall be properly rated for that hazard. Motors for potable water wells shall be water-filled/lubricated.
- m. Frame Size: Frame designations shall be in accordance with NEMA standards.
- n. Winding Overtemperature Sensors: All motors 15 horsepower and over shall be provided with motor winding thermostats. The devices shall be hermetically sealed, snap-acting thermal switches, actuated by a thermally responsive bi-metallic disk. A minimum of 1 per phase is required; with switches wired into the control circuit of the starter to provide deenergization should overheating threaten. All submersible motors shall be equipped with motor winding thermostats.

- o. All submersible pump/motor assemblies shall be equipped to detect presence of moisture and alarm at the controller.
 - p. Inverter duty motors shall use inverter grade magnet wire, have insulated bearings, and have a motor shaft grounding brush.
2. Mechanical Characteristics
- a. Integral Horsepower Motor Construction
 - 1) Motor frames for horizontal motors shall be cast iron, heavy fabricated steel, or cast aluminum (alloy 356 or 360). A steel insert ring shall be set into the aluminum alloy endshield when cast to minimize wear of the bearing support. Aluminum alloy motors shall not be used in areas where exposed to chlorine gas.
 - 2) Motor frames for vertical motors shall be cast iron, heavy fabricated steel, or extruded aluminum (alloy 6063-T4 or 6063-T6). Endshields for vertical motors must be cast iron.
 - 3) If an aluminum frame is used, the endshields and/or all other steel hardware must be plated with zinc or cadmium and coated with grease before assembly to minimize the galvanic action between the steel and aluminum.
 - 4) Motor frames and endshields shall be of such design and proportions as to hold all motor components rigidly in proper position and provide adequate protection for the type enclosure employed. Lifting lugs of all motors shall conform to NEMA standards.
 - 5) Windings shall be random or form wound, adequately insulated and securely braced to resist failure due to electrical stresses and vibration. If the windings are aluminum, there shall be a cold welded aluminum-copper transition joint at the termination of the windings to permit the use of standard copper to copper connection techniques by the electrician and to prevent galvanic action between the copper power wires and the aluminum windings.
 - 6) The motor shaft shall be made of high grade machine steel or steel forging of size and design adequate to withstand the load stresses normally encountered in motors of that particular rating. Bearing journals shall be ground and polished.
 - 7) Rotors shall be made from high grade steel laminations adequately fastened together and to the shaft. Rotor cage windings may be cast aluminum of bar type construction with brazed end rings.
 - 8) Integral horsepower motors shall be equipped with cone, roller, or ball bearings made to AFBMA standards, Grade 1 and shall be of ample capacity for the motor ratings. The bearing housing shall be large enough to hold sufficient lubricant to minimize the need for frequent relubrication (ten years normal operation without lubrication), but facilities shall be provided for adding new lubricant and draining out old lubricant without motor disassembly. The bearing housing shall have long, tight running fits or rotating seals to protect against the entrance of foreign matter into the bearings or leakage of lubricant out of the bearing cavity.
 - 9) See the specification division relating to each piece of motor driven equipment for additional motor requirements to those listed above.
 - b. Fractional Horsepower Motor Construction

- 1) Motor and shell shall be rigid welded steel designed to maintain accurate alignment of motor components and provide adequate protection. End shields shall be reinforced, lightweight, die cast aluminum. Windings shall be of varnish insulated wire with slot insulation of polyester film and baked on bonding treatment to make the stator winding strongly resistant to heat, aging, moisture, electrical stresses, and other hazards. Motor shafts shall be made from high grade, cold rolled, shaft steel with drive shaft extensions carefully machined to standard NEMA dimensions for shaft coupled drive connection. Bearings shall be carefully selected precision ball bearings with extra quality, long life grease and large reservoir providing 10 years normal operation without relubrication, AFBMA Grade 1.
- c. Submersible Motor Construction
 - 1) See Equipment Specifications.
3. Tests, Nameplates, and Shop Drawings
 - a. Tests
 - 1) Tests shall be required on integral horsepower motors only. A factory certified test report of electrically duplicate motors previously tested shall be supplied on all motors under 200 horsepower. The test shall be certified by the factory and shall contain a statement to the effect that complete tests affirm the guaranteed characteristics published in the manufacturer's catalogs or descriptive literature.
 - 2) Tests will be in accordance with IEEE test procedures.
 - b. Nameplates
 - 1) Each motor shall have a permanently affixed nameplate of brass, stainless steel, or other metal of durability and corrosion resistance. The data contained on the nameplate shall be in accordance with NEMA standards.
 - c. Shop Drawings
 - 1) Shop Drawings shall consist of motor dimensions, nameplate data from each motor and tests as outlined above. Also included shall be efficiency and power factor at 100, 75, and 50 percent load. Operation, maintenance, and lubrication information (including bearing catalog numbers) shall be submitted with Shop Drawings for review.
- B. Efficiency Requirements (Motors 1-500 HP under 600 volts)
 1. Motors shall be energy efficient type to comply with requirements of the 2007 Energy Independence and Security Act (EISA).

PART 3 - EXECUTION

3.1 INSTALLATION/APPLICATION/ERECTION

- A. Installation of motors shall comply with motor manufacturer instructions as well as applicable NEMA recommendations and requirements of the driven equipment OEM (original equipment manufacturer).
- B. Motors shall be aligned to acceptable tolerances and shall not vibrate excessively.
- C. Motors shall not be energized until they have been accepted by the OEM start up personnel.

END OF SECTION 266013

DIVISION 40
PROCESS INTEGRATION

SECTION 409000 – INSTRUMENTATION AND CONTROL FOR PROCESS SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall furnish all materials, labor, tools, equipment, supplies and services necessary to install all process control and instrumentation equipment complete as specified herein and shown on the Drawings. The Contractor shall be responsible for the expense of changing Drawings or structures, or any other expense necessitated by reason of installing alternative equipment. The Contractor will assume the responsibility for the satisfactory operation of any and all equipment offered.
- B. The following equipment specification is included to establish the quality of equipment to be obtained. It is the intent of these Specifications to obtain industrial quality instrumentation and control equipment. Equipment furnished shall be accepted by the Engineer, prior to purchase by the Contractor. All Division 40 equipment and materials are implied to be the responsibility of the instrumentation supplier.
- C. Auxiliary and accessory devices necessary for system operation or performance, such as transducers or relays to interface with existing equipment or equipment provided under other Sections of this Specification, shall be included whether specified or not, at no extra cost.
- D. In order to ensure proper integration and compatibility of the project instrumentation and control systems, the systems must be supplied by a single provider of instrumentation and control equipment. This is not to say that all equipment being supplied shall be manufactured by a single manufacturer, but rather that a single provider of instrumentation and control equipment shall be responsible for supplying the complete system. To facilitate the Owner's future operation and maintenance, products performing the same function shall all be of the same manufacturer, type, and model number.
- E. Substitutions on functions or equipment specified will not be acceptable. In order to ensure the interchangeability of parts, the maintenance of quality, the ease of interfacing between the various subsystems, and the establishment of minimums with regard to ranges and accuracy, strict compliance with the above requirements shall be maintained. In order to ensure compatibility between all equipment, it shall be the responsibility of the system supplier hereunder to coordinate all interface requirements with mechanical and electrical system suppliers and furnish any signal isolation devices that might be required.
- F. Equipment shall be fabricated, assembled, installed, and placed in proper operating condition in full conformity with detail drawings, specifications, engineering data, instructions and recommendations of the equipment manufacturer as accepted by the Engineer.
- G. The instrument supplier for this Contract shall be responsible for making the modifications shown on the Drawings and for recalibrating all instruments (existing and new) and placing them in proper working order.

1.2 RELATED WORK

- A. The following Divisions of these Specifications contain requirements on equipment furnished by other suppliers that must interface with the instrument system, or on methods and materials to be performed/used in the installation and/or wiring of the instrumentation system.

DIVISION 01 – General Requirements

DIVISION 11 – Equipment

DIVISION 26 – Electrical

DIVISION 46 – Water and Wastewater Equipment

1.3 QUALITY ASSURANCE

- A. The system supplier shall be prequalified as specified in Section 409010.

1.4 REFERENCES

- A. The Contractor is referred to Standards and Practices for Instrumentation published by the International Society of Automation (latest edition), for terminology, symbols, methods and practices used or described herein or on the Drawings.

1.5 SUBMITTALS

- A. General – Comply with requirements of Section 013323.
 - 1. Complete detail Drawings of the instrumentation and control systems and all components shall be submitted in 3 copies in a 3-ring loose-leaf cardboard reinforced vinyl binder (or in a searchable single bookmarked pdf file if submitted electronically) to the Engineer for review. They shall include installation instructions, operation and maintenance instructions, descriptive literature, connection drawings, and parts list for each item as well as individual control schematic drawings for each item.
 - 2. The Contractor shall make any corrections or changes required by the Engineer, within the scope of the Drawings and Specifications, and return copies in 3-ring loose-leaf cardboard reinforced vinyl binders (or searchable pdf) for final review and distribution. Number of copies shall be as specified in Special conditions and as agreed at the pre-construction conference.
 - 3. Should any system submitted in the shop drawings not meet with the Engineer's acceptance as to conformity with requirements of the Drawings and Specifications, it shall be the responsibility of the successful Contractor to make whatever changes are necessary for acceptance at no extra cost to the Owner.
- B. Detailed Requirements - Instruments/Hardware
 - 1. Detailed information for each instrument or control device shall be submitted, including manufacturer's descriptive literature and a specific data sheet for each device which shall include as a minimum:
 - a. Tag number assigned by the manufacturer.

- b. Product (item) name used herein and on the Contract Drawings.
 - c. Manufacturer's complete model number.
 - d. Location of the device.
 - e. Input - output characteristics.
 - f. Range, size, and graduations.
 - g. Physical size with dimensions, enclosure NEMA classification, and mounting details.
 - h. Materials of construction of all components.
 - i. Instrument or control device sizing calculations where applicable.
 - j. Certified calibration data on all flow metering devices.
2. Submit a detailed loop diagram, for each monitoring or control loop, each on a single 8 ½ in. X 11 in. sheet. The format shall be the International Society of Automation, Standard for Instrument Loop Diagrams, ISA-S5.4.
 3. The data sheets shall be provided with an index and proper identification and cross-referencing. Partial submittals will be rejected.
 4. Submit detailed drawings concerning control panels and/or enclosures including:
 - a. Cabinet assembly and layout drawings to scale.
 - b. Fabrication and painting specifications.
 - c. Point to point wiring diagrams depicting wiring within the panel as well as connections to external devices.
 - d. Color samples for paint selection by the Engineer and/or Owner.
 5. Exceptions to the Specifications or Drawings shall be clearly defined by the system supplier. Data shall contain sufficient details so a proper evaluation may be made by the Engineer.
 6. Prior to final acceptance, the final shop drawing submittal, which is to include Installation, Operation, and Maintenance instructions, shall be updated to reflect "As Constructed" status, and shall provide at least the following as a minimum:
 - a. A comprehensive index.
 - b. A complete "As Constructed" set of accepted shop drawings.
 - c. A complete list of the equipment supplied, including serial numbers, ranges, and pertinent data.
 - d. Full specifications on each item.
 - e. System schematic drawings "As Constructed", illustrating all components, piping and electrical connections of the systems supplied under this Section.
 - f. Detailed service, maintenance, and operation instructions for each item supplied.
 - g. Special maintenance requirements particular to this system shall be clearly defined, along with special calibration and test procedures.
 - h. The operating instructions shall also incorporate a functional description of the entire system, with reference to the systems schematic drawings and instructions.
 - i. Complete parts lists with stock numbers and name, address, and telephone number of the local supplier.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Shipping Precautions:

1. After completion of shop assembly, factory test, and acceptance, all equipment, cabinets, panels, and consoles shall be packed in protective crates and enclosed in heavy duty polyethylene envelopes or secured sheeting to provide complete protection from damage, dust, and moisture. Dehumidifiers shall be placed inside the polyethylene coverings. The equipment shall then be skid-mounted for final transport. Lifting rings shall be provided for moving without removing protective covering. Boxed weights shall be shown on shipping tags together with instructions for unloading, transporting, storing, and handling at the job site.
2. Special instructions for proper field handling, storage and installation required by manufacturer for proper protection, shall be securely attached to each piece of equipment proper to packaging and shipment.

B. Identification:

1. Each component shall be tagged to identify its location, tag number and function in the system. Identification shall be prominently displayed on the outside of the package.
2. A permanent stainless steel or other non-corrosive material tag firmly attached and permanently and indelibly marked with the instrument tag number, as given in the tabulation, shall be provided on each piece of equipment supplied under this Section.

C. Storage:

1. Equipment shall not be stored out-of-doors. Equipment shall be stored in dry permanent shelters including in-line equipment, and shall be adequately protected against mechanical injury. If any apparatus has been damaged, such damage shall be repaired by the Contractor at his own cost and expense. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such tests as directed by the Engineer. This shall be at the cost and expense of the Contractor, or the apparatus shall be replaced by the Contractor at his own expense.

1.7 DEMOLITION

- A. All existing instrumentation equipment presently installed in existing structures shall be abandoned and removed as shown on the Drawings. Unless otherwise noted, all removed instruments, materials and equipment shall be turned over to the Owner. In the event removed equipment is not desired by the Owner, the Contractor shall remove equipment from the site. Only existing structures to be modified under this contract are to have the existing instruments removed.

1.8 WARRANTY (MAINTENANCE CONTRACT)

- A. A written total instrument maintenance contract shall be provided to the Owner, executed by the system supplier as a part of the work under this Section. The maintenance contract shall include all labor, parts, and emergency calls providing on-site response within 48 hours, to provide complete instrument system maintenance for a period of one year after the date of final acceptance of the system. The maintenance contract shall also include a minimum of 2 semi-annual preventive maintenance visits by a qualified serviceman of the supplier who is familiar with the type of equipment provided for this project. Each preventive maintenance visit shall include routine adjustment, calibration, cleaning, and lubrication of all system equipment and

verification of correct operations. Emergency maintenance procedures or plant visits may coincide with a scheduled preventive maintenance visit, however, they shall not replace the work intended to be performed during a preventive maintenance visit. The system supplier shall have full responsibility for the preventive and corrective maintenance including replacing of defective components, maintaining sufficient spare parts on-site, and complete calibration of all components under this section, all at no cost to the Owner. The maintenance contract shall not begin until both the instrumentation training course and the system acceptance test have been successfully completed, at which time the Owner shall be capable of performing necessary preventive maintenance, and all instruments shall be functional.

- B. During the one-year maintenance period, observation of maintenance operations by designated Owner personnel, and the instruction of said personnel in the details of the maintenance work being performed shall be provided.
- C. A complete written report shall be furnished the Engineer and Owner after each scheduled and unscheduled visit, giving problems corrected, systems needing recalibration, and recommendations to prevent recurrence, if applicable.
- D. The costs for the one-year maintenance service contract shall be included in the Contract price.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The bid shall be for furnishing instrumentation and control equipment of the brands listed in the specifications by a qualified supplier.
- B. All instrumentation supplied shall be of the manufacturer's latest design and shall produce or be activated by signals which are established standards for the water industry.
- C. All electronic instrumentation shall be of the solid-state type and shall utilize linear transmission signals of 4 to 20 mA_{dc} (milliampere direct current), however, signals between instruments within the same panel or cabinet may be 0-10 V_{dc} (volts direct current), or other manufacturer standard.
- D. Outputs of equipment that are not of the standard signals as outlined, shall have the output immediately raised and/or converted to compatible standard signals for remote transmission. No zero based signals will be allowed for remote transmission.
- E. All instruments shall be provided with mounting hardware and floor stands, wall brackets, or instrument racks as shown on the Drawings or as required.
- F. All indicators and LED readouts shall be linear, direct reading in process units, unless otherwise noted. Percentage scales and indicators are prohibited.
- G. All transmitters shall be provided with either integral indicators or conduit mounted indicators in process units, accurate to two percent, unless otherwise noted.

- H. Electronic equipment shall be of the manufacturer's latest design, utilizing printed circuitry and suitably coated to prevent contamination by dust, moisture and fungus. Solid state components shall be conservatively rated for their purpose, to assure optimum long term performance and dependability over ambient atmosphere fluctuations and 0 to 95 percent relative humidity. The field mounted equipment and system components shall be designed for installation in dusty, humid, and slightly corrosive service conditions.
- I. All equipment, cabinets and devices furnished hereunder shall be heavy-duty type, designed for continuous industrial service. The system shall contain products of a single manufacturer, in-so-far as possible, and shall consist of equipment models which are currently in production. All equipment provided shall be of modular construction and shall be capable of field expansion.
- J. All equipment shall be designed to operate on a 60 Hertz alternating current power source at a nominal 115 volts, plus or minus 10 percent, except where specifically noted. All regulators and power supplies required for compliance with the above shall be provided between power supply and interconnected instrument loop. Where equipment requires voltage regulation, constant voltage transformers shall be supplied.
- K. Materials and equipment used shall be UL listed (or other independent lab listed) wherever such listed equipment and materials are available.
- L. All equipment shall be designed and constructed so that in the event of a power interruption, the equipment specified hereunder shall resume normal operation without manual resetting when power is restored.
- M. All circuit boards in instruments mounted in damp locations or mounted outdoors shall be fungus proofed.
- N. Equipment installed in a hazardous area shall meet Class, Group and Division as shown on the Contract Drawings, to comply with the National Electrical Code. All power supply and signals coming from and going to hazardous areas shall have intrinsic safety barriers provided.

2.2 INSTRUMENTS AND ACCESSORY EQUIPMENT

- A. Refer to other Division 40 Instrumentation Specification Sections for equipment requirements for field mounted primary devices, transmitters and secondary instruments, receivers and central control equipment.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 409000

SECTION 409010 - PRE-QUALIFICATION PROCESS CONTROL AND INSTRUMENTATION SYSTEMS (PCIS)

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Process Control and Instrumentation System (PCIS) specified in Section 409000 including the instrumentation devices specified in other Sections shall be provided by a single pre-qualified Instrumentation Supplier.
- B. The Contractor shall assign to the pre-qualified Instrumentation Supplier, full responsibility for the functional operation of all new instrumentation systems. The Contractor shall have said pre-qualified Instrumentation Supplier perform all engineering and coordination necessary in order to select, to furnish, to install and connect, to calibrate, and to place into operation all sensors, instruments, alarm equipment, control boards and panels, computers, man-machine interfaces, accessories and all other equipment provided under Division 40 of these specifications. Furthermore, said pre-qualified Instrumentation Supplier must calibrate and demonstrate the operability of said systems in accordance with the Contract Documents.
- C. The foregoing shall enable the Contractor and the Owner to be assured that full responsibility for the critical and complex technical requirements of Division 40 shall reside in a single organization which is qualified and experienced in the wastewater treatment process and the application of instrumentation and automated control systems.
- D. This pre-qualification requirement is intended to ensure that the PCIS and supporting equipment offered by the general construction contract bidders conforms to the requirements of the Contract Documents, is complete and fully integrated, and that the PCIS will be furnished by a responsible pre-qualified Instrumentation Supplier which has the capability and capacity to comply with the requirements of the Contract Documents. A pre-qualified Instrumentation Supplier shall assume full responsibility to perform or coordinate all engineering to select, furnish, install, program, test, calibrate, and place into operation all instrumentation, controls, control panels, and SCADA System, including application software, for a complete and functional system.
- E. Systems Integrator
 1. The Contractor shall provide all new PLCs and associated software as indicated on the Drawings (PLC1, PLC2 and PLC6) and specified herein. The Contractor shall prepare hardware, described in other sections, ready to receive the PLC control and HMI programming. In the case of PLCs, this shall include the configuration of I/O racks and communication modules.
 2. Worked to be performed by the System Integrator shall be described below:
 - a. As it pertains to **PLC6**, provide Systems Integration Services to ensure a complete working system as specified in the Contract Documents. For this Contract, services shall include determining and documenting functional requirements (control strategy, operational procedures, reporting, etc.), assignment and mapping

of all I/O to a fixed PLC I/O address, site support service (I/O checkout supervision, communications testing, commissioning training, etc.) and PLC documentation (Operations and Maintenance Manual, electrical copies of PLC programs). Services also include post-construction services which consist of on-site support for Owner requested enhancements, system optimization, field service, follow-up training.

- b. As it pertains to **PLC1 and PLC2**, provide Systems Integration shall be limited to providing the PLCs and associated software.
 - 1) Determining and documenting function requirements (control strategy, operational procedures, reporting, etc.), site support service (I/O checkout supervision, communications testing, commissioning training, etc.) will be **performed by a separate Contract (Owner's SCADA Design and Construction 2020 project)**.
- c. Integration into the existing the SCADA System Network including updating HMI software, service/workstation programing, and screen development for new and existing I/O will be **performed by a separate Contract (Owner's SCADA Design and Contraction 2020 project)**.

1.2 RELATED WORK

- A. The following Divisions of these Specifications contain requirements on equipment furnished by other suppliers that must interface with the instrument system, or on methods and materials to be performed/used in the installation and/or wiring of the instrumentation system.

Division 01 – General Requirements
Division 11 – Equipment
Division 26 – Electrical
Division 46 – Water and Wastewater Equipment

1.3 PRE-QUALIFICATION REQUIREMENTS

- A. All potential pre-qualification candidates shall apply for qualification in writing to the Engineer at least 15 days prior to the bid opening date. Each applicant for pre-qualification will be evaluated based on the organization's ability to meet the following minimum criteria:
 - 1. Provide a list of at least two instrumentation and control system projects successfully completed, of size and scope similar to that described herein, in which the applicant performed system engineering, system fabrication and installation, documentation (including schematic, wiring and panel assembly drawings), field testing, calibration and start-up, operator instruction and maintenance training. Each of the references cited must be accompanied by a written confirmation of the accuracy of the specific data submitted by a managerial member of the plants operational staff. Specifically, the two referenced projects must meet the following minimum requirements:

<u>Criteria</u>	<u>Quantity Required</u>
Number of PLCs Networked	6
Number of Analog Loops	12
Minimum Amount of Inputs/Outputs to PLC's	300
Implementation of Fiber Optic Communication Cables	Required
Implementation of Ethernet communications	Required
Minimum Number of P.C./Workstations Implemented	4
Implemented Process Control Software	Required
Implemented the Particular Software Packages Specified	Required
Minimum Dollar Value of Instrumentation/Software Portion of the Project	\$250,000.

In addition, list the following information for each project:

- a. Name of plant, Owner, contact name and telephone number. All phone numbers and contacts shall be verified by the applicant prior to submission.
 - b. Name of manufacturer(s) for the majority of instrumentation furnished.
 - c. Type of equipment furnished (i.e., transmitters, recorders, indicators, etc.).
 - d. Manufacturer and model number of networked programmable logic controllers interfaced with.
 - e. Date of completion or acceptance (must be no older than five years).
- B. Name of the individual person who will be responsible for office engineering and management of this project, and the individual who will be responsible for field testing, calibration, start-up and operator training for this project. Include references of recent projects of these individual persons. These individuals must have appropriate experience in similar responsible positions on similar instrumentation, control, PLC and computer system projects. Additionally, submit specific documentation which verifies the following:
1. The applicant's company must employ a minimum of (2) individuals who have been formally trained in the application of the following operating system:
 - a. Windows 7
 - b. Windows 8
 2. The applicant's company must employ a minimum of (2) individuals who have been formally trained in the application of one of the following graphical user interface (GUI) software packages:
 - a. Wonderware
 - b. Rockwell Automation Factorytalk View
 - c. GE Proficy HMI/SCADA – iFix
 - d. Schneider Electric Citect SCADA

- C. A preliminary system block diagram which identified each specified PLC, I/O associated with each PLC, and each PC/workstation. The preliminary system block diagram shall indicate the proposed vendors and respective model/revision numbers of all system hardware and software devices. The vendor content of this diagram shall reflect the applicant's understanding of the project requirements. If the diagram is not representative of the project requirements, the applicant shall not be approved. As a minimum, the hardware and software submittals made by the approved applicant subsequent to bid shall be based on the content of the preliminary system block diagram.
- D. Document that the applicant's company has been actively involved in the instrumentation systems business (under the same corporate name) for a minimum of two (2) years.
- E. Demonstrate financial capability. All prospective applicants shall submit a financial prospectus indicative of the corporate financial state. This prospectus shall also include:
 - 1. A current copy of a Dunn and Bradstreet report.
 - 2. A letter from a financial institution indicating a current line of credit and bonding limit.
- F. Each applicant will be reviewed for their capability to execute the scope of work required for this project. Pre-qualification does not exempt the Contractor from conforming to the requirements of the Contract Documents. The evaluation of applicants makes no finding regarding their financial capabilities or acceptability of proposed methods and equipment. All contract requirements must be complied with regardless of the data presented in the pre-qualification proposal.
- G. The following Instrumentation Suppliers have been evaluated and pre-qualified and do not require any further prequalification submittal information:
 - 1. Rawdon Myers, Inc.
 - 2. Southern Flow, Inc.
 - 3. Intellimodus
 - 4. Control Instruments, Inc. (C2i)
 - 5. Lord & Company
 - 6. CEC Controls Company
 - 7. BL Anderson

Any Instrumentation Supplier others than those listed above wishing to bid this project shall submit all required prequalification submittal information in compliance with this specification.

1.4 CERTIFICATION BY INSTRUMENTATION SUPPLIER

- A. At the time of quoting to prospective Contractors prior to bid opening, the prospective Instrumentation Supplier shall execute and submit a written certification of intent to assume full responsibility for the complete requirements of the Contract Documents for all instrument work required by Division 40 and the "I" series drawings, including work specified in other Divisions (or shown on other drawings) but required by reference from Division 40 or the "I" series drawings. A signed copy thereof shall be supplied to each prospective Contractor for inclusion by him with his Bidding Documents.

- B. The electrical contractor is still responsible for putting in place the correct wiring to implement the instrument work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 409010

SECTION 409030 - MEASUREMENT AND CONTROL COMMISSIONING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified and required to furnish and install all instrumentation equipment and coordinate all activities necessary to perform check-out and start-up of the equipment.
- B. The Contractor shall retain the services of the Supplier to supervise and/or perform check-out and start-up of all system components. As part of these services, the system Supplier shall include for those equipment items not manufactured by him the services of an authorized manufacturers' representative to check the equipment installation and place the equipment in operation. The manufacturer's representative shall be thoroughly knowledgeable about the installation, operation, and maintenance of the equipment.
- C. The Contractor shall provide all new PLCs and associated software as indicated on the Drawings (PLC1, PLC2 and PLC6) and specified herein. The Contractor shall prepare hardware, described in other sections, ready to receive the PLC control and HMI programming. In the case of PLCs, this shall include the configuration of I/O racks and communication modules.
- D. As it pertains to **PLC6**, provide Systems Integration Services to ensure a complete working system as specified in the Contract Documents. For this Contract, services shall include determining and documenting functional requirements (control strategy, operational procedures, reporting, etc.), assignment and mapping of all I/O to a fixed PLC I/O address, site support service (I/O checkout supervision, communications testing, commissioning training, etc.) and PLC documentation (Operations and Maintenance Manual, electrical copies of PLC programs). Services also include post-construction services which consist of on-site support for Owner requested enhancements, system optimization, field service, follow-up training.
- E. As it pertains to **PLC1 and PLC2**, provide Systems Integration shall be limited to providing the PLCs and associated software.
 - 1. The determining and documenting function requirements (control strategy, operational procedures, reporting, etc.), site support service (I/O checkout supervision, communications testing, commissioning training, etc.) will be **performed by a separate Contract (Owner's SCADA Design and Construction 2020 project).**
- F. Integration into the existing the SCADA System Network including updating HMI software, service/workstation programing, and screen development for new and existing I/O will be **performed by a separate Contract (Owner's SCADA Design and Contraction 2020 project).**

1.2 RELATED WORK

- A. The following Divisions of these Specifications contain requirements on equipment furnished by other suppliers that must interface with the instrument system, or on methods and materials to be performed/used in the installation and/or wiring of the instrumentation system.

DIVISION 01 – General Requirements

DIVISION 11 – Equipment

DIVISION 26 – Electrical

DIVISION 46 – Water and Wastewater Equipment

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 INSTALLATION/APPLICATION/ERECTION

- A. Instrumentation and accessory equipment shall be installed in accordance with the manufacturer's instructions. The locations of equipment, transmitters, alarms and similar devices shown on the Drawings are approximate only. Exact locations shall be as accepted by the Engineer during construction. Obtain in the field all information relevant to the placing of process control work, proceed as directed by the manufacturer and furnish all labor and materials necessary to complete the work in an acceptable manner.
- B. The instrumentation installation details on the Drawings indicate the designed installation for the instruments specified. Where specific installation details are not specified or shown on the Drawings, the manufacturer's recommended practice shall be followed.
- C. All work shall be executed in full accordance with codes. Should any work be performed contrary to said codes and/or regulations, the Contractor shall bear full responsibility for such violations and assume all costs arising there from. All equipment used in areas designated as hazardous shall be designed for the Class, Division, and Group as required on the Drawings for the locations.
- D. Unless specifically shown in the Contract Documents, direct reading or electrical transmitting instrumentation shall not be mounted on process piping. Instrumentation shall be mounted on instrument racks or stands. All instrumentation connections shall be provided with shutoff and drain valves.
- E. All piping to and from field instrumentation shall be provided with necessary unions, test tees, couplings, adaptors, and shut-off valves.
- F. Field instruments requiring power supplies shall be provided with local electrical shut-offs and fuses as required.
- G. Brackets and hangers required for mounting of equipment shall be provided. They shall be installed in a workmanlike manner and not interfere with any other equipment.

- H. The system supplier shall investigate each space in the building through which equipment must pass to reach its final location. If necessary, the system supplier shall be required to ship his material in sections sized to permit passing through restricted areas in the building. The system supplier shall also investigate, and make any field modifications to the allocated space for each cabinet, enclosure and panel to assure proper space and access (front, rear, side).
- I. The shield on each process instrumentation cable shall be continuous from source to destination and be grounded as directed by the manufacturer of the instrumentation equipment but in no case shall more than one ground point be employed for each shield.
- J. Lifting rings shall be removed from cabinets/assemblies. Hole plugs shall be provided for the holes of the same color as the cabinet.
- K. The system supplier, acting through the Contractor, shall coordinate the installation, the placing and location of system components, their connections to the process equipment panels, cabinets and devices, subject to the Engineer's acceptance. He shall be responsible to ensure that all field wiring for power and signal circuits are correctly done in accordance with best industry practice and provide for all necessary system grounding to ensure a satisfactory functioning installation. The Contractor hereunder shall schedule and coordinate his work under this Section with that of the electrical work specified under applicable Sections of Division 26.

3.2 FIELD QUALITY CONTROL

- A. After equipment and materials have been shipped to the job site, the Supplier shall furnish the services of a factory-trained service technician or engineer to assist and advise the Contractor during installation and to provide programming/calibration/adjustment at initial startup. A minimum period of 5 calendar days on the job site is required, and expenses associated with additional days necessary shall be at no cost to the Owner.
- B. Following installation, checkout, and final adjustment of all panels, instruments, meters, monitoring, and control devices, the Contractor shall schedule a performance test in the presence of the Engineer on all equipment. The Contractor shall furnish the services of the system supplier's servicemen, all special tools, calibration equipment, and labor to perform the tests.
- C. Meters shall be tested at 0 percent, 25 percent, 50 percent, 75 percent, and 100 percent of scale, if possible. All status and alarm switches as well as all monitoring and control functions shall also be checked, including logging at printers and change of state on graphics. Testing shall be done from the signal source to the final element or device including all field wiring. Results of all testing shall be submitted to the Engineer in writing.
- D. As much as possible, points shall be checked "end-to-end". For example, valve status inputs shall be checked by stroking the valve, and a pump start output shall be checked by using it to start the pump. Simulated testing shall be allowed only when no practical alternative exists. Workstation displays shall be verified for correctness at the same time. An I/O checklist shall be used to record test results and a copy provided to the Engineer upon completion. During system testing, the Contractor shall have a representative onsite continuously who is capable of troubleshooting and modifying SCADA system configuration programming.

- E. If, during running of the tests, one or more points appear to be out by more than the system accuracy statement, or fails to perform in accordance with agreed strategies, the system supplier's servicemen shall make such adjustment or alterations as are necessary to bring equipment/programming up to specification performance. Following such adjustment, the tests shall be repeated for all specified points to ensure compliance.

3.3 ADJUSTING AND CLEANING

- A. All equipment furnished under this Section of the Specifications shall be adjusted/calibrated as defined elsewhere this Section/Division.
- B. All instruments and equipment shall be left free from shipping stickers, paint splatter, dirt, grease, etc., and shall be clean and in like new condition at final acceptance. Touch-up paint shall be furnished as needed to repair blemishes and scratches in finish paint on panels and enclosures, which shall be corrected by the Contractor.

END OF SECTION 409030

SECTION 409129 - PRESSURE MEASURING SYSTEMS

PART 1 - GENERAL

1.1 THE REQUIREMENT

- A. General: The Contractor shall provide pressure measuring systems, complete and operable, in accordance with the Contract Documents.
- B. The requirements of Section 409000, Instrumentation and Control for Process Systems apply to this Section.

1.2 CONTRACTOR SUBMITTALS

- A. Shop Drawings, Owner's Manual, and Record Drawings shall be submitted in conformance with Section 409000 and Section 013323 - Contractor Submittals.

PART 2 - PRODUCTS

2.1 GENERAL

- A. General: Electrical interface and code compliance shall conform to the requirements of Section 409000.
- B. Provide pressure gauges as listed in the gauges schedule in Part 3 of this specification section.

2.2 PRESSURE GAUGES

- A. All indicating gauges in dry non-process areas are pipe mounted with male and brass threaded pipe connections. Gauges shall be 4 1/2 inch liquid filled for maximum vibration and corrosion protection. Gauges shall have phosphor bronze Bourdon tubes, white laminated phenol dials. Gauges shall have micrometer adjustment of pointers and black phenol, black cast iron, brass, or aluminum case and ring, original rotary gear design, corrosion resistant, stainless steel movement, blowout protection, and bronze socket with wrench flats. Accuracy shall be within 1/2 of 1 percent of the scale range. They shall be Ashcroft, 1279 Duragage.
- B. All indicating gauges in chemical feed areas and outside locations are pipe mounted with male and 316 stainless steel threaded pipe connections. Gauges shall be 4 1/2 inch liquid-filled for maximum vibration and corrosion protection. Gauges shall have phosphor bronze Bourdon tubes (or other material compatible with stainless steel stem), white laminate phenol dials. Gauges shall have micrometer adjustment of pointers and black phenolic hermetically sealed case and ring, original rotary gear design, corrosion resistant, stainless steel movement, blowout protection, and 316 stainless steel socket with wrench flats. Accuracy shall be within 1/2 of 1 percent of the scale range. They shall be Ashcroft, 1279 SS Duragage.

- C. Gauges shall be combination scale in both feet and PSI. Suction gauges shall be compound vacuum and pressure.
- D. All gauges shall be piped with provisions for venting pressure to allow calibration (zero) checks. Valves for gauge shutoff and zeroing shall be 1/4 turn ball valves with lever handle, corrosion-resistant. Ball valves in chemical feed rooms and in outside locations shall be 316 stainless steel.
- E. Liquid-filled diaphragm seals shall be installed on all gauges as indicated in the Gauge Schedule herein. Diaphragm seals shall be of the continuous duty type, 3 piece construction with 1/4 inch flushing connection, 1/4 inch fill connection, 316 stainless steel upper housing, lower housing and diaphragm material, 1/2 inch gauge connection and 1/2 inch lower connection. Housing bolts shall also be stainless steel. Acceptable models are Marsh 42-01, Helicoid 100H, or equal. Viton diaphragms are required on low range pressure applications (less than 15 psig). Diaphragm seals shall be “permanently” attached to gauges by installation of a lead sealed wire connecting the two. This is to prevent accidental loss of fill fluid. Fill fluid shall be factory installed glycerine. All gauges shall be precalibrated, as an assembly with the seal.

PART 3 - EXECUTION

3.1 GENERAL

- A. Pressure measuring systems shall be handled, installed, calibrated, loop-tested, pre-commissioned, and performance tested according to Section 409030. The manufacturer shall furnish the manufacturer's service, supervision, and training indicated by Section 409000.

3.2 PRESSURE GAUGE SCHEDULE (SEE SHEET M-05-602)

Quantity	Location Required	Range					Accessories
		Combination			Compound		
		Size	PSI	Feet	Vacuum (in)	psi	
7	Sodium Hypochlorite Discharge Piping	4-1/2:	0-200	0-460			A, B, C, D, E

Pressure Gauge Accessory Code:

- A – Gauge Liquid Filled
- B – Diaphragm Seal, Liquid Filled
- C – Ball Valves for Shutoff and Vent
- D – Stainless Steel Gauge
- E – Stainless Steel Ball Valves and Piping
- * - Viton Diaphragm (0-15 psi)

END OF SECTION 409129

SECTION 409443 – PROGRAMMABLE LOGIC PROCESS CONTROLLERS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall furnish all labor, materials, tools, equipment, design, assembly, testing and startup services necessary to provide a complete and operational programmable logic controller (PLC) system, fully configured to meet all of the requirements specified herein and shown on the Contract Drawings. The system includes, but is not necessarily limited to the following:
 - 1. PLC processors, I/O modules, chassis, power supplies, communications modules.
 - 2. PLC programming software,
 - 3. PLC system design, assembly, installation, testing and startup services.
 - 4. Spare PLC parts.
- B. The Process and Instrumentation Diagrams (P&IDs) and the specifications illustrate and describe the overall PLC system.
- C. The PLC software shall be provided by the Contractor. For PLC1 and PLC2, software programming shall be performed by a separate Contract (Owner's SCADA Design and Construction 2020 project). For by PLC6, software programming shall be performed by this Contract's System Integrator.
- D. In order to ensure proper integration and compatibility of the plant instrumentation and control systems, the Instrumentation Supplier shall be singularly responsible for selecting, configuring, and verifying correct operation of compatible hardware to provide a functional PLC system. The Instrumentation Supplier shall be the integrator of all hardware and shall be responsible for configuring each component.
- E. The Contractor shall be responsible for the interface to systems furnished by others. The Contractor shall engage the manufacturer/vendor and obtain all hardware and software information required to integrate the systems.
- F. The SCADA system configuration and design is based on Rockwell Automation ControlLogix PLC hardware, and Ethernet IP Communications protocol.

1.2 RELATED WORK

- A. The following Divisions of these Specifications contain requirements on equipment furnished by other suppliers that must interface with the instrument system, or on methods and materials to be performed/used in the installation and/or wiring of the instrumentation system.

Division 01 – General Requirements
Division 11 – Equipment
Division 26 – Electrical
Division 46 – Water and Wastewater Equipment

1.3 SUBMITTALS

- A. Refer to Section 013323.
- B. Product Data: For each type of PLC include dimensions, mounting arrangements, and weights. Also, include manufacturer's technical data on features, performance, electrical ratings, characteristics, and terminal connections.
- C. Complete software documentation, including annotated ladder logic diagram printout.
- D. Narrative description of the sequence of operation.
- E. Operation and Maintenance Data: Provide literature detailing routine maintenance requirements (if any) for each PLC component including:
 - 1. System specifications
 - 2. Electrical power requirements
 - 3. Application considerations
 - 4. Assembly and installation procedures
 - 5. Power-up procedures
 - 6. Programming procedures
 - 7. Explanation of internal fault diagnostics
 - 8. Shut down procedures
 - 9. Recommended spare parts list

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer shall be capable of providing training, parts, and coordination of emergency maintenance and repairs.
- B. The programmable controller and all of the corresponding components within the family of controller products shall be manufactured by a company that regularly manufactures and services this type of equipment.
- C. The manufacturer shall comply with ISO9001 standards for "Quality Systems- Model for Quality Assurance in Design/Development, Production, Installation, and Servicing".
- D. The manufacturer shall provide complete technical support for all of the products. This shall include factory or on-site training, regional application centers, local or factory technical assistance, and a 24/7/365 technical support phone service.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver PLC components in packaging designed to prevent damage from static electricity and physical damage.
- B. Store PLC equipment according to manufacturer requirements. At a minimum, store indoors in clean, dry space with uniform temperature to prevent condensation. Protect PLCs from exposure to dirt, fumes, water, corrosive substances, and physical damage. Also, protect the PLC from all forms of electrical and magnetic energy that could reasonably cause damage.

1.6 SPARE I/O

- A. Each I/O drop and I/O location shall include at least 20 percent (minimum of four) points of each type (AI, AO, DI, and DO) for future use, regardless of whether any of those point types are used in that drop or location or not. The spares shall be the same type of I/O modules supplied.
- B. Spare output points that require the use of an external relay shall be supplied with the external relay.
- C. Regardless of the spare requirement, all installed unused points on all I/O modules shall be wired to terminal blocks in the order that they occur on the I/O modules. Unwired spares shall not be acceptable.

1.7 SPARE PARTS

- A. The following PLC spare parts shall be furnished:
 - 1. Processors: Provide one spare processor unit(s) for each unique processor installed.
 - 2. Memory Cards: Provide one spare for each type of card installed.
 - 3. I/O Cards: Provide spares for each unique I/O module type installed. Provide two or 10 percent of installed quantity, whichever is greater.
 - 4. Network interface, remote I/O, and communication modules: Provide one spare communication module for each unique communication module installed.
 - 5. Specialty Modules: Provide as a minimum a spare of each type of module identified. Provide an additional spare for every ten modules of a specific type installed.
 - 6. PLC Power supplies: Provide spare power supplies for each unique power supply installed.
 - 7. Chassis: Provide spare chassis for each unique chassis installed.
 - 8. Fixed PLCs: Provide spares for each unique type of PLC installed.
 - 9. Miscellaneous components (including cables): Provide spares for each unique component installed.
 - 10. Ten percent of total quantity of each type of fuse used in the system.
 - 11. Twelve fan filters for each PLC cabinet (if ventilated).
- B. Spare parts shall be individually packaged for long term storage and identified with labels describing contents. The Contractor shall replace, at no additional cost, all spare parts consumed during the one-year warranty period.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Programmable logic controllers shall be manufactured by Rockwell Automation (Allen Bradley) ControlLogix Series.

2.2 GENERAL

- A. Provide Programmable Logic Controller equipment with the required memory and functional capacity to perform the specified sequence of operation with the scheduled input and output points.
- B. Processor Systems shall include processor, power supply, input/output modules, communication modules, redundancy modules, and remote interface modules as required to meet system requirements.
- C. Furnish products listed and classified by Underwriters Laboratories (UL), CSA, or FM approval as suitable for purpose specified and indicated.
- D. All equipment and devices furnished hereunder shall be designed for continuous industrial service. The system shall contain products of a single manufacturer, insofar as possible, and shall consist of equipment models that are currently in production.
- E. All equipment furnished shall be designed and constructed so that in the event of power interruption the systems shall go through an orderly shutdown with no loss of memory, and resume normal operation without manually resetting when power is restored.
- F. The PLCs shall communicate between the operator workstation and field-mounted transducers, switches, controllers, and process actuators. Communications protocol shall be completely transparent to process operators at the Human Machine Interface (HMI).
- G. The PLC shall be capable of stand-alone operation in the event of failure of the communication link to the HMI subsystem.
- H. Backup Processor Systems, if indicated on the drawings, shall consist of two chassis with power supplies, each containing a processor, redundancy module and communications module(s). Remote chassis shall be provided with communication modules to meet I/O and communication requirements.
- I. Remote Input/Output Units shall include input/output modules, interface modules, communication modules, and power supply to meet system input and output requirements.
- J. Agency and environmental specifications:
 - 1. Electrical supply voltage to the PLC shall be 120 Vac, plus or minus 15 percent, 48-63Hz. PLC system power supplies shall be fused for overload protection.
 - 2. Vibration: 3.5 mm Peak-to-Peak, 5-9 Hz: 1.0G, 9-1501Hz. The method of testing is to be based upon IEC 68-2-6 and JIS C 0911 standards for vibration. The system is to be operational during and after testing. Vibration rating of 2.0G maximum peak acceleration for 10 to 500Hz. in accordance with at least one of the following:
 - a. Installed rating: DIN rail mounted PLC: 10-57 Hz, amplitude 0.075 mm, acceleration 25-100 Hz, and
 - b. Panel or plate mounted PLC: 2-25 Hz, amplitude 1.6mm, acceleration 25-200 Hz.
 - c. In compliance with IEC 60068 and IEC 61131.

3. Shock: 15G, 11 msec. The method of testing is to be based upon IEC 68-2-27 and JIS C 0912 standards for shock. The system is to be operational during and after testing.
4. Temperature: All PLC hardware shall operate at an ambient temperature of 0 to +55 degrees C (+32 to +140 degrees F), with a storage ambient temperature rating of -25 to +70 degrees C (-40 to +185 degrees F).
5. Relative Humidity: The Programmable Controller hardware shall function continuously in the relative humidity range of 30 percent to 95 percent non-condensing.
6. Noise Immunity: The Programmable Controller system shall be designed and tested to operate in the high electrical noise environment of an industrial plant as governed by the following regulations: IEEE 472, IEC 801, MILSTD 461B, IEC 255-4, NEMA ICS 2-230.40, and ANSI/IEEE C-37.90A-1978.
7. Altitude:
 - a. Operation: 0-6,500 feet
 - b. Storage: 0-9,800 feet
8. Degree of protection: NEMA 1 (IP20)
9. All products shall have corrosion protection.

K. All major assemblies and sub-assemblies, circuit boards, and devices shall be identified using permanent labels or markings indicating:

1. Modules product type such as analog or digital
2. Modules catalog number
3. Modules major revision number
4. Modules minor revision number
5. Module manufacturer vendor
6. Module serial number

L. All necessary cables shall be included. All cables and connectors shall be as specified by the manufacturer. Cables shall be assembled and installed per the manufacturer recommendations.

2.3 CENTRAL PROCESSING UNIT (CPU)

- A. Type: Microprocessor-based, industrial, single-slot CPU.
- B. Installation Location: Any slot in the I/O chassis to the right of the communications cards.
- C. The CPU shall be, at a minimum, a 16-bit microprocessor that provides system timing and is responsible for scheduling I/O updates, with no user programming required to ensure discrete or analog update. It shall execute user relay ladder logic programs, communicate with intelligent I/O modules, and perform on-line diagnostics. The CPU shall consist of a single module which solves application logic, stores the application program, stores numerical values related to the application processes and logic, and interfaces to the I/O.
- D. The CPU shall sample all the discrete and analog inputs and outputs including internal coils and registers, and service special function modules every scan. The CPU shall process the I/O with user program(s) stored in memory, then control the outputs based on the results of the logic operation.

- E. Supply the CPU with a battery-backed time of day clock and calendar.
- F. The CPU family shall allow for user program transportability from one CPU model to another.
- G. Diagnostics
 - 1. The CPU shall perform on-line diagnostics that monitor the internal operation of the PLC. If a failure is detected, the CPU shall initiate system shutdown and fail-over. The following, at a minimum, shall be monitored: Memory failure, memory battery low, and general fault, communications port failure, scan time over run, I/O failure, and analog or special function I/O module failure.
 - 2. All diagnostic information shall be accessible to the host communications interfaces and to the PLC program.
 - 3. The PLC shall have indicators and on board status area to indicate the following conditions:
 - a. CPU run
 - b. CPU error or fault
 - c. I/O failure or configuration fault.
 - d. Battery good
 - e. Communications indicator
- H. Memory
 - 1. The user program and data shall be contained in non-volatile battery backed memory, of type CMOS RAM program memory.
 - a. Main Memory: 4 Mb RAM (minimum).
 - 2. Memory Backup System: provide lithium battery backup capable of retaining all memory for a minimum of three months and a Flash memory system capable of reloading program in the event of memory loss.
 - a. Backup Battery: The backup battery shall be capable of being replaced without disrupting memory integrity. Provide a visual indication of low battery voltage and a low battery alarm contact.
 - b. Flash Memory Card: Memory card storage capacity shall be minimum 2.5 Mb. Memory cards shall be installed in processors for factory testing.
 - 3. The operating system shall be contained in non-volatile firmware. The memory containing the operating system shall be field updateable via a separate update tool.
- I. Programming Environment
 - 1. Programming port: The PLC shall utilize a built-in serial or Ethernet port for programming.
 - 2. On-Line programming: Application programs may be modified or stored while the CPU is running, with minimal impact on the scan time.
 - 3. Online programming including runtime editing
 - 4. IEC 61131-3 programming languages supported: Ladder logic, function block, sequential function chart, and structure text.

5. Supply all hardware and software necessary to program the CPU in these languages.

J. Communication Ports

1. The CPU shall be expandable and supplied with additional modules to support the required communication interfaces.

K. Remote I/O Communications

1. The CPU shall be capable of communicating with up to 12 remote base locations at a combined distance of 2500 feet. The CPU shall automatically sample and update all local and remote I/O modules each scan cycle of the CPU.

2. The communication link between the CPU and any RIO chassis shall be as recommended by the PLC manufacturer. For racks located on a link of less than 2500 cable feet, the speed of the communications link shall be greater than 230K baud with RIO scan rate of less than 5 millisecond per RIO.

3. Diagnostic and equipment status information shall be available from each RIO.

4. It shall be possible to communicate with remote I/O racks or other PLCs via fiber optic cable.

5. The remote I/O system shall have available a remote input/output arrangement capable of operation at locations physically separated from the PLC CPU by up to 5,000 feet as detailed on the drawings.

6. Communication with the remote I/O arrangement shall be through cable as recommended by the PLC manufacturer and provided by the PLC system supplier under this specification section.

L. The central processing unit (CPU) shall be Rockwell Automation 1756-L72.

2.4 POWER SUPPLIES

A. The PLC shall have chassis mounted power supplies to power the chassis backplane, and provide power for the processor and applicable modules.

B. Power supplies shall have a clearly visible LED to indicate that the incoming power is acceptable and the output voltage is present.

C. Power supplies shall feature over-current and over-voltage protection and should be designed to operate in most industrial environments without the need for isolation transformers.

D. Power supplies shall be sized to accommodate the anticipated load plus 30%.

E. Provide surge protection, isolation, and outage carry-over up to 2 cycles of the AC line.

F. Provide all cabling as required.

G. Input Voltage: 120 VAC, 60 Hz.

2.5 CHASSIS

- A. Type: Chassis shall be designed to accept the PLC processor, I/O, and communications modules. The chassis shall be subpanel mounted.
- B. Cabling: Provide all required signal and power cables between the chassis and [power supplies, as required.
- C. All system and signal power to the CPU and support modules shall be distributed on the backplane. No interconnecting wiring between these modules via plug-terminated jumpers shall be acceptable.
- D. All system modules, main and expansion chassis shall be designed to provide for free air flow convection cooling. No internal fans or other means of cooling, except heat sinks, shall be permitted.
- E. All system modules including the processor shall be removable from the chassis or inserted in to the chassis while power is being supplied to the chassis without faulting the processor or damaging the modules.
- F. Modules shall be designed to plug into a chassis and to be keyed to allow installation in only one direction. The design must prohibit upside down insertion of the modules as well as safeguard against the insertion of a module into the wrong slot or chassis via an electronic method for identifying a module. Electronic keying shall perform an electronic check to insure that the physical module is consistent with what was configured.
- G. Provide module for extending the backplane to a second local rack. Provide cable used to link backplanes.
- H. The backplane (chassis) shall be 4, 7, 10, 13, 17 slot or as shown in the point list.

2.6 I/O MODULES

- A. All I/O modules and system hardware supplied shall incorporate the following design and construction features and comply with the following requirements:
 - 1. Noise immunity and filtering.
 - 2. IEEE surge-withstand rating.
 - 3. Optical isolation for all inputs and outputs to provide controller logic protection.
 - 4. All I/O modules shall be supplied with locking bars and/or screws to hold modules in place.
 - 5. LED status indicators for each individual input and output point to indicate when power is applied at the I/O terminals.
 - 6. The assembled system shall include fuse blocks as sized by the application. Circuit breakers or fuses shall be provided for any device requiring power. Each input and output module shall have individual overcurrent protection to prevent a field short from taking down the entire PLC. In addition, each separate input group on non-isolated modules shall have individual overcurrent protection. Front panel indication shall be provided for blown fuse status.

7. All modules shall be protected by surge protective devices either built-in the terminal strip or added to the panels.

B. Discrete Input and Output Modules

1. General

- a. Digital input and output modules shall provide ON/OFF detection and actuation.
- b. The I/O count and type shall be as required to implement the functions specified plus an allowance for active spares, as noted below.
- c. Modules shall be designed to be installed or removed while chassis power is applied.
- d. Modules shall have indicators to display the status of communication, module health and input / output devices.
- e. Each module shall have the following status indicators.
 - 1) The On/Off state of the field device.
 - 2) The module's communication status.

2. I/O modules shall contain a maximum of 16 points per module.

3. Non-Isolated Input Module

- a. Sixteen-point 120VAC non-isolated discrete input modules. The discrete input modules shall be Allen Bradley Model 1756-IA16.
- b. Where 24 volt dc digital input modules are indicated, utilize 1756-IB16 sinking.

4. Isolated Output Module

- a. Sixteen-point triac type discrete output modules shall have an associated interposing relay located in the same control panel. 120 VAC power for relay outputs shall be provided from the associated motor starter control circuit (when used with motor starters) or other 120 VAC source (when I/O is not associated with a particular motor starter). Allen Bradley Model 1756-OA16.

5. Contact Output Module

- a. Sixteen-point relay output modules which shall have a current capacity of 5A per point at 120VAC. The relay output modules shall be Allen Bradley 1756-OX16I.

C. Analog Input and Output Modules

1. General

- a. Analog input modules shall convert an analog signal that is connected to the module's screw terminals into a digital value. The digital value representing the magnitude of the analog signal shall be transmitted on the backplane. Analog output modules shall convert a digital value that is delivered to the module via the backplane into an analog signal on the module's screw terminals.
- b. Modules shall be designed to be installed or removed while chassis power is applied.

- c. Modules shall have indicators to display the status of communication, module health and input / output devices.
- d. Each analog module shall provide both hardware and software indication when a module fault has occurred. Each module shall have an LED fault indicator and the programming software shall display the fault information.
- e. Analog modules shall be software configurable through the I/O configuration portion of the programming software.
- f. The following status shall be capable of being examined in ladder logic
 - 1) Module Fault Word — Provides fault summary reporting.
 - 2) Channel Fault Word — Provides under-range, over-range and communications fault reporting.
 - 3) Channel Status Words — Provides individual channel under-range and over-range fault reporting for process alarm, rate alarms and calibration faults.
- g. The 24 VDC power for analog instrument loops shall be provided as a part of the system. The 24 VDC power supply shall be derived from the 120 VAC input power circuit to the PLC. The field side of the 24 VDC power sources(s) shall have individual or grouped (of logically associated circuits) fusing and be provided with a readily visible, labeled blown fuse indicator.

2. Isolated Analog Input Module

- a. Eight-point analog input modules (16-bit minimum resolution) which accept an input of 4-20 mA DC. The analog input modules shall be Allen Bradley 1756-IF8I.

3. Isolated Analog Output Current Module

- a. Eight-point analog output modules (15-bit minimum resolution) which produce an output of 4-20 mA DC. The analog output modules shall be Allen Bradley 1756-OF8IH.

2.7 COMMUNICATION INTERFACES

- A. The PLC system shall include Ethernet modules as required for system communications to operator terminals and other devices.
- B. The Ethernet modules shall be Allen Bradley 1756-EN2T.

2.8 PROGRAMMING SOFTWARE

- A. Provide a PLC configuration and application development software package complete with documentation and disks (RSLogix 5000, latest version). The PLC software package and associated licensing and/or activation shall be installed on the PLC's shown on the drawings.
- B. The software package shall allow on-line/off-line program development, annotation, monitoring, debugging, uploading, and downloading of programs to the PLCs.

- C. All required hardware (including cables, cable adapters, etc.) for connection to PLCs shall be furnished.
- D. All software licenses required to achieve the functionality described in the Specifications shall be provided.
- E. The software package shall include a software license agreement allowing the Owner the right to use the software as required for any current or future modification, documentation, or development of the PLCs furnished for this project.
- F. The software provided shall be capable of the following IEC 61131-3 functions:
 - 1. Ladder logic.
 - 2. Function block.
 - 3. Sequential function chart.
 - 4. Structure text.
- G. In addition to the above editors, an add-on instruction editor shall work with any of the above-mentioned editors to create custom reusable function blocks. This software shall allow any of the derived function blocks to be modified on-line.
- H. The software shall be Microsoft Windows-based and run on the supplied computers.
- I. The software shall include a security feature to prevent unauthorized personnel from modifying and downloading the programs.
- J. Provide an I/O simulator which allows the PLC application load program to be tested on a PC with simulated analog and digital inputs and outputs, allowing I/O testing and debugging to be performed in a safe, isolated environment without the need for running the PLC CPU and process I/O boards.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. Maintain area free of dirt and dust during and after installation of programmable controller products.
- B. Anchor PLCs within enclosures as recommended by the PLC manufacturer.
- C. Ventilation slots shall not be blocked, or obstructed by any means.
- D. Examine areas, surfaces, and substrates to receive PLCs for compliance with requirements, installation tolerances, and other conditions affecting performance.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.
- F. Install in accordance with manufacturer's instructions.
- G. Unload, unpack and transport equipment to prevent damage or loss.

- H. Replace damaged components as directed by Engineer.
- I. Comply with the other specific installation, startup, and testing requirements as specified in Division 40.

3.2 TRAINING

- A. Instruction: The Contractor shall provide training for the purpose of familiarizing the Owner's technical maintenance staff, with the use, maintenance, calibration, trouble shooting and repair of all components of the PLCS.
- B. The training shall be scheduled concurrent with the calibration, equipment testing, and process system testing phases of the project.
- C. The training shall be performed by qualified representatives of the Contractor or the Manufacturer as noted in the table below. Training shall be specifically tailored to this project and reflect the PLC system installation and configuration. The table below summarizes training hours required, which shall be provided at no additional cost to the Owner. All training shall be conducted at the job site unless another location is approved by the Engineer and the Owner.

<u>Training Classes Required</u>	<u>Maintenance and Operator's Class (Hrs.)</u>	<u>Conducted By</u>
1. PLCS System Hardware/Software General Familiarity	2	Contractor
2. PLCS Hardware		
2.a. Troubleshooting and Repair of PLCS	2	Manufacturer
3. PLCS System PLC programming, I/O, ladder logic, registers, etc.	4	Manufacturer
4. The Owner's System Integrator shall conduct separate training on the sequences and programming that are site specific.		

- D. The training classes shall be scheduled a minimum of 3 weeks in advance of when they are to be given. Proposed training material, including a resume for the proposed instructor(s) (indicating previous instructional experience) and a detailed outline of each lesson shall be submitted to the Engineer at least 30 days in advance of when the lesson is to be given. The Engineer shall review the submitted data for suitability and provide comments that shall be incorporated into the course. Final materials will be provided at least two weeks in advance of the training sessions.
- E. The Owner reserves the right to record any or all portions of training performed for future usage.
- F. Training shall be conducted for all shift workers (repeated) on their normal shift.

END OF SECTION 409443

SECTION 409513 – PROCESS CONTROL PANELS AND HARDWARE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall furnish and install all boxes, panels, control centers, and accessory items as shown on the Contract Drawings and as specified herein.

1.2 RELATED WORK

- A. The following Divisions of these Specifications contain requirements on equipment furnished by other suppliers that must interface with the instrument system, or on methods and materials to be performed/used in the installation and/or wiring of the instrumentation system.

DIVISION 01 – GENERAL REQUIREMENTS

DIVISION 11 – EQUIPMENT

DIVISION 26 – ELECTRICAL

DIVISION 46 – WATER AND WASTEWATER EQUIPMENT

1.3 SUBMITTALS

- A. Comply with the requirements of Section 013323 and Section 409000.

PART 2 - PRODUCTS

2.1 FABRICATION

A. Instrument Panels

1. Furnish and install the modifications required to the SCADA System Control Panels, CP-1 and CP-2
2. The existing Control Panels have been shown on the Drawings and reflects field observations and existing shop drawings.
3. Modifications to the panels shall be made as shown on the Drawings or as specified herein.
 - a. All panel equipment shall be mounted and wired on or within the cabinet. Wiring shall comply with the latest National Electrical Code. All wiring within the panel shall be grouped together with harnesses or ducts and secured to the structure. All wiring shall be numbered in accordance with the numbering system used on the wiring/connection diagrams. Power wiring shall be routed in separate wireways from low voltage DC signal wiring. Where crossing power and low voltage DC wiring is necessary, crossing shall be at right angles. Parallel troughs for different voltages shall be separated by a minimum of 12 inches. Power wire shall be 12

AWG type THWN stranded, insulated for not less than 600 volts, unless specified otherwise. Signal wire shall be 16 AWG, THW stranded, insulated for not less than 600 volts.

- b. Wire color shall be as follows:
 - 1) Line Power – Black
 - 2) Neutral or common – White
 - 3) AC Control – Red
 - 4) DC Control – Blue
 - 5) Equipment or Chassis Ground – Green
 - 6) Externally powered circuits - Yellow.
- c. Wiring and connection diagrams shall conform to ISA S5.4 Instrument Loop Diagrams and shall be submitted by the manufacturer as part of the shop drawings for review by the Engineer.
- d. All wiring in the panels shall terminate in a terminal blocks. Terminal blocks shall have a minimum of 25 percent spares of each type. Terminal blocks shall be arranged in vertical rows and separated into groups (Power, AC control, DC signal, alarm). Terminal blocks shall be barrier type with the appropriate voltage rating (600 volts minimum). They shall be the raised channel mounted type. Wiring trough for supporting internal wiring shall be plastic type with snap-on covers. The sidewalls shall be open top type to permit wire changing without disconnecting. Wire connectors shall be the hook fork type with non-insulated barrel for crimp type compression connection to the wire. Wire and tube markers shall be the sleeve type with heat impressed letters and numbers. Terminal strips shall be provided for the purpose of connecting all control and signal wiring. Direct interlock wiring between equipment will not be allowed. Only one side of a terminal block row shall be used for internal wiring. The field wiring side of the terminal shall not be within 6 inches of the side panel or adjacent terminal. Wiring troughs shall not be filled to more than 60 percent visible fill. Wiring trough covers shall be match marked to identify placement. If component identification is shown on covers for visibility, the ID shall also appear on the mounting sub-panel.
- e. All wiring to hand switches and devices which are live circuits independent of the panel's normal circuit breaker protection shall be clearly identified as such.
- f. Provide new storage pockets installed inside of each panel. Its size shall be sufficient to hold all of the prints required to service the equipment.
- g. All components shall be mounted in a manner that shall permit servicing adjustment, testing and removal without disconnecting, moving or removing any other component. All gages, meters, receivers, switches, pushbuttons and accessories shall be flush mounted.
- h. Components mounted on the inside of panels shall be mounted on removable plates and not directly to the enclosure. Mounting shall be rigid and stable unless shock mounting is required otherwise by the manufacturer to protect equipment from vibration. Component mounting shall be oriented in accordance with the component manufacturer's and industries' standard practices. All internal components shall be identified with suitable plastic or metal engraved tags attached with drive pins adjacent to (not on) each component identifying the component in accordance with Drawings, Specifications, and Supplier's data.
- i. Pushbuttons shall be heavy-duty, oil tight, 30.5 mm, with momentary contacts. Switches shall be supplied with the number of poles required for the application, an escutcheon plate, and contacts rated for 10 amperes at 120 volts AC.
- j. Relays shall be double pole, double throw, octal plug-in type with a transparent dust cover. The relay shall be equipped with an indicating light to indicate when its

coil is energized. The relays shall have contacts rated for 10 amperes at 120-volts AC. The mechanical life of the relay shall be 10,000,000 operations minimum (ampere rating shall be increased as necessary for load handling capacity where needed). Relays for switching low level analog signals shall have bifurcated gold overlay contacts, Allen Bradley Bulletin 700-HAX, or equal.

- k. Timing relays shall be solid-state plug-in type with a dust and moisture resistant case. The timers shall be of the multi-range/analog or digital type with selectable ranges, between 1 second and 10 hours full scale. The output contacts shall be rated at 2.5 amperes minimum at 120 volts AC. The timing relay shall have a "timing in progress" indication. The mechanical life shall be 10,000,000 operations minimum.
- l. Selector switches shall be heavy-duty 30.5 mm, oil tight. Switches shall be supplied with the number of poles required for the application, an escutcheon plate, and contacts rated for 10 amperes at 120 volts AC.
- m. General layout of instruments and controls are shown on the Drawings. Minor deviations from the layout may be allowed after review by the Engineer.
- q. The main Ethernet switches in existing CP-1 and CP-2 shall be Allen Bradley Stratix 8300.
- r. Power Supplies:
 - 1) General: Single unit power supply. Provide DC power for two-wire current loops and other field and panel devices that require auxiliary power.
 - 2) Performance Requirements:
 - a) The maximum load allowed on power supply shall be no more than 80 percent of the power supply's rated, continuous output current.
 - b) Power to each device shall be distributed in parallel to independent, fused terminal blocks with blown-fuse indication. Therefore, the failure of any device or the blowing of any fuse shall not affect the power to any other device.
 - c) Output current rating shall be de-rated according to the manufacturer's temperature ratings.
 - d) Provide all mounting rail and hardware, fusing, and terminal blocks.
 - e) Provide one (1) spare power supply for every ten (10) power supplies. Provide not less than one spare power supply.
 - f) Mounting: Standard DIN rail. Provide DIN rail and all mounting hardware.
 - g) Solid state circuitry.
 - h) Output: Regulated 24 VDC or voltage as required.
 - i) Current output: Sized according to load(s), but unit to supply a minimum of 1 amp.
 - j) Power input: 120 VAC \pm 10 percent, 60 Hz, single phase.
 - k) Power on indicator.
 - l) Adjustable output voltage.
 - m) Temperature: Operational from -10 to 60 deg C at full power rating.
 - n) Regulation: \pm 1 percent of output voltage.
 - o) Ripple: Less than 50 mV pp.
 - p) Protection: Overvoltage protection and short circuit protection.
 - q) NEC Class 2 current limited.
 - r) Screw terminal connections.
 - s) Approval: UL recognized.
 - 3) Manufacturer and Model:
 - a) Sola SDP Series.

- b) Phoenix Contact.
- c) Approved equal.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 409513

SECTION 409533 – CABLED PROCESS CONTROL NETWORKS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This section covers the furnishing of cables, connectors, equipment and testing for cabled process control network systems for the Process Control System (PCS). Cabling of the network systems shall be as indicated on the Drawings and as described below.
- B. System Integrator shall furnish all necessary cable equipment, interconnecting cables, accessories, and appurtenances for proper network operation and to meet the functional requirements indicated on the Drawings and specified herein.
- C. Network Functional Description
 - 1. The cabled process control network system shall provide Ethernet communications between the all Process Control System components.

1.2 RELATED WORK

- A. The following Divisions of these Specifications contain requirements on equipment furnished by other suppliers that must interface with the instrument system, or on methods and materials to be performed/used in the installation and/or wiring of the instrumentation system.

Division 01 – General Requirements

Division 11 – Equipment

Division 26 – Electrical

Division 46 – Water and Wastewater Equipment

1.3 SUBMITTALS

- A. Refer to Sections 013323.
- B. Product Data: For each type of component include dimensions, mounting arrangements, and weights. Also, include manufacturer's technical data on features, performance, electrical ratings, characteristics, and terminal connections.
- C. The submittals shall include the following items for the Cabled Network Design submittal:
 - 1. A complete network topology diagram, detailing all hardware, cabling and the interconnections between all connected equipment, interconnections to existing installed equipment and Owner-furnished equipment shall be included in the diagram.
 - 2. A complete listing of IP addresses to be assigned to all equipment furnished under this contract shall be provided. The assignment of IP addresses shall be coordinated with the Owner.
- D. All above documentation shall also be provided in the O&M manuals.

- E. Operation and Maintenance Data: Provide literature detailing routine maintenance requirements (if any) for each component.

1.4 QUALITY ASSURANCE

A. Standards, Codes and Regulations:

1. Construction of panels and the installation and interconnection of all equipment and devices mounted within shall comply with applicable provisions of the following standards, codes, and regulations:
 - a. National Electrical Code (NEC).
 - b. National Electrical Manufacturer's Association (NEMA) Standards.
 - c. Institute of Electrical and Electronics Engineers, Inc (IEEE).
 - d. Local and State Building Code.
 - e. Operational Safety and Health Administration (OSHA) Regulations.
 - f. American Society for Testing and Materials (ASTM).
 - g. Where any conflict arises between codes or standards, the more stringent requirement shall apply.
2. All electrical materials and equipment shall be new and shall bear the label of the Underwriters Laboratory (UL), Inc., Factory Mutual (FM) or equivalent where standards have been established and label service regularly applies.

B. Acceptable Manufacturers:

1. Furnish devices by the named manufacturers or equal equipment by other manufacturers, if so listed.
2. The named manufacturers have been specified to establish the standard of quality and performance of the equipment to be supplied.
3. Obtain all devices of a given type from the same manufacturer.

C. Factory Assembly and Testing:

1. Fully assemble the Process Control System including all networking components and cabling at the factory prior to shipment, demonstrating that all specified functions are performed.
2. Comply with the requirements of Section 409020, Factory Testing.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components in packaging designed to prevent damage from static electricity and physical damage.
- B. Store equipment according to manufacturer requirements. At a minimum, store indoors in clean, dry space with uniform temperature to prevent condensation. Protect components from exposure to dirt, fumes, water, corrosive substances, and physical damage. Also, protect the components from all forms of electrical and magnetic energy that could reasonably cause damage.

1.6 CONNECTION TO OWNER NETWORKS

- A. Network hardware and software provided shall be compatible with the Owner's existing network systems wherever a system interconnection is provided. System Integrator shall verify existing systems to ensure compatibility.
- B. All connections to the Owner's existing network shall be fully coordinated between the Owner and the System Integrator. Prior to connecting to the existing network, the System Integrator shall provide a written request to the Owner for an Owner's representative to be available when existing systems are disconnected and at the time of any new connections.
- C. The System Integrator shall coordinate all demolition, installation, and rework on the existing networks with the Owner and the Engineer. No work shall be performed without the written consent of the Owner. The System Integrator shall submit a written request to perform work on the existing network, including date, time, scope of work, length of time, and any Owner's support that may be required.

1.7 SPARE PARTS

- A. The following spare parts shall be furnished:
 - 1. 20 percent Ethernet patch cables used in the system.
 - 2. One spare Ethernet switch used in the system.

PART 2 - PRODUCTS

2.1 ETHERNET UNSHIELDED TWISTED PAIR (UTP) CABLE

- A. Ethernet cables and connectors shall be provided for a complete and working system, and/or as shown on the Drawings. Cable for Ethernet wiring shall be UTP Cat-6 cable with blue jacket.
- B. Cable shall meet the following characteristics:
 - 1. Category 6 UTP Cable.
 - a. Cat-6 cable shall meet the following requirements:
 - 1) 23AWG
 - 2) 4 pair solid strand FEP Teflon insulation
 - 3) 100 Ohm impedance
 - 4) 1250 MHz frequency range
 - 5) Min attenuation 19.9 Db
 - 6) 100 Ohm impedance
 - 7) Min NEXT 44 3 dB/100MHz
 - 8) Min PS-NEXT 42 3dB.100MHz
 - 9) Min ELFEXT 27 8dB.100MHz
 - 10) Min PS-ELFEXT 24.8dB/100MHZ
 - 11) Min return loss 20.1 dB/100 MHz
 - 12) Max delay skew 45 ns

- 13) Max propagation delay 540 ns
 - 14) UL listed
 - 15) EIA/TIA compliant
2. Plenum rated cable shall have FEP insulation jacketing and FEP insulation for conductors. Non plenum rated cable shall have PVC insulation jacketing and polyethylene insulation for conductors. Cat-6 cable shall be Belden 1872 or equal.

C. Ethernet Patch Cables

1. Pre-wired and terminated patch cables with RJ-45 connectors and lever protecting boot shall be furnished for all connections to computers, network equipment, and controller equipment except where physical conditions (i.e. length over 12 ft. or conduit size) require unterminated wire to be installed. Patch cables shall be Cat-6 and shall meet the requirements of Cat-6 cable specified in this section. Straight through cables shall be wired using the T568-B standard for both connectors. Crossover cables shall be wired using the T568-A standard for one connector and the T568-B standard for the opposite end.

2.2 FIBER OPTIC CABLE

- A. The fiber optic cable shall be a round, water-resistant, tight buffer cable suitable for both indoor and outdoor installation. The fiber optic cable shall consist of, but not be limited to the following components:

- Multimode, helically arranged, optical fibers with Aramid strength member and 900 micro meter tight buffer
 - Elastomeric subcable jacket to prevent moisture intrusion
 - A synthetic yarn strength member helically laid directly over the stranded core
 - PVC core-locked outer jacket
1. Each optical fiber shall be all glass, graded index, with a core diameter of 62.5 microns and cladding diameter of 125 microns. The optical fiber shall have an attenuation no greater than 3.0dB/km at a wavelength of 850nm supporting a bandwidth of no less than 220MHz-km. The fiberglass shall be manufactured by AT&T, or equal.
 2. The minimum bend radius of the cable under full long-term tensile load shall be no longer than 10-times the outside diameter of the cable. The outer jacket of the cable shall be surface printed with the manufacturer's identification, the cable part number and sequential numerical footmarks.
 3. The cable manufacturer shall be ISO 9001 certified, UL listed and optimized for Gigabit Ethernet applications. Gel-filled cables are not acceptable. The cable shall be manufactured by Optical Cable Corp., B Series Ultra-Fox Plus Breakout Cables (fiber part no. W3RB/1GC), or equal.

- B. Fiber optic waterproof termination shall be of ST all polymer type (including body and ferrule) as manufactured by Methode Electronics, Inc. Termination fiber must be bonded within the ST connector ferrule utilizing two part anaerobic bonding compound. Crimp type connectors and/or epoxy heat cure connectors that require ovens shall not be deemed acceptable. The fiber optic ST connector shall be the 908 Series MST Style by Methode Electronics, Inc. Upon proper termination of the fiber optic cabling, the Contractor shall measure dB losses over the cable

length using an Engineer approved fiber testing device. This device shall be capable of producing hard copy test results for submittal to the Engineer. Official fiber tests are to be witnessed by the Engineer. In addition to allowing 1dB loss per connector, losses exceeding 3dB per kilometer of fiber will not be acceptable. All fiber technicians must be trained and certified by the fiber connector manufacturer. All connections must be approved by the fiber connector manufacturer.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. Install cabling in manufactured conduit sweeps and long-radius elbows whenever possible. Fiber optic cable shall be installed in innerduct tubing.
- B. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- C. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated equipment, outlet, etc.
- D. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
- E. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii
- F. Install cabling with horizontal and vertical cable guides in in network equipment racks or cabinets with terminating hardware and interconnection equipment.
- G. Identify all system components, wiring, and cabling. All labels must be easily viewable. All cables, components and device identities must be unique.
- H. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
- I. Test UTP copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
- J. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- K. Test fiber optic cable for End-to-End Attenuation. Attenuation shall not exceed 7.5 dB.
- L. Test UTP cable, fiber optic cable, passive network components, and miscellaneous supporting equipment for operational performance. End-to-end continuity, performance, and diagnostic tests should be final tests performed in all cases.

- M. Data for each measurement shall be documented and supplied to the Owner and engineer for review.
- N. Remove and replace cabling where test results indicate that they do not comply with specified requirements.
- O. End-to-end cabling will be considered defective if it does not pass tests and inspections.

END OF SECTION 409533

SECTION 409620 - INSTRUMENT LISTS AND REPORTS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. General: The Contractor shall be responsible for furnishing, installing, and configuring all instrumentation equipment and accessories, PLC's, and HMI hardware for implementation of the control strategies, the functions detailed on the Contract Drawings, and the points listed in the I/O schedules. The requirements of Section 409000 – Instrumentation and Control for Process Systems apply to this section.
- B. All PLC programs shall be capable of functioning normally in the absence of an HMI station without any special modifications. All process logic, including monitoring, control, and alarming functions shall be programmed at the PLC level only.
1. Abbreviations used in this section:
- | | | |
|-------|---|--|
| LCS | - | Local Control Station |
| LCP | - | Local Control Panel |
| HMI | - | Human-Machine Interface |
| PID | - | Proportional + Integral + Derivative |
| PLC | - | Programmable Logic Controller |
| SCADA | - | Supervisory Control and Data Acquisition |
| VFD | - | Variable Frequency Drive |
| DCS | - | Distributed Control System |
| OSC | - | Open-Stop-Close |
| L/R | - | Local/Remote |
| GUI | - | Graphic User Interface |
| S/S | - | Start/Stop |
| MCC | - | Motor Control Center |
| A/M | - | Auto/Manual |
| LOR | - | Local-Off-Remote |
| HOR | - | Hand-Off-Remote |
| HOA | - | Hand-Off-Auto |
| VSD | - | Variable Speed Drive |
- C. This specification pertains to the PLC6 only. PLC1 and PL2 will have PLC software programming performed by a separate Contract (Owner's SCADA Design and Construction 2020 project).
- D. PLC6 control programming shall be performed by the Contractor, while the workstation HMI programming shall be performed by a separate Contract (Owner's SCADA Design and Construction 2020 project). The Contractor shall prepare the hardware, described in other sections, ready to receive the PLC control and HMI programming. In the case of the PLC, this shall include the configuration of I/O racks and communication modules as well as the assignment and mapping of all I/O to a fixed PLC I/O address.

- E. Integration into the SCADA System Network including updating HMI software, service/workstation programming, and screen development for new and existing I/O will be performed by a separate Contract (Owner's SCADA Design and Construction 2020 project).

1.2 RELATED WORK

- A. The following Divisions of these Specifications contain requirements on equipment furnished by other suppliers that must interface with the instrument system, or on methods and materials to be performed/used in the installation and/or wiring of the instrumentation system.

DIVISION 1 - GENERAL REQUIREMENTS

DIVISION 11 - EQUIPMENT

DIVISION 26 - ELECTRICAL

DIVISION 46 - WATER AND WASTEWATER EQUIPMENT

1.3 LOOP DESCRIPTIONS

- A. Miscellaneous Monitoring:

1. Refer to ISA format P & ID's in the Drawings for additional information on required monitoring.
2. Refer to point list in Instrument Drawings for PLC I/O requirements at new and existing PLC's.

- B. Loop 1000 - Basin No. 1 Clarifier Monitoring

1. The Plant HMI software shall allow operator to monitor Basin No.1 Clarifier. Provide hand-off-automatic selection for clarifier. In the hand position, the clarifier shall run continuously. In the automatic position, the clarifier shall operate based on start/stop pushbuttons in the local control station.
2. A Cut Out Torque Alarm is provided and will be prevent clarifier operation.
3. Under a separate Contract - HMI graphic indication of clarifier running status, motor fail, alarm torque and cut out torque alarm. Record running time in the plant SCADA HMI software.

- C. Loop 2000 - Basin No. 1 Sludge Valve Control/Monitoring

1. The Plant HMI software shall allow operator interface for monitoring and control of the new Basin No. 1 Sludge Valve. Full open/full close motor actuator shall be provided. Motor actuator shall be provided with local-off-remote control mode. In local position, the valve actuator shall operate manually through local open/stop/close pushbuttons. In remote position, the valve actuator shall be controlled via open/close pushbuttons in the HMI software (existing PLC5).
2. Under a separate Contract - HMI graphic indication of valve "in remote", open and closed position indication.

- D. Loop 3000 – Basin No. 1 Flocculators Control/Monitoring
1. The Plant HMI software shall allow operator interface for control and monitoring of the flocculators (typical of 6). Provide local-off-remote selection for each flocculator. In the local position, the flocculator shall operate using start/stop pushbuttons in the VFD enclosure. Once started in local, the flocculators shall run continuously. In the remote position, all flocculators shall operate using start/stop pushbuttons in the HMI software.
 2. Adjustable speed control (0-100%) shall be provided to vary the speed of each flocculator. A speed feedback signal shall be provided to verify the speed setpoint.
 3. Under a separate Contract – HMI graphic indication of running status, VFD fault, motor overtemp, “in remote” indication, and record running time.
- E. Loop 4000 – Basin No. 1 Gate Control/Monitoring
1. The Plant HMI software shall allow operator interface for monitoring and control of the new Basin No. 1 Gates (typical of 2). Full open/full close motor actuator shall be provided. Motor actuator shall be provided with local-off-remote control mode. In local position, the gate actuator shall operate manually through local open/stop/close pushbuttons. In remote position, the gate actuator shall be controlled via open/close pushbuttons in the HMI software.
 2. Under a separate Contract – HMI graphic indication of gate “in remote”, open and closed position indication.
- F. Loop 5000 - Basin No. 4 Clarifier Monitoring
1. The Plant HMI software shall allow operator to monitor Basin No.4 Clarifier. Provide hand-off-automatic selection for clarifier. In the hand position, the clarifier shall run continuously. In the automatic position, the clarifier shall operate based on start/stop pushbuttons in the local control station.
 2. A Cut Out Torque Alarm is provided and will be prevent clarifier operation.
 3. Under a separate Contract – HMI graphic indication of clarifier running status, motor fail, alarm torque and cut out torque alarm. Record running time in the plant SCADA HMI software.
- G. Loop 6000 – Basin No. 4 Sludge Valve Control/Monitoring
1. The Plant HMI software shall allow operator interface for monitoring and control of the new Basin No. 4 Sludge Valve. Full open/full close motor actuator shall be provided. Motor actuator shall be provided with local-off-remote control mode. In local position, the valve actuator shall operate manually through local open/stop/close pushbuttons. In remote position, the valve actuator shall be controlled via open/close pushbuttons in the HMI software (existing PLC5).
 2. Under a separate Contract – HMI graphic indication of valve “in remote”, open and closed position indication.
- H. Loop 7000 – Basin No. 4 Flocculators Control/Monitoring
1. The Plant HMI software shall allow operator interface for control and monitoring of the Basin No. 4 Flocculators (typical of 6). Provide local-off-remote selection for each flocculator. In the local position, the flocculator shall operate using start/stop pushbuttons in the VFD enclosure. Once started in local, the flocculators shall run

continuously. In the remote position, all flocculators shall operate using start/stop pushbuttons in the HMI software.

2. Adjustable speed control (0-100%) shall be provided to vary the speed of each flocculator. A speed feedback signal shall be provided to verify the speed setpoint.
3. Under a separate Contract – HMI graphic indication of running status, VFD fault, motor overtemp, “in remote” indication, and record running time.

I. Loop 8000 – Basin No. 4 Gate Control/Monitoring

1. The Plant HMI software shall allow operator interface for monitoring and control of the new Basin No. 4 Gates (typical of 2). Full open/full close motor actuator shall be provided. Motor actuator shall be provided with local-off-remote control mode. In local position, the gate actuator shall operate manually through local open/stop/close pushbuttons. In remote position, the gate actuator shall be controlled via open/close pushbuttons in the HMI software.
2. Under a separate Contract – HMI graphic indication of gate “in remote”, open and closed position indication.

J. Loop 9000 – Rapid Mix No. 2 Control/Monitoring

1. The Plant HMI software shall allow operator to monitor Basin No.4 Clarifier. Provide local-off-remote selection for rapid mix. In the local position, the clarifier shall operate manually through local start/stop station. In the remote position, the rapid mix shall operate using start/stop pushbuttons in the HMI software.
2. Under a separate Contract – HMI graphic indication of rapid mix running status, motor fail, and “in remote” indication. Record running time in the plant SCADA HMI software.

1.4 GENERAL FUNCTIONALITY

- A. Equipment READY Logic: “Ready” shall be defined in the PLC program (if not already defined by field relay logic) as follows:
1. Field equipment is currently in Remote and/or Auto mode.
 2. There are no fail conditions pending.
 3. The equipment is not currently in Run mode.
 - a. Ready shall be interpreted as “being available for remote (PLC and/or HMI) operation”.
- B. Control Strategy Refinement: It shall be understood that some refinement and/or minor modification of the control strategies shall be necessary over the course of the project at no additional cost. Forums for informal discussions and clarifications have been provided in these documents.
- C. Failure of the PLC shall result in safe shutdown of the equipment.
- D. Analog values shall be scaled in engineering units and checked to see if process signal from the field devices is within acceptable range (4-20 mA \pm 0.5 mA). Signals outside of this range shall be alarmed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 409620

SECTION 409700 – PROCESS CONTROL AUXILIARY DEVICES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall furnish and install all accessory items as shown on the Contract Drawings and as specified herein.

1.2 RELATED WORK

- A. The following Divisions of these Specifications contain requirements on equipment furnished by other suppliers that must interface with the instrument system, or on methods and materials to be performed/used in the installation and/or wiring of the instrumentation system.

DIVISION 01 – General Requirements

DIVISION 11 – Equipment

DIVISION 26 – Electrical

DIVISION 46 – Water and Wastewater Equipment

PART 2 - PRODUCTS

2.1 ACCESSORY EQUIPMENT

- A. Product Descriptions

1. Transient/Lightning Suppressors:

- a. Lightning protectors shall be of 2 types - those for protecting d-c wires (current protectors) and those for protecting a-c wires.
- b. The d-c protectors shall be of the fast-acting metal oxide varistor type (MOV) designed to fit and protect all typical 4-20 mA, field mounted transmitters from damaging transients induced by lightning or heavy electrical equipment, and shall provide protection each line to ground, and line-to-line.
- c. The a-c protectors shall be the fast-acting MOV type in combination with a gas tube type secondary protector designed to provide protection against lightning and other high voltage surges for any a-c line-to-ground system.
- d. The lightning protectors shall be installed at each end of each metering loop, and on all power supplies.
- e. All PLC I/O shall be protected by TVSS devices either built-in the terminal strip or added to the panels.
- f. Lightning and surge arrestors at field instruments shall be EDCO SLAC Series, or equal, for combination ac and dc signals.
- g. Lightning and surge arrestors at field instruments shall be EDCO SS64 Series, or equal for 4-20 mAdc signals.

2. Instrument Valves (1/4" through 3/4")

- a. Shutoff valves shall be provided on each pressure line to an instrument and accessory item, and shall be bronze (316 stainless steel) 1/4 turn ball valves with Teflon seats as manufactured by Whitey Co., Gould, Inc., Hoke, Inc., Apollo, or equal. Valves shall have a corrosion resistant handle.
 - b. Throttling valves where required and/or shown on the Drawings shall be bronze globe valves, NUPRO “J” Series, Hoke 3700-3800 series, or equal for use with copper tubing. Valves shall have a corrosion resistant handle.
 - c. Throttling valves for stainless steel tubing shall be by Swagelok or equal.
3. Electric Gate/Valve Operators
- a. The actuator shall consist of a three-phase electric motor with automatic phase correction, worm gear reduction, absolute position encoder, electronic torque sensor, reversing motor contactor, electronic control-protection-monitoring package, manual override handwheel, valve interface bushing, LCD panel, and local control switches, all contained in an enclosure that is sealed to NEMA 4, 4X, 6, and IP68. IP68 submersible actuators shall be certified to a depth of 15 meters for 168 hours.
 - b. Quarter-Turn Actuators: Actuators for valves requiring less than 1,500 ft-lb (2,034 N-m) of starting torque shall accept three-phase and single-phase power supplies, utilizing brushless DC motors with solid state motor control. The actuator shall be tested and documented per IEC standards for open/close and modulating applications up to 1,800 starts per hour and 10 million cycles.
 - c. Three-Phase Powered Actuators: For valve starting torques greater than 1,500 ft-lb (2,034 N-m), the actuator motor shall be 3-phase, 60 hertz, 208 volts, squirrel cage induction type designed for valve actuation service. The motors shall include Class F insulation and a thermistor embedded within the windings to prevent damage due to torque overload. The actuator shall allow adjustment of motor thermal trip settings. The motor shall be easily detached from the actuator gear housing by removing the motor housing bolts and disconnecting the motor lead’s plug and socket connection. The actuator gear housing lubrication shall not be exposed during motor removal.
 - d. Valve position shall be sensed by an 18-bit, absolute position encoder. Position shall be 100% repeatable with redundant detection circuits. Open and closed positions shall be stored in permanent, non-volatile memory. The encoder shall measure valve position at all times, including both motor and handwheel operation, with or without primary power present, and without the use of a battery. Position resolution shall be better than 0.1%.
 - e. The actuator torque output shall be controlled electronically. Designs measuring torque through compression of mechanical springs shall not be allowed. Each actuator shall be torque tested to the required valve torque – and provide a minimum safety margin of 125% of the required torque. A copy of the torque test data shall be provided with each actuator at time of shipment.
 - f. A padlockable LOCAL-STOP-REMOTE selector switch and an OPEN-CLOSE selector switch shall be included for local valve actuator control. The control switches shall not penetrate the controls cover and shall be designed to electrically isolate the actuator internal components from the external environment. The OPEN-CLOSE switch may be configured for maintained or push-to-run (inching) control.

- g. Primary and secondary control fuses shall be located inside the double-sealed, climate-controlled compartment cover. Fuses inside the terminal chamber are not permitted.
- h. The multi-language, 32-character liquid crystal display (LCD) shall display valve position as a percent of open, 0-100%, and current actuator status. "STATUS OK" shall be displayed for normal operation. If an abnormal condition occurs the appropriate alarm shall be displayed. The alarm shall be continuously displayed until the actuator is returned to normal operation. Red, green, and yellow LED's shall be included to indicate open, close, stop, and moving indication. Actuators requiring hand held calibrating tools shall require one calibration tool for each installed actuator.
- i. The actuator shall be non-intrusive, with all commissioning and updates accomplished at the local display of the actuator without any special tool or device. Calibration shall be performed directly through the use of the control panel by answering the "YES" and "NO" questions displayed on the LCD. "YES" is signaled by using the OPEN switch and "NO" by using the CLOSE switch, as indicated adjacent to the switches. A configurable password shall be available to prevent unauthorized changes. The actuator shall also include the ability to turn off all wireless signals such as Bluetooth and IRDA signals during normal operation to eliminate potential cyber threat to the actuator controls. Use of a PDA or handheld configuration tools shall be available as an option, but not required.
- j. Three conduit entries, (2) -1.25" NPT (M32) and (1)-1.5" NPT (M40), shall be located in the terminal chamber. Applications requiring network controls must be provided with a fourth (4th) conduit connection to allow for separate communication wiring paths. All control covers and compartments shall be cast aluminum or iron materials. Use of phenolic or plastic control compartments on the actuator shall not be allowed due the potential for damage and water ingress.
- k. All actuators shall be supplied with a minimum of four programmable relays for reporting of position and status.
- l. Manual operation of the valve by use of the actuator handwheel shall not require more than 100 pounds of rim force to break the valve from a fully seated position. The Declutch lever must be pad lockable to allow for safety lock out during service outages.
- m. The actuators shall be manufactured by Flowserve Limitorque MX or QX, AUMA, Beck, Emerson (EIM) or approved equivalent.
- n. Options:

1) Relays for Status and Alarms

Up to eight additional latching output contacts rated 250 VAC/30 VDC, 5A shall be provided for status indication in the N/O or N/C state for the following conditions: Open, close or mid travel position, switched to local, overtorque, motor over temperature, manual operation, switched to remote, switched to stop, valve moving, close torque switch, open torque switch, hardware failure, ESD active, inhibits active, valve jammed, analog IP (input) lost, lost phase, and network controlled.

2) Auxiliary Control Station (where noted).

An auxiliary control station shall be provided in a separate enclosure for control of the actuator. The enclosure shall meet the same environmental

requirements as the actuator and shall be suitable for either surface mounting or stanchion mounting. The control station shall include two selector switches OPEN-STOP-CLOSE function, (~~LOCAL-OFF-REMOTE~~ function), and two lights for position indication (RED for OPEN and GREEN for CLOSED). The LOCAL-OFF-REMOTE selector switch shall be padlockable in each position. The enclosure shall have two conduit entries for control wiring. Provide factory cable between control station and actuator.

Schedule:

Tag No.	Service	Open-Close	Voltage	Accessories
FCV-15-3501	Basin No. 1 8" Sludge Valve	Open – Close	208Vac	1,2
FCV-15-3504	Basin No. 4 8" Sludge Valve	Open - Close	208Vac	1
FCG-3001	Basin No. 1 Slide Gate No. 1	Open – Close	208Vac	1
FCG-3002	Basin No. 1 Slide Gate No. 2	Open – Close	208Vac	1
FCG-6001	Basin No. 4 Slide Gate No. 1	Open – Close	208Vac	1
FCG-6002	Basin No. 4 Slide Gate No. 2	Open – Close	208Vac	1

Accessories:

1. Relay for status.
2. Auxiliary control station including umbilical cord for extending to actuator.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 409700

DIVISION 46

WATER AND WASTEWATER
EQUIPMENT

SECTION 462010 - PROCESS PIPING

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Provide all labor, materials, equipment and services required to furnish and install all plant process piping as shown on the Drawings and specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Piping furnished with equipment is included in the specific equipment item.

1.3 SUBMITTALS

- A. The Contractor shall comply with the requirements of Section 013323 of these specifications.
- B. A notarized certification shall be furnished for all pipe and fittings which verifies compliance with all applicable specifications.

PART 2 - PRODUCTS

2.1 DUCTILE IRON PIPE/DUCTILE IRON FITTINGS

- A. Unless otherwise noted or required, all inside ductile iron piping shall be flanged pipe with threaded flanges in accordance with AWWA C 115. All piping flanges shall have ring gaskets, 1/8-inch thick.
- B. All exposed iron pipe to be field painted shall be furnished with an external coating of rust inhibitive primer, such as Tnemec Series 1 OmniThane, Sherwin-Williams Corothane I GalvaPac, or equal. Pipe manufacturer shall be responsible for compatibility of shop applied coatings with the field paint systems and products specified in Division 09, Section 09 96 01. Do not apply asphalt or bituminous coatings on pipe to be painted.
- C. The interior of all ductile iron pipe shall be cement-mortar lined with bituminous seal coat in accordance with AWWA C 104. Thickness of the lining shall be as set forth in Section 4.8.1 of the aforementioned specification unless otherwise directed by the Engineer.
- D. Ductile iron fittings shall conform to AWWA C 110 with flanges faced and drilled 125-pound. Fittings shall have interior lining and exterior coating same as the pipe.

2.2 WALL PIPE AND SLEEVES

- A. All wall pipe shall be furnished with cast or welded collar water stops in the positions shown on the Drawings. Welding of water stop collars on pipe shall be accomplished by the wall pipe manufacturer in their shop. All centrifugally cast wall pipe shall be ductile iron meeting the requirements of AWWA C151 for the pipe barrel, conforming to the pressure rating of the pipeline in which installed, and in no case be lighter than Class 53.
- B. All statically cast wall pipe shall be ductile iron meeting the requirements of AWWA C110 for fittings. Mechanical joint end and cast-on flange end wall pipe shall conform to AWWA C110 and threaded flange wall pipe shall conform to AWWA C115. Where flanged or mechanical joint bell ends are flush with the wall, they shall be drilled and tapped for stud bolts which are to be of 300 Series stainless steel.
- C. The length of all wall pipe shall be not less than the thickness of the wall in which installed. Wall pipe shall have the same pressure rating as connecting pipe. All wall pipe shall be cement-mortar lined per AWWA C104. The outside of wall pipes shall be left uncoated and shall be field primed for painting on the portion exposed, uncoated where embedded and field coated with standard bituminous coated where buried.
- D. Contractor may have the option to install wall pipe flush face-to-face of wall in lieu of the dimensioned length wall pipe shown on the Drawings, in order to eliminate form penetrations. This option will be subject to Engineer's review at each wall pipe location and covers both flanged and mechanical-joint bell-end wall pipe. Embedded flanged and M.J. bell-end bolt holes shall be tapped for stud bolts; tapped bolt holes in embedded flanges shall be plugged for protection during concrete pouring.
- E. All pipe wall sleeves shall be plain end galvanized steel pipe of diameter noted on Drawings and length to fit flush face-to-face of wall.

2.3 INTERLOCKING LINK PIPE SEALS

- A. In all locations indicated on the Drawings, interlocking link pipe seals shall be used in lieu of lead packing a pipe wall sleeve. Seals shall be modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall sleeve. Links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and nut. After the seal assembly is positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide an absolutely water-tight seal between the pipe and wall sleeve. Seals shall be "Link-Seal" as manufactured by Thunderline Corporation, Wayne, Michigan, or approved equal.
- B. The Contractor shall determine the required diameter of each individual wall opening according to the manufacturer's recommendations before ordering and installing the seal. Pipe shall be accurately centered in the sleeve and the link seals shall be sized, installed and tightened in accordance with the manufacturer's instructions.

2.4 COUPLINGS AND ADAPTERS

- A. Flexible couplings shall be of the sleeve type with a middle ring, two round-wedge shaped rubber gaskets at each end, two following rings together and compress the gasket against the pipe. Flexible couplings shall be steel with minimum wall thickness of the middle ring or sleeve installed on pipe being 5/16-inch for pipe smaller than 10 inches, 3/8-inch for pipe 10 inches or larger. The minimum length of the middle ring shall be 5-inches for pipe sizes up to 10 inches and 7 inches for pipe 10 inches to 30 inches. The pipe stop shall be removed. Gaskets shall be suitable for 250 psi pressure rating or at rated working pressure of the connecting pipe. Couplings shall be harnessed and be designed for 250 psi.
- B. Flanged adapters shall have one end suitable for bolting to a pipe flange and the other end of flexible coupling similar to that described hereinbefore. All pressure piping with couplings or adapters shall be harnessed with full threaded rods spanning across the couplings or adapters. The adapters shall be furnished with bolts of an approved corrosion resistant steel alloy, extending to the adjacent pipe flanges. Flanges on flanged adapter (unless otherwise indicated or required) shall be faced and drilled ANSI B16.1 Class 125.
- C. Flexible couplings and flanged adapters shall be as manufactured by Dresser, Rockwell, or equal, per the following, unless otherwise specified and/or noted on the Drawings:

- 1. Steel couplings for joining same size, plain-end, steel, cast iron, and PVC plastic pipe -

Dresser	Smith-Blair
Style 253 (2"-15")	411
Style 38/138 (18" & above)	

- 2. Transition couplings for joining pipe of different outside diameters-

Dresser	Smith-Blair
Style 162 (4"-12")	413 steel (2"-24")
Style 62 (2"-24")	415 steel (6"-48")
	433 cast (2"-16")
	435 cast (2"-12")

- 3. Flanged adapters for joining plain-end pipe to flanged pipe, fittings, valves and equipment.

Dresser	Smith-Blair
Style 227 cast (3"-12")	912 cast (3"-12")
Style 128 steel (3"-48" D.I. Pipe)	913 steel (3"-24" D.I. Pipe)
Style 128 steel (2"-96" steel pipe)	

2.5 FLANGED JOINTS

- A. Flange bolts and nuts shall be ASTM A 307, Grade B and shall have hexagonal heads. All bolts, nuts and studs for flanged pipe in submerged locations shall be of 300 Series stainless steel. The flanges shall be drawn together until the joint is perfectly tight, with bolts of a length such that they will not project greater than 1/4-inch from the nut nor fall short of the end of the

nut when drawn up. No washers shall be used. Gaskets shall be carefully fabricated prior to installation and must be suitable for pressure rating for the pipe for which it is used.

- B. All flanges (unless otherwise indicated or required) shall be faced and drilled ANSI B16.1 125-pound for ductile iron and ANSI B16.5 150-pound for steel.
- C. At the Contractor's option, and at no additional expense to the Owner, the following patented SBR flange gaskets or approved equal may be substituted for standard sheet packing ring gaskets in ductile iron flanged pipe:
 - 1. TORUSEAL by American Cast Iron Pipe Company
 - 2. FLANGE-TYTE by United States Pipe & Foundry Company

When using such gaskets, flange bolts shall be torqued to manufacturer's recommended torque values.

2.6 METAL PIPE SUPPORTS AND HANGERS

- A. The Contractor shall furnish and install all pipe hangers, inserts, brackets, plates, anchors, and other supports not specifically included under other items. Generally pipe supports are not shown on the Drawings, but shall be supplied as specified herein. However, any bracing or support details shown on the Drawings shall be followed.
- B. Prior to installation, the Contractor shall submit to the Engineer for review, manufacturer's data sheets on all catalogued items to be used and sketches covering all specially designed hanger and support assemblies and fabrications.
- C. Supports and hangers shall be as manufactured by Grinnell, Elcen, or Fee & Mason, or equal or fabricated by the Contractor. Field fabricated supports may be used only for special conditions where manufactured items may not be suitable. In such cases, details of proposed supports shall be submitted to the Engineer for review. All such supports shall be galvanized.
- D. Except as shown on the Drawings or as directed by the Engineer, supports and hangers shall be as follows:
 - 1. Pipes with centerlines less than 24 inches from a wall shall be supported by a typical wall support bracket. Pipes with centerlines less than 6 feet above a floor shall be supported from below. All other pipes shall be hung from above. Piping shall be supported at no greater than 10 feet 0 inches on centers.
 - 2. Pipe supported from underneath shall have adjustable pipe saddle supports on properly sized pipe stanchions. The saddle assembly shall be of cast iron. Standard pipe stanchions with hold-down "U" bolts shall be Grinnell Fig. 259, Elcen Fig. 49, Fee & Mason Fig. 2595, or equal.
 - 3. Hangers are to be suspended from concrete work. Hangers shall be supported from approved metal inserts placed in concrete before the concrete is placed. Standard concrete inserts shall be Grinnell Fig. 281 or 282, Elcen Fig. 86 or 65, Fee & Mason Fig. 186 or 2570, or equal. If special support from overhead concrete is necessary due to unusually heavy loads, support shall be as detailed on the Drawings. In no case shall standard concrete inserts be used where pipe load exceeds the manufacturer's recommended load for the insert, or where the hanger rod exceeds 7/8" diameter.

4. All pipe hangers, inserts, clamps, supports and other like items shall be submitted for review by the Engineer prior to installation.
5. All inside horizontal flanged piping shall be supported with approved split ring type adjustable hangers of malleable iron with suitable hanger rods unless shown otherwise on the Drawings. Special supports shall be constructed in accordance with details shown on the Drawings. Wall supports and/or hangers shall be placed not over 10 feet apart. All piping shall be rigidly supported to prevent loosening under vibration.
6. Pipe, valve operating stems, fixtures and conduits shall be bracketed or suspended from walls, ceilings, and beams at or near valves and fittings and where needed for firm support, by standard brackets, rods, turnbuckles, and rings made especially for pipe of sizes supported. Perforated strap iron and/or copper will not be acceptable.
7. Clevis hangers for "iron pipe size" O.D. pipe shall be Grinnell Figure 65, Elcen Figure 12, Fee & Mason Figure 239, or equal. Clevis hangers for Cast Iron O.D. pipe shall be Grinnell Figure 260, Elcen Figure 12C, Fee & Mason Figure 104, or equal. All clevis hangers shall be galvanized.
8. Turnbuckles shall be forged steel. Rods shall be of black steel, machine threaded of following sizes:

<u>Pipe Size</u>	<u>Rod Diameter</u>
1/2" - 2"	3/8"
2 1/2" - 3"	1/2"
4" - 5"	5/8"
6"	3/4"
8" - 12"	7/8"
14" - 16"	1"
18"	1 - 1/8"
20" - 24"	1 - 1/4"

9. Brackets shall be of standard castings of fabricated steel and shall be reviewed by the Engineer. Standard catalogued bracket shall be medium duty Grinnell Fig. 195, Elcen Fig. 57, Fee & Mason Fig. 151, or equal, galvanized, size as noted on Drawings. Provide light or heavy duty brackets if specifically noted on Drawings. "U" bolts shall be Grinnell Fig. 137, Elcen Fig. 68 or 68A, Fee & Mason Fig. 176, or equal.
10. Column type pipe supports shall consist of pipe columns of size required to carry the full pipe and standard cast iron bases and saddles as required. Saddles shall be of proper size to fit the pipe being supported.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPING

- A. Materials shall be new and of the best grade and quality; workmanship shall be first class in every respect.
- B. Each piece of iron pipe and each fitting shall be plainly marked at the foundry with class number and weight.
- C. Where indicated on the Drawings, plain-end pipe shall be joined by means of flanged adapters or flexible couplings which shall be Rockwell, Dresser, or equal.

- D. All pipe couplings shall be designed to safely withstand the operating pressure of the lines in which they are installed. All couplings shall be shop primed with an approved rust inhibitive primer.
- E. Taps and connections to piping shall be made as required to connect equipment, sample lines, etc., and where otherwise shown on the Drawings.
- F. Piping shall be installed straight and true, parallel or perpendicular to walls, with approved offsets around obstructions. Standard pipe fittings shall be used for changing direction of piping. No mitered joints or field fabricated pipe bends are permitted unless accepted by the Engineer.
- G. All piping, fittings, valves and other accessories shall be thoroughly cleaned of dirt, chips and foreign matter before joint connections are made.
- H. All plastic pipe shall be adequately supported and braced. Support spacing shall not exceed the recommendations of the Plastics Pipe Institute.
- I. Teflon tape shall be used on all plastic pipe threaded connections.
- J. Field cut male threads on plastic pipe shall be made with plastic pipe threading dies.
- K. The annular space of plain wall sleeves shall be packed tight with lead wool to within 3/4" of wall face and then patch grouted flush to wall face with non-staining nonshrink grout, Masterflow 713 by Master Builders, SonogROUT by Sonneborn-Contech, or equal.
- L. All pipe sleeves passing through walls or floors of chlorine feed and storage areas shall be provided with gas tight seals.
- M. All pipe threads shall conform to ANSI B2.1.
- N. Piping shall be erected to provide for expansion and contraction.
- O. Screwed or soldered unions shall be provided in all small piping as required to permit convenient removal of equipment, valves and piping accessories from the piping system.
- P. Dielectric insulating couplings or brass adapters shall be used whenever the adjoining materials being connected are of dissimilar material such as connections between copper tubing and steel pipe.
- Q. All inside piping shall be color coded, stenciled and label tagged for identification as specified in Section 099600.

END OF SECTION 462010

SECTION 462012 – 8-INCH SLUDGE VALVES

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Provide all labor, materials, equipment and services required to furnish and install all new 8-inch sludge valves in 24-foot deep valve vaults at a drinking water treatment plant as shown on the Drawings and/or specified herein. All 8-inch sludge valves shall be plug valves.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Valve Actuators: Section 409700
- B. Valves furnished with equipment are included with equipment specifications.

1.3 SUBMITTALS

- A. Descriptive literature, catalog cuts, and dimensional prints clearly indicating all dimensions and materials of construction, shall be submitted on all items specified herein to the Engineer for review before ordering. Comply with provisions of Section 013323.
- B. At the time of submission, the Contractor shall, in writing, call Engineer's attention to any deviations that the submittals may have from the requirements of the Engineer's Contract Drawings and Specifications.

PART 2 - PRODUCTS

All 8-inch sludge valves shall be plug valves installed in 24-foot deep valve vaults at a drinking water treatment plant. Valves shall be NSF 61 certified.

2.1 PLUG VALVES

- A. All plug valves shall be eccentric plug valves unless otherwise specified.
- B. Valves shall be of the non-lubricated eccentric type with flanged ends faced and drilled per ANSI B16.1 125 lb.
- C. Valve bodies shall be flushing body type and made of ASTM A126 Class B cast iron. Valves shall be furnished with a 1/8" welded overlay seat of not less than 95% pure nickel. Seat area shall be raised, with raised surface completely covered with weld to insure that the plug face contacts only nickel. Screwed-in seats shall not be acceptable.
- D. Plugs shall be made of ductile iron and have a cylindrical seating surface eccentrically offset from the center of the plug shaft. The interference between the plug face and body seat, with the plug in the closed position, shall be externally adjustable in the field with the valve in the

line under pressure. Plug shall be resilient faced with neoprene or hycar, suitable for use with sludge from a drinking water treatment plant clarifier.

- E. Valves shall have replaceable sleeve type bearings and grit seals at the upper and lower journals.
- F. Valve shaft seals shall be of the multiple V-ring type and shall be externally adjustable and repackable without removing the bonnet or actuator from the valve under pressure. Valves utilizing O-ring seals or non-adjustable packing shall not be acceptable.
- G. Valve pressure ratings shall be 175 psi. Each valve shall be given a hydrostatic and seat test.
- H. Valves shall be electric motor actuated valves and shall comply with the specification.
- I. Electrical motor actuated valves shall also be able to be operated manually. Manual operation of the plug valves shall be via a worm gear actuator, stainless steel input shaft and handwheel operator. All gearing shall be enclosed in a semi-steel housing and be suitable for running in a lubricant with seals provided on all shafts to prevent entry of dirt and water into the actuator. The actuator shaft shall be stainless steel and the quadrant shall be supported on permanently lubricated bronze bearings. Actuators shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque and to provide seat adjustment to compensate for change in pressure differential or flow direction change. All exposed nuts, bolts and washers shall be stainless steel.
- J. Valves shall provide drip tight shutoff up to the full pressure rating. Valves shall be provided with adjustable limit stops and rotate 90 degrees from fully opened to fully closed.
- L. Valves shall have rectangular port openings for throttling service, and shall open to 100% of the corresponding pipe diameter.
- M. Plug valves shall be NSF 61 approved.
- N. Plug valves shall be rated to for 20 feet of water head upstream of valve and 0 feet of head downstream from valve with minimal leakage.
- O. Valves shall be coated inside and out with NSF-61 certified fusion bonded epoxy coating or NSF-61 certified 2-part thermal setting epoxy paint. Valve internal and external coatings shall be in accordance with AWWA C550.
- P. Plug valves shall be as manufactured by DeZurik, or approved equal.

2.2 PLUG VALVE OPERATORS

- A. All plug valves shall be operated with electric motor actuators. The Basin 1 sludge valve shall have an “umbilical” electrical cord extending from the electric motor actuator controls located at ground level to the 8-inch sludge valve located 24 feet below in a valve vault. The Basin 4 sludge valve shall have a straight stem extension from the electric motor actuator controls located at ground level to the 8-inch sludge valve located 24 feet below in a valve vault. A valve position indicator shall be located both at the valve and at the electric motor actuator controls. Electric motor actuated valves shall also be able to be operated manually. Manual

operation of the plug valves shall be via a worm gear actuator, stainless steel input shaft and handwheel operator.

- B. Valve operators shall be as shown on the plans and specified herein and in Section 409700. Valves shall be positioned to provide for the most convenient position of the actuator possible.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All valves and actuators shall be installed in accordance with the manufacturer's recommendations.

END OF SECTION 462012

SECTION 462050 - STAINLESS STEEL SLIDE GATES

PART 1 – GENERAL

1.1 SUMMARY

- A. The Contractor shall provide all labor, materials, equipment, and incidentals required to furnish and install slide gates, operating stems, and operating floor stands, complete and operational with all necessary accessories as shown on the Contract Drawings, as specified herein, or as required for complete operation. Slide gates shall be provided at the following locations: one each on the baffle walls between flocculation zones 1 and 2 in Basins 1 and 4; and one each on the baffle walls between flocculation zone 2 and the sedimentation zone in Basins 1 and 4.
- B. The Contractor shall obtain all equipment specified in this Section from one manufacturer to ensure proper coordination and functionality. The manufacturer shall have responsibility for performance and compatibility of the entire system. This does in no way relieve the Contractor for ultimate responsibility under this Contract for equipment, coordination, installation, operation and guarantee.
- C. The Contract Drawings are for purpose of guidance and to show functional features and required external connections. They do not necessarily show all components necessary to accomplish the desired results nor do they necessarily show all components required to interface with the equipment. The Contractor shall provide all parts, equipment, and devices necessary to meet the functional requirements of the system.

1.2 REFERENCES

- A. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:
 - 1. American Water Works Association (AWWA C561)
 - 2. American National Standards Institute (ANSI)
 - 3. American Society for Testing and Materials (ASTM)
 - 4. NSF 61

1.3 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. The slide gates shall be manufactured in accordance with the latest version of AWWA C561 and shall be constructed of stainless steel (ASTM 304L).
 - 2. Liberal safety factors will be used in the design of all equipment. Gate, frame, and yoke design shall be such that the flexural stress does not exceed 18,750 psi or that the minimum safety factor is 4-to-1 based on the ultimate strength of the material used.
 - 3. Slide gates shall be provided in accordance with the following Schedule:

Location	Total	Opening Size (Width x Height)	Operating Head (Seating/Unseating)	Design Head (Seating/Unseating)	Frame Type	Operator Type	Actuator Mounting
Baffle walls between floc zones 1 & 2 in Basins 1 & 4	2	24"x24"	6 inches	15 feet	Self-Contained Frame with Integral Stem Guides	Motor Operator with Manual Handwheel Backup	Pedestal Mounted
Baffle walls between floc zone 2 and sedimentation zone in Basins 1 & 4	2	24"x24"	6 inches	15 feet	Self-Contained Frame with Integral Stem Guides	Motor Operator with Manual Handwheel Backup	Pedestal Mounted

1.4 SUBMITTALS

A. For approval: Submit the following shop drawings for approval:

1. Manufacturer's information, specifications, and data showing dimensions, materials of construction, and weight of all major items of equipment.
2. Installation diagrams showing location, arrangement, and size of all fasteners required for the equipment.
3. Setting drawings, templates, and instructions for installation of frames, stems, etc.
4. Certification that all components were designed based upon the maximum seating and unseating heads described herein.

B. Upon completion of installation, submit three (3) copies of the Operation and Maintenance Manual for this equipment. A final copy of this manual shall be approved by the Engineer prior to distribution and as a minimum shall contain the following:

1. Operational and maintenance manuals shall include all approved shop drawings associated with this Section, complete instructions for installation, and parts list for all components.
2. Include a list and frequency of specific maintenance activities.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Provide slide gates as manufactured by the following:

1. Hydro Gate;
2. or approved equal.

2.2 EQUIPMENT MATERIALS

A. All slide gates shown on the plans and listed in the specifications shall conform in all respects

to the latest version of AWWA C561, with the noted changes and additions: Materials used in construction of slide gates and appurtenances will be best suited for the application and will conform to the following specifications:

1. Frame, Slide, Yoke, and Reinforcing: Stainless Steel, ASTM A240/A240M, Type 304L.
 2. Stainless Steel for stems: ASTM A-276, Type 304.
 3. Stainless Steel for fasteners: F-593/F-594, Alloy Group 1, 2 (SS316)
 4. Invert seals and compression load pad: Neoprene, ASTM D2000, 60 Durometer, with a stainless steel ASTM A276, Type 304L retainer bar.
 5. Side Seal: Ultra High Molecular Weight (UHMW) Polymer, ASTM D4040
 6. Top Wedges: Type 316 Stainless Steel ASTM A351-CF8M
- B.** Gate frame shall be a wall mounted, self-contained frame as shown in the “Gate Schedule” and on the drawings. Spigot-back frames are not acceptable. The frame shall be an integral unit of brake form and structural shapes, rigidly assembled to form the waterway openings. Holes shall be provided for mounting on anchor bolts. The head channels shall be welded or bolted to the gate frame. The channels are to be sufficiently spaced to allow removal of the gate slide. **A stainless steel plate shall be welded or bolted (using stainless steel fasteners) to the upstream face of the self-contained frame. This plate shall cover the entire area of the self-contained frame to an elevation of 779.50 so that no water can pass through the self-contained frame above the 24-inch by 24-inch slide gate opening.**
- C.** Gate slide shall conform to the safety factors stated under “General”, but shall, in no case, be less than ¼-in. thickness. Deflection under full head shall be limited to 1/720 of the span or 1/16 in., whichever is less. The stem connector clips or stem block pocket shall be welded to the slide. Gates over 24” wide shall have adjustable top wedges in order to prevent deflection in the slide resulting from over closure.
- D.** Flush Bottom: Slide gates shall incorporate a flush-bottom seal that is mechanically fastened to the bottom frame invert member. The seal shall be of the materials shown in “Materials of Construction.” Seals attached to the slide or “press fit seals” are not acceptable.
- E.** Side Seals: UHMW seals shall be provided. Seals shall be securely fastened to the frame with formed stainless steel retainers and shall be replaceable and adjustable without removing the gate from the installed position. A compression load pad shall be set behind the UHMW seal to allow for a self-adjusting seal system. The face of the UHMW guide that is in contact with the cover bar shall have a machined or extruded groove, in order to create a raised surface on each side, to allow for secondary adjustment of the seal clamp force.
- F.** The operating stem shall be of a size to safely withstand, without buckling or permanent distortion, the stresses induced by normal operating forces. In addition, the stem shall be designed to transmit in compression at least 2 times the rated output of the floor stand or bench stand with a 40-pound effort on the crank or handwheel. The threaded portion of the stem shall have cold rolled threads of the double lead Acme type with a minimum surface finish of 24 micro-inches. Cut threads shall not be acceptable. Stainless Steel couplings, threaded and keyed to the stems, will join stems of more than one section. All threaded and keyed couplings of the same size will be interchangeable. Manually operated, rising stem type gates will be provided with an adjustable stop collar on the stem to prevent over-opening of the gate.
- G.** Stem guides will be split collar bronze type, mounted integrally within the self-contained frame. They will be adjustable in two directions and will be spaced at sufficient intervals to

adequately support the stem. Stem guide spacing will not exceed an L/r ratio of 200.

- H. Gate lifts shall be motor operated with a handwheel backup as shown in the "Gate Schedule." Lifts shall operate the gate with a maximum pull of 40 lb on the handwheel. Motor operator and backup handwheel shall be located approximately 36 inches above the grating or walkway and mounted on a pedestal supplied by the slide gate manufacturer (the self-contained frame shall terminate at the bottom of grating or walkway). All lifts shall have thrust bearings, bronze lift nuts, and an aluminum stop nut to limit the downward travel of the stem and slide. All geared lifts shall have cast or ductile iron housings and pedestals. All lifts shall be rising stem type. Stem covers made of clear butyrate shall be furnished for all lifts. Lifts shall be grease lubricated and regreaseable through grease zerks. Oil bath lifts are not acceptable.
- I. Motor-Operated Lift: Refer to Specification Section 409700 - Process Control Auxiliary Devices.
- J. A clear, polycarbonate plastic stem cover and indicator shall be provided on each slide gate operator. Stem indication shall be provided to denote gate level at quarter, half, three-quarter, and full open. A cast aluminum adaptor shall be used to mount the cover to the lift. The covers shall be capped, vented, and of sufficient length to allow full travel of the gate.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. The slide gate equipment and appurtenances shall be installed in accordance with the Installation Manual furnished by the gate manufacturer. Self-contained slide gate frames shall be mounted to concrete columns using epoxy anchors (NSF 61 certified) with stainless steel bolts at intervals recommended by the slide gate manufacturer. Extreme care should be used in handling, storage, and installation of this equipment to prevent damage or distortion of the equipment and to insure proper performance.

3.2 FIELD QUALITY CONTROL

- A. Field testing shall be performed after installation of the equipment. The field testing shall demonstrate the following:
 - 1. The equipment has been properly installed in accordance with manufacturer's instructions and recommendations.
 - 2. The equipment has been installed in the specified location and orientation or as shown on the Contract Drawings.
 - 3. The equipment has been aligned.
 - 4. There are no mechanical defects in any of the parts.
 - 5. Gates shall be operated through at least two complete open/close cycles. Limit switches shall be adjusted following the manufacturer's instructions.

END OF SECTION 462050

SECTION 463300 - CHEMICAL FEED PIPING, TUBING AND ACCESSORIES

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Provide all labor, materials, equipment and services required to furnish, install and place into service all chemical feed tubing, casing pipe, valves, and accessories as described in the Drawings and Specifications.
- B. Only one peristaltic pump will be allowed to be out of service at any given time. The chemical feed piping improvements shall be made by taking only one peristaltic pump out of service at any given time.

1.2 RELATED WORK

- A. Shop Drawings: Section 013323
- B. Instrumentation: Division 33

1.3 SUBMITTALS

- A. Descriptive literature, product types and materials, catalog cuts, dimension drawings, shop drawings, and installation instructions shall be submitted to the Engineer for review before shipment. The data shown on the shop drawings shall be complete with respect to dimensions, materials of construction and the like, to enable the Engineer to review the information as required. Shop drawing shall comply with the provisions of 013323.
- B. At the time of submission, the Contractor shall, in writing, call the Engineer's attention to any deviations that the Drawings may have from the requirements of the Engineer's specifications.

1.4 CHEMICAL FEED PIPING SYSTEM

- A. All components of the Chemical Feed Piping System shall be mounted in the same configurations as shown on the schematics unless otherwise indicated in the Drawings or Specifications. The systems shall be compatible with sodium hypochlorite and be complete with all appurtenant piping, valves, fittings, and accessories.
- B. Refer to Drawings for locations of chemical feed piping, valves, and accessories.
- C. All chemical feed piping, valves, and accessories shall be compatible with and be provided to feed 12.5% sodium hypochlorite liquid disinfectant having a specific gravity of 1.08 to 1.27 (1.20 average).

1.5 GUARANTY

- A. The Contractor shall guarantee and warrant that the materials and equipment furnished and installed is free from defects of design, material and workmanship, and will operate satisfactorily. In the event the equipment fails to perform as specified, and after the Owner has given due notice, the Contractor or Supplier, at their own expense, shall promptly repair or replace the defective equipment without any additional cost to the Owner.
- B. The guaranty period shall be as set forth in specification Section 00700, "General Conditions". In the event that the manufacturer's guarantee period for any product exceeds that as stated in the General Conditions, the manufacturer's guarantee period will stay in effect and shall not be replaced by that previously stated.

PART 2 - PRODUCTS

2.1 CHEMICAL FEED DISCHARGE TUBING

- A. Chemical feed discharge tubing between the peristaltic pump discharges and the flow meters shall be clear or translucent braid reinforced flexible PVC tubing with standard wall thickness and shall be installed inside a PVC casing pipe. Two 3/8-inch diameter flexible PVC tubing chemical feed lines (one for backup) shall be installed inside one 2-inch schedule 80 PVC casing pipe where shown on the Drawings for each feed train (7 total).
- B. Chemical feed discharge tubing shall come in a continuous roll of minimum 100 foot lengths. Chemical feed discharge tubing shall extend from the peristaltic pump discharges to the flow meters.
- C. The chemical feed discharge tubing connection to the existing peristaltic pump tubing (Marprene II thermoplastic elastomer) shall be via hose barbs supplied by the Contractor. Hose barbs shall be secured to the pump tubing and the chemical feed discharge tubing via hose clamps tightened around the OD of the tubing.
- D. The chemical feed discharge tubing connections to PVC hard piping near the flow meters shall be made utilizing barbed by NPT threaded polypropylene fittings tapped into PVC caps on the ends of the PVC hard piping near the flow meters. Flexible PVC tubing shall be retained on the barbed fittings using black nylon "Kwik Clamps".
- E. Flexible PVC tubing, barbed fittings and "Kwik Clamps" shall be as manufactured by New Age Industries, Southampton, PA, or approved equal.

2.2 PVC PIPE

- A. The carrier pipe for 12.5% sodium hypochlorite and the casing pipe for the chemical feed discharge tubing from the peristaltic pump discharges to the air release valves shall be PVC plastic pressure pipe.
- B. Polyvinyl chloride (PVC) plastic pressure pipe shall be ASTM D 1785 Schedule 80 with solvent weld joints. Fittings shall be ASTM D 2467 Schedule 80 socket type. All socket type

connections shall be made with PVC solvent cement complying with ASTM D 2564. PVC solvent cement shall be furnished from the same supplier as the PVC pipe. Provide socket-threaded adapters for connection to threaded appurtenances where required. Threaded connections shall be minimized.

- C. All socket type connections shall be made with chemical-resistant solvent cement formulated for chemical applications. Product shall be Weld-On 724 by IPS Corporation, EP42 by Oatey, or approved equal.

2.3 CHEMICAL FEED VALVES

A. Ball Valves

1. Unless otherwise noted, small diameter plastic (PVC) ball valves (shut-off valves) shall be Chemtrol TU Series 150 psi socketed true union ball valves as manufactured by Chemtrol Industrial Products NIBCO, Inc., Louisville, Kentucky; Hayward Manufacturing Co., Inc., Elizabeth, New Jersey; or Engineer approved equal, and NSF listed for potable water.
2. **Ball valves shall be vented. Vented ball valves shall be installed so indicator arrow is in the direction of flow.** All gaskets shall be Viton material. Unless otherwise noted on the Drawings, fasten and run wire or chain through valve handle to enable operation from floor, where applicable.

B. Ball Check Valves

1. Small diameter plastic (PVC) check valves shall be Chemtrol BC Series 150 psi socketed true union ball check type as manufactured by Chemtrol Industrial Products NIBCO, Inc., Louisville, Kentucky; Hayward Manufacturing Co., Inc., Elizabeth, New Jersey; or Engineer approved equal, and NSF listed for potable water. All gaskets shall be viton material

2.4 FRP PIPE SUPPORTS AND HANGERS

- A. The Contractor shall furnish and install all FRP pipe hangers, inserts, brackets, plates, anchors, and other supports needed but not specifically included under other items above. Generally pipe supports are not shown on the Drawings, but shall be supplied to facilitate installation requirements. FRP pipe support systems, including anchoring hardware, shall be chemical and corrosion resistant to the chemical it is serving.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The chemical feed equipment and accessories shall be installed in strict accordance with each manufacturer's installation instructions and shop drawings.

- B. All plastic pipe or tubing shall be adequately supported and braced. Support spacing shall not exceed the recommendations of the Plastics Pipe Institute. The existing overhead pipe rack shall be reused and the new piping shall be securely fastened to the existing overhead pipe rack.
- C. Materials shall be new and of the best grade and quality; workmanship shall be first class in every respect.
- D. Piping shall be installed straight and true, parallel or perpendicular to walls, with approved offsets around obstructions. Standard pipe fittings shall be used for changing direction of piping. No mitered joints or field fabricated pipe bends are permitted unless accepted by the Engineer.
- E. All materials and equipment shall be clean and free of oil, grease and/or chemical contaminants prior to installation.

END OF SECTION 463300

SECTION 463350 – RAPID MIXER

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This specification defines the minimum mechanical requirements for equipment to be operated indoors in a drinking water treatment plant rapid mix. Each assembly shall include as a minimum, an electric motor, flexible element motor coupling and guard, speed reducer, upper and lower shaft, and impellers. Only equipment specifically designed for mixing service are acceptable. The gear drive shall be specifically designed to operate for 24 hours per day service under moderate shock loading conditions.

1.2 QUALITY ASSURANCE

- A. The mixing unit is to be a standard product of a manufacturer who is and has been an established commercial supplier of such equipment for not less than 10 years and has a minimum of 50 installations in the United States in drinking water treatment plant rapid mix applications. The mixer supplier shall also be the manufacturer of the speed reducer, shaft and impellers.

1.3 WARRANTY

- A. The equipment seller shall be solely and fully responsible for warranty and mechanical design adequacy of all the components in the scope of supply defined in this section of the specification, including purchased and sub-contracted items. This warranty will be effective 24 months from installation or 30 months from shipment. This warranty automatically doubles in duration should a factory-trained technician supervise installation and startup.

1.4 SUBMITTALS

- A. Submittals during construction shall be made in accordance with the following requirements:
 - 1. Make, model, and weight of each major item of equipment.
 - 2. Complete drawings with dimensions, and descriptive literature on the equipment and any proposed exceptions to the Specifications.
 - 3. List of recommended spare parts.
 - 4. Expected thrust, torque, and bending moment loads.
 - 5. Complete motor nameplate data, as defined by NEMA, motor manufacturer, and any motor modifications.

PART 2 – PRODUCTS AND MATERIALS

2.1 RECOMMENDED EQUIPMENT SUPPLIERS

- A. Rapid Mixer shall be furnished by one of the following manufacturers:
 - 1. LIGHTNIN, Rochester, NY,
 - 2. or approved equal

The basis of the rapid mixer design for this project is the LIGHTNIN Mixer Model 82Q7.5. For a non-listed manufacturer’s equipment to be considered as equal all aspects and criteria of this specification must be met at a minimum. Deviations from the requirements of this specification will not be allowed.

2.2 MIXER DESCRIPTION

Rapid Mixer Information	Criteria
Chamber Size	6’10” x 10’0” x 11’6” deep (water level is 9’9” deep)
Mixer Model	Lightnin Mixer Model 82Q7.5
Mixer Motor	7.5 hp, 1800 rpm, 208 V, 60 Hz, Severe Duty, TEFC Enclosure, NEMA 213T Frame
Mixer Shaft Length (from mounting base)	128 inches
Mixer Shaft Diameter (at mounting base)	2.5 inches
Mixer Impellers:	
Number:	2
Size & Configuration:	39.0 inches A510 with 22 degree Tip Chord Angle
Spacing:	36”
Attachment to Shaft:	Keyed with Adjustments
Rapid Mixer Wetted Parts	316 or 316L stainless steel

2.3 SPEED REDUCER

- A. The speed reducer shall be specifically designed for drinking water treatment service. To facilitate installation and maintenance, the gear drive shall be a right angle type comprised of helical and spiral bevel gearing. The speed reducer shall be furnished with independent bearing support construction. Parallel shaft and worm gear drives are not acceptable. As a minimum, all helical gearing shall meet the requirements of AGMA Quality No. 10 under AGMA standard 390.03. Spiral bevel gears shall be designed in accordance with the latest AGMA standards. The reducer shall be of hollow quill design with the drive shaft coupled to the gearing through the use of a torsionally resilient flexible coupling

General maintenance, specifically including motor changes, speed changes, replacement of all anti-friction bearings (except the bearing supporting the output shaft), and oil system maintenance, shall not require removal of the speed reducer housing from its foundation.

1. Speed Reducer Rating

- a. Drives shall be rated for continuous 24 hour per day operation in accordance with the latest applicable AGMA standards for enclosed gear drives. The thermal rating of the speed reducer shall exceed the design mechanical rating to eliminate the need for external coolers. External cooling devices are not acceptable. The manufacturer shall certify, in writing, that the speed reducer is designed to the applicable AGMA Standards.
- b. Gear drives for units whose impellers are classified by the Impeller Section of this specification as being liquid level sensitive shall have an AGMA mechanical rating not less than 2 times the motor nameplate horsepower.

2. Reducer Housing

- a. Each drive unit shall include a heavy-duty speed reducer in a cast-iron or fabricated steel housing. All non-machined housing, retainer and cage interior surfaces shall be coated with gear case sealer by spraying or dipping. Assembled drives shall be pressure tested.
- b. To prevent oil leakage along the drive output shaft, a drywell will be provided to exclude oil from the output portion of the gear drive. Where manometer type wells are used radial clearances shall be not less than one half inch to prevent oil pumping.
- c. The speed reducer breather shall be located above possible oil foam level. All speed reducer openings below the operating oil level shall be positively sealed with compressible gaskets. No O-ring seals will be allowed.
- d. The speed reducer shall be provided with lifting lugs. The speed reducer shall be spin-tested before shipment.

3. Reducer Output Shaft

The speed reducer output shaft shall be constructed and supported so that the shaft deflection caused by operating loads does not affect alignment of the anti-friction bearings or cause misalignment of gearing during mixer operation.

2.4 BEARINGS

- A. Bearings throughout the design shall be anti-friction type of ball, roller, or tapered roller design. Pressed-on type or sliding, journal type bearings are not acceptable. Replacement of any gear drive anti-friction bearing, except the bearing supporting the output shaft, shall not require removal of the speed reducer housing from its foundation.

1. Bearing Life

All speed reducer output shaft and independent mixer shaft support bearings shall have a minimum L-10 life of 100,000 hours as calculated by the latest AFBMA standard. Other bearings shall be of a type appropriate to the nature and size of the torsional, thrust and lateral loads encountered. In addition to the design torsional and thrust loads created by the gearing, bearing life calculations shall include the bending loads caused by the forces acting at the mixing impeller. The type and magnitude of the forces used in the calculation shall be substantiated by the equipment supplier.

2. Shaft Bearings

The output shaft bearings shall be grease-lubricated with grease inlet and relief accessible from the mounting surface. Grease fittings serving the mixer and output shaft bearings are to be plainly marked and each grease fitting shall be protected with a removable cover.

2.5 LUBRICATION

- A. The speed reducer oil shall have a splash lubrication system suitable for all weather starting and operation. Splash lubrication by means of an oil slinger or by gears running in an oil bath is preferred.
- B. Grease lubrication of some working parts is permissible, providing adequate separation is made of these parts from the oil lubricated parts.
- C. All oil-lubricated bearings shall be located above the top of the main lubricant drain and sufficiently above the speed reducer oil sump to prevent life-shortening particulate matter and sludge from entering the bearings. No oil seals will be permitted below the operating oil level for rotating elements.
- D. A dip stick shall be provided to measure oil levels for all systems.
- E. All oils, greases, and lubricants shall be food grade, suitable for use in a drinking water treatment plant, and NSF 61 approved.

2.6 OIL DRAIN

- A. A single extended oil drain shall be provided, positioned for easy access, and located to leave not more than 1/4" of residual oil within the drive housing. Following the initial run-in period, oil changes shall not be required at less than 2500-hour intervals when operated continuously at ambient conditions above freezing. Instruction manuals shall include a list of acceptable lubricants, and recommended change intervals for low temperature operation.

2.7 MIXER SHAFT

- A. The impeller shaft shall be supported on two adapter type antifriction bearings mounted independent of the speed reducer so as to isolate the gearing from bending loads caused by the varying direction of fluid reaction forces. These bearings shall carry only the impeller shaft loads and shall include a thrust bearing capable of supporting the entire weight of the vertical impeller shaft and impellers. Systems requiring the alignment of three bearings are not acceptable. A torsionally resilient coupling shall be provided between the speed reducer output shaft and the impeller shaft for the purpose of damping transient torsional fluctuations caused by interaction of the impeller and the process liquid. The output shaft shall be totally overhung; the use of submerged or steady bearings is not permitted. When turned over by hand, impeller shaft runout or deflection shall not exceed 1/4" per 10' of length.

1. Shaft to Drive Attachment

Separation of the shaft supporting the impeller from the speed reducer shall not require disassembly or other disturbance of the speed reducer internal gearing. A bolted connection to a hollow output shaft or a flanged coupling joining the reducer output and impeller shafts may be used. Flanged connection for impeller assembly is an acceptable alternate.

2. Critical Speed

When stabilizing devices are used in conjunction with mixing impellers, the rotating speed of the unit shall not exceed 80% of the first natural frequency, in air, of the shaft and impeller assembly. The rotational speed shall not exceed 40% of the natural frequency when impellers operate for prolonged periods at or near the liquid surface or when impellers without stabilizing devices are used.

2.8 IMPELLER

- A. Impellers whose power consumption, side load, and pumping characteristics have not been fully documented by the equipment manufacturer will not be acceptable. Such impeller data shall include the affects of liquid level variation on power investment, basin hydraulic stability, blade loading, and process performance.

1. Impeller Construction

The design of the impeller shall be of the axial flow type design. The impeller hub shall be of cast stainless steel material, with the blades bolted to the hub.

2. Vibration

The impeller shall be of such design, and operate at such rotational speed that dynamic balancing is not required to prevent damaging vibration.

2.9 MOTOR

- A. The driver shall be a totally enclosed, fan cooled, high efficiency, severe duty, electric induction motor with insulation meeting Class B, a weather tight junction box and a 1.15 service factor. The manufacturer's standard starting code will apply unless otherwise specified. The insulation shall be non-hygroscopic. The maximum motor speed shall be 1800 rpm. Unless otherwise specified, the electrical characteristics shall be 208-volts/3 phase/60 Hertz. A flexible coupling and coupling guard shall be provided between the electric motor driver and the gearbox-input shaft.

2.10 TESTING

- A. Prior to shipment, each drive unit shall be run with a polarizing, rust-inhibiting oil during the reducer spin test at the manufacturer's facility to verify that it is correctly manufactured and

assembled and is free of oil leaks. After installation, each unit shall be run to demonstrate its ability to operate without overheating, jamming or excessively vibrating during normal operation.

2.11 PAINTING

- A. Normally, painted surfaces not subject to continuous wetting by the process liquid shall include motors and speed reducers. Surfaces of the drive assembly to be painted shall be commercially blast-cleaned before application of the manufacturer's standard primer.
- B. Preparation shall meet Steel Structures Painting Council Surface Preparation Specification and Pictorial Vis 1 (Latest Editions), SSPC-SP6. All blast cleaning shall take place before any assembly occurs. Painting requirements elsewhere in this specification shall not require or permit abrasive blasting of final assemblies with rotating components.
- C. Finish-coat painted surfaces shall be capable of withstanding heat such that minimum discoloration of the paint takes place at temperatures below 250 F. The paint shall have a minimum salt spray resistance of 400 hours, and shall withstand most solvents if removed within five (5) minutes. The paint shall be modified styrenated alkyd enamel.

2.12 PREPARATION FOR SHIPMENT - CORROSION PROTECTION

- A. Special measures shall be taken to treat all mixer internal and external mild steel parts that are without permanent coatings, e.g., paint, etc., for resistance to corrosion from water vapor. Under ordinary conditions, these procedures will assure adequate protection of mixers during shipment (domestic or export).
- B. A vapor phase inhibitor shall be sprayed into each gear drive through one of the openings. Care will be taken to maintain the spray propellant free of water and water vapor. Holes in the gear drive for the dipstick and breather shall be plugged and the dipstick and breather will be shipped loose.

In cases where units are shipped without the upper shaft installed in the gear drive, open ends of the quill shaft will be sealed off with plastic plugs. The inside surfaces of the bearing adapter sleeves and the Quill Coupling respectively will be coated with molybdenum rich anti-seize compound. Exterior portions of the steel shaft and the quill coupling shall be protected with a waxy film, moisture-excluding coating such as CRC Industries SP400. The entire upper portion of the mixer shafts which are to be field installed in the gear drive, including the top end and tapped holes, shall be coated with anti seize compound. A tightly wrapped layer of inhibitor coated paper shall be applied to this portion which will then be covered with waterproof export paper and sealed with waterproof tape. All exposed steel parts such as shafts, impeller assemblies, steady bearing assemblies, flexible coupling hubs, motor components and gear drive shaft extensions, mixer bearing assemblies, etc. shall be protected with a waxy film moisture excluding coating such as CRC Industries SP400 sprayed on or hand applied.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The installation contractor shall install the rapid mixer in the position shown on the project drawings.
- B. The rapid mixer shall be installed in accordance with the manufacturer's shop drawings, instructions, and recommendations.

3.2 MANUFACTURER SERVICES

- A. Provide the services of a manufacturer's representative for inspection, supervision of installation, startup, and training. That person must be an experienced and competent technical (not sales) representative of the manufacturer. Upon completion, provide a certified document from the manufacturer of the services provided.
- B. The Manufacturer's Representative shall be capable of providing: pre-installation inspection, supervision of installation, commissioning and start up services, preventative and predictive maintenance services, and operational and maintenance training.
- C. The cost of the services of the Manufacturer's representative shall be included as part of the equipment price.

END OF SECTION 463350

SECTION 464130 - VERTICAL HYPERBOLIC FLOCCULATORS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Furnish, install and place into satisfactory operation vertical hyperbolic flocculators complete with all accessories and appurtenances as shown on the Drawings and specified herein, and as needed for a complete installation.
- B. General:
 - 1. Flocculators shall be of the vertical shaft, hyperboloid-body type.
 - 2. The flocculator and its appurtenances shall be specifically designed for continuous duty operation in a submerged application in a flocculation basin. The flocculators shall not overload the motors at any point within the operating limits recommended by the flocculator manufacturer.
 - 3. The flocculator shall be designed with no submerged bearings and with a dry installed motor. The entire weight of the flocculators shall be supported by new metal walkways.
 - 4. Contractor and Manufacturer shall field verify all existing basin measurements before preparation and submittal of flocculator shop drawings.

1.2 QUALITY ASSURANCE

- A. All equipment in this Section shall be furnished by a single supplier who will be responsible for the coordination, supply, and testing of the equipment. Equipment shall be fabricated, assembled, erected and placed in proper operating condition in full conformity with the Drawings, Specifications, instructions and recommendations of the equipment manufacturer.
- B. Qualifications of Manufacturer: The manufacturers shall be experienced in the design and construction of equipment for this purpose, and shall have furnished such equipment and can prove that it has performed successfully for a period of not less than five (5) years at ten (10) water treatment plants operating in the United States of America. Manufacturers shall prepare a Computational Fluid Dynamics (CFD) model and provide modeling results for both zones of the flocculation basin shown on the Basin 1 and 4 drawings (i.e. two (2) zones, six (6) flocculators, FRP baffle walls, indicated basin dimensions) demonstrating that both zones of the flocculation basin will be thoroughly and uniformly mixed without shearing the formed floc particles and without allowing accumulation of significant amounts of sludge in the flocculation zone.
- C. Flocculator Basis of Design:
 - 1. The flocculator design in this project is based on vertical hyperbolic flocculators manufactured by Invent Environmental Technologies, Inc. of Cedar Grove, NJ as listed in this Section.

- D. Acceptable Manufacturers and Models:
 1. Invent Environmental Technologies, Inc., Model HFM/2500-24-5.0,
 2. or equal.

1.3 SUBMITTALS

- A. Submit shop drawings, manufacturer's literature, maintenance data and operating instructions and warranty data in accordance with the General Conditions of the Contract and Sections 13323, 17823, and 17834.
- B. Submit general arrangement and assembly drawings indicating:
 1. construction details and dimensional drawings;
 2. structural requirements which include support base and anchor bolt requirements;
 3. operating weight distribution;
 4. installation requirements requiring coordination with the Contractor.
- C. Submit electrical load calculations, rated power, rated input power, recommended position and depth of the flocculators in the tank, minimum distances from tanks walls and bottom requirements.
- D. Bearing life calculations.
- E. Shop test results.
- F. Operations and Maintenance Manuals as required in Section 17834.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. The flocculators shall be capable of completely mixing each zone of the two (2) zone flocculation basins while providing gentle floc acceleration.
- B. Flocculators shall be designed to meet the following conditions:

No. of flocculators	3 per zone, 6 per train, total 12
No. of zones	2
G value, minimum	70 s ⁻¹ at full speed
Flocculator configuration	Hyperbolic
Flocculator Body	One body with 8 integral transport ribs
Liquid being mixed	Screened surface water with coagulants
Chemical Addition	Ferric Sulfate 5-25 mg/L PolyAluminum Chloride 25-40 mg/L Potassium Permanganate 0.2-1.0 mg/L
Percent solids	< 1,000 mg/L
Sludge Volume Index	Minimum 80 L/kg

Maximum flocculators body speed	24.3 RPM
Zone Size:	
Water Depth	Ranges from 13.33 to 14.00 feet for zone 1 & 14.17 to 14.83 feet for zone 2
Length	25.17 ft. for zone 1 & 25.17 ft. for zone 2
Width	90 ft
Maximum Motor Horsepower:	5 Hp
Motor Type:	Squirrel Cage, Induction type, VFD capable
Nominal Motor Speed:	1800 rpm
Motor Efficiency:	NEMA MG1 Premium Efficiency
Design:	TEFC, IP66, Class B
Duty:	Continuous, designed for a minimum of ten starts per hour.
Insulation:	Class F
Voltage:	208V, 3 Ph., 60 Hz.
Service Factor:	1.15 (The motor service factor shall not be used in sizing the motors)

2.2 MATERIALS

A. General

1. Each flocculator assembly shall consist of a dry installed heavy-duty speed reducer with hollow shaft, electric motor, baseplate, composite FRP shaft, and hyperbolic flocculator body.
2. The bottom of the hyperbolic mixing body should not exceed 12" above the basin floor.
3. Flocculators shall be designed to provide mixing and floc formation, and to prevent settlement in the tanks and to re-suspend material on the tank bottom.
4. The flocculator should be designed as a vertical shaft flocculator, with a dry installed motor. During operation the flocculator should not generate any upward forces on the bridge construction.
5. The flocculator should have a steady stationary flow pointed downward parallel to the flocculator shaft. The highest speeds and turbulent fluctuations should be produced in the bottom area. On the water surface, no or little surface turbulence should appear.

B. Gear Drive

1. The gear drive assembly for each flocculator shall consist of parallel-shaft helical gear box and motor as designed by SEW Eurodrive.
2. The gear drive assembly shall have a high-quality corrosion protection coating, robust weather protective hood, and PTC resistor for thermal protection of the motor.
3. The gear box housing shall be cast iron covered with an epoxy coating, having a thickness of at least 6.0 mil. The gear box shall be connected to the mounting base using a flange connection with 316 stainless steel nuts and bolts.
4. The gear box speed shall not exceed 24.3 rpm. The calculated lifetime L10 of the bearings shall exceed 100,000 hours.
5. The drive motors shall be a squirrel cage induction motor, 460 V, 3 phase, 60 Hz, 1,800 RPM, Class F insulation.
6. The motors shall be equipped with a weather protection hood.
7. The geardrive will be lubricated with a food grade oil.

8. The hollow shaft shall be covered and sealed with a special hollow shaft cap.

C. Mounting Base

1. The mounting base of each flocculator shall consist of a gear base plate mounted in rubber buffers connected permanently to the bridge/supports by bolted connection. The plate shall be able to be leveled using the threaded bolts, which can be adjusted in height.
2. The rubber buffers shall absorb start-up torque, prevent any transfer of vibrations to the bridge and constitute the galvanic separation of the flocculator from its surroundings.
3. The mounting base shall be a fastening set for the metal bridge/walkway with threaded rods and a 316 stainless steel mounting kit.

D. Shaft

1. The drive shaft of the flocculator shall be made from FRP.
2. At the top end of the flocculator shaft, there shall be a tappet for the connection to the gear hollow shaft.
3. All bolted connections shall utilize 316 stainless steel hardware.
4. Drive shaft length shall be coordinated with drawings to ensure that shaft length is sufficient for flocculator drives to be mounted on top of new flocculator bridges/walkways while allowing the bottom of the flocculator bodies to be approximately 5 inches above the basin floor. Note that basin floors are sloped and as a result the drive shaft length for the flocculators in flocculation zone 1 will be slightly shorter than the drive shaft length for the flocculators in flocculation zone 2.

E. Hyperboloid Flocculator Body

1. Each hyperboloid flocculator body shall be manufactured of FRP/impact resistant thermoplastic and be a streamlined stress-free body without any mounted or fitted parts. The flocculator body shall be coated in NSF 61 approved gelcoat.
2. The transport ribs which accelerate the flow shall be integrated in the flocculator body (INVENT - Evolution 7 design). The floc particles shall be accelerated over a minimum of 3 feet.
3. The hyperboloid flocculator shall have laminated stainless steel insert nuts.

F. Spare Parts

1. One set of rubber buffers per installed flocculator type.
2. One shaft holder for each shaft diameter supplied.
3. All lubricating oils required for the first year of operation shall be provided. The products supplied shall be factory prefilled, in accordance with manufacturer's recommendations. All lubricants shall be NSF 61 approved and suitable for use in a drinking water treatment plant.
4. Spare parts shall be identical to and interchangeable with similar parts installed.

PART 3 - EXECUTION

3.1 FACTORY TESTS

- A. The hyperbolic flocculator manufacturer shall perform the following manufacturer's standard QC inspections and tests on each unit before shipment including:
 - 1. Hyperbolic flocculator body diameter, motor rating, and electrical connections shall be checked for compliance with contract requirements.
- B. Certified copies of all QA/QC inspections shall be provided to the Engineer prior to shipment.

3.2 INSTALLATION

- A. In accordance with manufacturer's instructions.

3.3 START-UP AND TESTING

- A. Performance Test:
 - 1. Prior to start of the performance tests, fill the zones to the maximum water elevation with test water (plant effluent).
 - 2. Run the flocculator for one hour. Demonstrate each flocculator:
 - a. Is free of overheating of any parts.
 - b. Is free of all objectionable vibration, in accordance with manufacturer's recommendations.
 - c. Is free of overloading of any parts.
 - 3. Via the Control Station(s), verify flocculator functions.
 - 4. Record amperage draw.
 - 5. Continue operating the flocculator for 24 hours without overheating, excessive vibration or overloading.
 - 6. Should any portion of the system fail to meet the requirements specified, the Contractor shall make any and all necessary modifications such that the system meets the requirements of this Specification, at no additional cost to the Owner.
 - 7. Factory trained manufacturer's representative shall provide the following services:
 - a. Installation Inspection and Commissioning – Two (2) site visits each consisting of one (1) full eight (8) hour day for each of the two basins (Total of four (4) site visits and four full eight (8) hour days). Provide certificate that each flocculator has been properly installed and commissioned.
 - b. Operator Training – One (1) site visit consisting of one (1) full eight (8) hour day. Provide certificate that operators have been properly trained in operation and maintenance of flocculators.

END OF SECTION 464130

SECTION 464210 - FIBERGLASS REINFORCED PLASTIC (FRP) BAFFLE WALL

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

The work covered by this section shall include materials and installation for the slide-guide fiberglass reinforced plastic (FRP) baffle wall system and direct "bolt to concrete column" system to be installed in a drinking water treatment plant, which includes but is not limited to:

- A. FRP baffle wall panels
- B. FRP slide-guide angles
- C. Base plates, angles, and beams
- D. Stainless steel fasteners and connections

1.2 QUALITY ASSURANCE

- A. Contractor shall be responsible for verifying all field dimensions for development and approval of the manufacturer's drawings.
- B. Baffle system components (excluding any associated concrete items) shall be provided by a single manufacturer to insure coordination and compatibility of parts.
- C. Manufacturer of baffle wall system shall have full responsibility for products and design. Split responsibility of materials and design is not acceptable.
- D. Manufacturer of baffle wall system shall have completed within the last five years a minimum of five (5) projects of similar type to that required in this scope.
- E. Manufacturer shall be ISO9001 certified.
- F. NSF 61 certification.

1.3 PERFORMANCE TESTING

- A. Materials shall comply with Federal and Local laws, ordinances, applicable codes, standards, regulations, and regulatory agency requirements including:
 - 1. ASTM D 638, Standard Test Method for Tensile Properties of Plastics
 - 2. ASTM D 790, Standard Test Method for Flexural Properties of Plastics
 - 3. ASTM D 570, Standard Test Method for Water Absorption of Materials
 - 4. ASTM D 256, Standard Test Method for Izod Impact (Notched)

1.4 DESIGN CRITERIA

Design load, considered as uniform loading over the entire wall, shall include fluid flow pressure plus any dynamic pressure associated with mechanical equipment.

- A. Design Load: The load for design would be the greater of water differential or wind load but not a combination of the two.
 - 1. Water Differential: 6 inches
 - 2. Wind Load: 10 Lbs./SF Uniform Load (*Minimum load per ASCE 2000*)
- B. Deflection Limits and Factors of Safety
 - 1. Baffle Panels: $L/D = 90$ (not to exceed 2.75"); Factor of Safety = 2.0

1.5 SUBMITTALS

Submittals shall include, but not be limited to:

- A. Dimensioned drawings including layouts; connection and framing details; fastener types and spacing; product description, and installation guidelines.
- B. Material certifications.

PART 2 - PRODUCTS

2.1 MANUFACTURER(S)

- A. The standard for design, characteristics, and performance shall be based on materials and components provided by:
 - 1. Enduro Composites, Inc., (713) 358-4000, www.endurocomposites.com.
 - 2 or approved equal.

2.2 MATERIALS - FRP Baffle Panels, Slide-Guide Angles, Slide-Guide End Attachments, Base Plates, Angles and Beams

- A. Potable Water Certification:
 - 1. All fiberglass components shall be third party certified to meet ANSI/NSF Standard 61.
 - 2. All fiberglass components including baffle panels, structural framing, angles, beams, channels, and other components used shall be individually certified.
 - 3. The baffle components shall each be rated to provide a designated maximum surface area to volume ratio of 490 sq cm/L or more.
- B. FRP structural materials shall exhibit these minimum physical properties:

Tensile Strength	48,000 psi	ASTM D 638
Flexural Strength	58,000 psi	ASTM D 790
Flexural Modulus	2,000,000 psi	ASTM D 790
Izod Impact (Notched)	25	ASTM D 256
Water Absorption	0.25% maximum	ASTM D 570

C. FRP Baffle Panels and Deflector Baffles

1. FRP baffle panels shall be a ribbed profile in 2.75" depth x 24" height coverage (full panel dimension).
2. FRP baffle panels shall be a minimum of 1/4" (.25 inch) thick.
3. FRP baffle panels shall have (top) horizontal ribs that slope downward not less than 10 degrees to minimize sediment build-up.
4. FRP baffle panels between flocculation zones 1 and 2 shall be designed to slide into slide-guide angles at each panel end. Minimal bolting of panels is required when using slide-guide angles.
5. FRP baffle panels between flocculation zone 2 and the sedimentation zone shall be bolted in a vertical orientation directly onto existing horizontal concrete beams at each end using three epoxy anchors with stainless steel bolts at each end (epoxy anchor and stainless steel bolt size to be determined by baffle manufacturer).
6. FRP baffle panels shall comply with the structural requirements in Section 1.4 Design Criteria.
7. FRP material shall include glass fiber reinforcements 50% (minimum) of the material weight embedded within UV Stabilized Polyester Resin. Color shall be standard gray.
8. FRP material shall have a surfacing veil on both top and bottom sides.
9. Factory cut edges and drilled holes shall be sealed with NSF 61 approved material.
10. All baffle panels shall be Enduro Composites "H" series or approved equal.

D. FRP Slide-Guide Angles

1. FRP slide-guide angles shall comply with the structural requirements in Section 1.4 Design Criteria.
2. FRP slide-guide angles shall be a minimum of 3/8" (.375 inch) thickness and 90 degrees.
 - a. Installing contractor shall field attach FRP slide-guide angles to new concrete columns and walls between flocculation zones 1 and 2 using epoxy anchors with stainless steel bolts at intervals recommended by FRP baffle manufacturer but not less than every 18-inches.
3. FRP material shall include glass fiber reinforcements 50% (minimum) of the material weight embedded within UV Stabilized Polyester Resin. Color shall be standard gray.
4. FRP material shall have a surfacing veil on both top and bottom sides.
5. Factory cut edges and drilled holes shall be sealed with NSF 61 approved material.

E. Slide Gate Penetrations (indicated on drawings)

1. Slide gate penetrations (shown on drawings) shall be accommodated by the baffle manufacturer and the Contractor to provide a baffle wall which is neatly, cleanly, and squarely installed up to and contacting the slide gate frame.

F. Openings in Baffle Wall (15-inch by 15-inch)

1. Each opening (15-inches wide by 15-inches high) in the baffle wall shall be reinforced with FRP and/or stainless steel beams, baseplates, and/or angles as determined by the FRP baffle manufacturer.

G. Deflector Baffles (20-inch by 20-inch)

1. Deflector baffles (as required and detailed on the plan drawings) shall be factory fabricated by the FRP baffle system manufacturer.
2. Deflector baffles shall be anchored and reinforced with FRP and/or stainless steel angles, beams, and/or baseplates as determined by the FRP baffle manufacturer.
3. Deflector baffles shall be positioned 12 inches in front of the 15-inch by 15-inch opening in the baffle wall.
4. Baffles shall be "H" series by Enduro Composites or approved equal.

H. Hardware

1. All anchors shall be epoxy adhesive type (sized by baffle manufacturer & NSF 61 certified)

with stainless steel bolts for attaching the slide guide angles, attached FRP panel directly to concrete cross members, and mounting the deflector baffles. Wedge or expansion anchors are not allowed.

2. All fasteners and other structural hardware shall be 316 Stainless Steel.

PART 3 – EXECUTION

3.1 MATERIAL HANDLING

- A. At the time of delivery, all materials shall be inspected for shipping damage. The freight company and the Manufacturer shall be notified immediately of any damage or quantity shortages.
- B. The Contractor shall protect FRP materials from cuts, scratches, gouges, abrasions, and impacts. When lifting crated FRP materials, spreader bars shall be used (not wire slings unless materials are fully protected). FRP components shall not be dragged across one another unless separated by a non-scratching spacer.

3.2 INSTALLATION

- A. Before placing and attaching components, the contractor must confirm the alignment and location of concrete columns, bearing surfaces, etc. All bearing surfaces must be level, flat, clean and free of debris.
- B. Erection shall proceed according to sequence shown on the approved drawings.
- C. Contractor shall install pads, curbs or piers to modify uneven or sloped concrete surfaces to create a flat, level surface for baffle system attachment.
- D. Contractor shall field cut materials as required and shown on the Manufacturer's drawings.
- E. Contractor shall seal field cut edges and drilled holes with NSF 61 approved material.
- F. Contractor shall install slide-guide angles onto concrete columns and walls as required on the approved layout drawings. Field modifications (cuts, copes, holes, etc.) unless shown on the drawings are not allowed without the manufacturer's written approval. Shim FRP slide-guide angles only with approved materials.
- G. Before placement of baffle panels, contractor shall check alignment and location of concrete columns, walls, and FRP slide-guide angles.
- H. Contractor shall adjust FRP baffle panels for proper bearing and alignment, slide them into the slide-guide angles, and fasten them to the slide-guide angles at intervals as shown on the approved layout drawings.
- I. Refer to manufacturer's installation instructions and drawings for attachment requirements, fastener selection and procedure. Contractor shall adjust panels for proper bearing and alignment before fastening (as required).
- J. Contractor shall place and fasten other miscellaneous components or hardware as shown on the approved drawings.
- K. The baffle wall between flocculation zones 1 and 2 is directly beneath the flocculator bridge/walkway. If the flocculator bridge/walkway is installed prior to the baffle wall then the top sections of the FRP baffle panels and slide guide angles will have to be installed as follows: 1) install the downstream slide guide angle, 2) install the FRP baffle panel, and 3) install the upstream slide guide angle to complete the installation.
- L. Rebar in the basin concrete walls, floors, columns and cross beams shall not be breached, cut, or damaged during installation of the anchors for the FRP baffle wall system.

END OF SECTION 464210

SECTION 464300 – INCLINED PLATE SETTLER SYSTEM

PART 1 - GENERAL

1.1 WORK OF THIS SECTION

- A. **SCOPE:** This section covers furnishing of a complete plate settler system as specified herein. The plate settler equipment shall be designed for installation in basins having the dimensions indicated herein and on the drawings. The CONTRACTOR and Manufacturer shall field verify existing basin structure and equipment measurements before preparing and submitting the shop drawings. Sludge collecting equipment that will be installed within the basins below the plate settlers is covered in other sections. The CONTRACTOR and Manufacturer shall coordinate the inclined plate settler shop drawing with the clarifier shop drawing to ensure that the top of the clarifier rake arms do not conflict with the bottom of the inclined plate settlers or interfere with the operation or performance of the inclined plate settlers.
- B. **CONTRACTOR:** Shall furnish all labor, materials, equipment, and incidentals as shown, specified and required to provide a complete plate settler system as specified herein.
- C. **GENERAL:** Equipment furnished under this section shall be fabricated and assembled in full conformity with drawings, specifications, engineering data, instructions, and recommendations by equipment manufacturer.
- D. **MANUFACTURER** of the plate settler equipment shall be vested with unit responsibility for the proper function of the complete plate settler system as specified. The equipment covered by this specification is intended to be standard equipment of proven ability as manufactured by reputable concerns having extensive experience in the production of such equipment.

1.2 REFERENCES

- A. The following is a list of standards which are referenced in this section:
 - 1. American Society for Testing and Materials (ASTM)
 - 2. ASTM A240 – Type 304L & 316L Stainless Steel
 - 3. ASTM A992 GR50KSI Steel
 - 4. American National Standards Institute (ANSI)
 - 5. American Welding Society (AWS)

1.3 SUBMITTALS

- A. Submit for approval the following:
 - 1. Provide shop drawing submittals for review electronically in PDF format and include tabbed sections defining scope, process calculations, mechanical and structural calculations, catalog cuts, and drawings. Each shop drawing shall be submitted for review as a single PDF document. After review and acceptance of a shop drawing submittal, provide final version of shop drawing in electronic PDF format and also provide four (4) complete paper copies of accepted shop drawing

- manuals in white 3-ring binders and include tabbed sections defining scope, process calculations, mechanical and structural calculations, catalog cuts, and drawings.
2. All structural design calculations shall be prepared by the manufacturer and sealed by a professional engineer licensed in Kentucky.
 3. Manufacturer's literature, illustrations, specifications, and engineering data including the total weight of each unit (wet and dry), structural loads at supports (wet and dry), connection details, and performance data.
 4. Drawings shall show dimensions, the overall arrangement of equipment and materials of construction.
 5. Literature and certified shop drawings describing the equipment and showing all important details of construction and dimensions. Dimensions shall show overall size and space requirements including that for installation, leveling, dismantling and maintenance.
 6. Cross sections and details to show that all components are in conformance with the intent of the specification and are satisfactory from the standpoint of design and physical arrangement.
 7. All information required for the detailed design and location of all connecting or adjacent structural and/or mechanical items, such as foundations, anchor bolts, steel supports, piping, conduit, etc. Any recommended or required deviations from the dimensions and locations of connecting or adjacent items as shown in the Drawings shall be described completely in the submittal.
 8. Weight of the equipment (dry and wet) and its distribution on the supports.

B. Operation and Maintenance Manuals

1. Provide Operation and Maintenance Manual submittals for review electronically in PDF format. Each Operation and Maintenance Manual shall be submitted for review as a single PDF document. After review and acceptance of an Operation and Maintenance Manual, provide final version of Manual in electronic PDF format and also provide (4) complete paper copies of reviewed Operation and Maintenance manuals. Paper manuals shall be in a white 3-ring binder with tabbed sections to include reinforced 8.5" x 11" paper, 11" x 17" B-size drawings when practical, and individually sleeved D-size drawings.
2. The manual shall include Equipment Introduction and Operation, Warranty, Troubleshooting, Maintenance, and Drawings.
3. Field start-up reports as described in paragraph 3.3 (Manufacturer's Services) shall be submitted after start-up for owner's insertion into approved O&M manual.

C. NSF-61 Compliance

1. To ensure public safety, the plate settler system shall be certified by NSF/ANSI Standard 61. Systems that do not have NSF-61 certification will not be accepted.

1.4 QUALITY ASSURANCE

- A. Basis of Design: The structural, mechanical and process design for the inclined plate settlers are based on information provided by the first-listed inclined plate settler manufacturer. The cost of any changes and modifications resulting from the use of other approved inclined plate settler equipment shall be borne solely by the CONTRACTOR. Fundamental changes in the configuration of the plate settler system will not be allowed. The CONTRACTOR shall submit drawings and supporting documents, identifying all proposed changes, to the ENGINEER for review and acceptance. Supporting documents shall delineate all proposed changes including complete structural calculations stamped and signed by a Professional Engineer licensed in Kentucky.
- B. The manufacturer shall be solely and fully responsible for the warrant, mechanical design, and structural design adequacy of all the provided components under this Section.

- C. The second naming of a manufacturer in this specification is not an indication that the manufacturer's standard equipment is acceptable instead of the specified component features. Naming is only an indication that the manufacturer may have the capability of engineering and supplying a system as specified. Manufacturers shall not quote, submit, or supply any material, not in full compliance with this specification.
- D. This specification has been prepared on the basis of the specific requirements for this application. These specifications may require modification of the manufacturer's standard equipment design and it will be mandatory that all manufacturers meet all requirements of this specification. Equipment manufacturers shall modify their standard designs and recommended operational parameters to meet all requirements of this specification and as shown on the drawings.
- E. Structural Design
 - 1. The structural design of the plate settler system shall be in accordance with the requirements of the current edition of the International Building Code (IBC).
 - 2. Inclined Plate Settler support frames shall be designed for the worst-case load conditions of an empty basin and full effluent troughs.
 - 3. The inclined plate settler arrangement shown on the Contract Drawings is based on design information provided by the first-listed Inclined Plate Settler Manufacturer. The actual installation requirements including the location of structural supports shall be based upon shop drawings submitted by the CONTRACTOR and reviewed by the ENGINEER based upon the requirements specified herein.
- F. Responsibilities
 - 1. The Plate Settler Manufacturer is responsible for delivery of equipment and supplies required under these specifications. The CONTRACTOR is responsible for proper coordination and integration of all equipment required for installation in the basins, plate pack assemblies, support beams and columns, piping, and all other associated work shown on the drawings and specified in the Contract Documents. The CONTRACTOR and Manufacturer are responsible for ensuring that the plate settler system shall be properly coordinated and will function as a unit in accordance with these specifications. The CONTRACTOR and Manufacturer shall bear ultimate responsibility for equipment coordination, installation, operation, and guarantees.
- G. Workmanship
 - 1. Workmanship in the fabrication of the inclined plate settlers shall be first-class, including the following requirements: The assembled plate packs shall have members that are straight and true. Structural distortions, warps, and other defects shall not be present in the plate pack assemblies before or after installation in the sedimentation basins. All exterior surfaces and edges of the plate packs shall be smooth. Sharp corners shall be ground round and smooth.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Plates shall be factory installed in the frame, and shall be shipped as one plate pack assembly. All equipment shall be shipped with suitable in transit protection. Special handling instructions shall be included.
- B. Stainless steel lifting jigs shall be provided to ensure proper lifting locations are followed.
- C. Plate packs shall be shipped on flatbed trucks to allow access by crane provided by the

CONTRACTOR.

- D. Equipment shall be stored and protected in accordance with the manufacturer's recommendations.

1.6 SYSTEM DESCRIPTION

- A. The plate settlers shall be designed for operation in the sedimentation basin as indicated on the Contract Drawings. The equipment shall be designed for the following conditions as listed in the Process Table below.

B. PROCESS TABLE

Service	24 hr
Number of Basins	4
Inside Basin Width (ft)	90
Inside Basin Length (ft)	90
Side Water Depth (ft)	16.2 (clarifier edge) to 19.95 (clarifier center)
Minimum Flow (MGD) per Basin	1.0
Design Flow (MGD) per Basin	11.0
Peak Hydraulic Flow (MGD) per Basin	11.0
Minimum Effective Projected Horizontal Surface Area (ft ²) per Basin	27,282-sf
Design Loading Rate (gpm/ft ²)	0.28 gpm/ft ²
Plate Efficiency (<i>Ten State Standard</i>)	80%
Nominal parallel distance between plates (in.)	1.86 to 2.0
Plate Inclination Measured from the Horizontal	55 degrees
Plate Width (ft)	4.5
Plate Length (ft)*	9.5 to 10.0
Number of plate rows per basin	12 to 14
Minimum number of plates per basin	1,320
Minimum number of effluent troughs per basin	9 including center total effluent trough (number of effluent troughs must be odd including the center total effluent trough)
Number of cross collection flumes per basin	1
Weir loading rate at design flow (gpd/ft)	22,727 (<i>maximum</i>)
Raw Water Characteristics Prior To Flocculation	
Temperature, Fahrenheit	33-90
Influent Turbidity, NTU	2-100
Effluent Turbidity, NTU	1.0
pH	5.5 – 8.0

*Plate length is the finished settling length at 55 degrees used to derive the number of plates required to achieve the minimum effective projected horizontal surface area.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. The equipment shall be manufactured by:

1. Jim Myers & Sons, Inc. (JMS), of Charlotte, NC,
2. Meurer Research, Inc. (MRI), of Golden CO
3. or approved equal.

Inclusion in the acceptable equipment manufacturer list above does not eliminate the requirement to fully comply with all aspects of this specification.

B. The inclined plate settler design for this project is based on JMS inclined plate settlers.

C. **The equipment described by this specification defines minimum equipment requirements. All unforeseen costs associated with approved equal equipment manufacturers shall be the sole responsibility of the Contractor.**

D. **The use of an approved equal equipment manufacturer does not negate the requirement of full compliance with all aspects and criteria of this specification. Deviations from these specification requirements will not be allowed.**

E. **To be considered an equal all aspects and criteria of this specification must be met at a minimum.**

F. The equipment shall be the product of a manufacturer engaged in the design and manufacture of similar equipment in successful operation in similar applications. The manufacturer shall have a minimum of 10 years of United States municipal water experience with 10 installations of the same type of equipment as specified herein with documented successful operation.

G. Manufacturers shall submit the following with the shop drawing:

1. A list of at least 10 previous installations in the US municipal water market, including contact information and project information for projects of similar size and design as this project.
2. Preliminary drawings and process calculations specific to this project.
3. A letter stating that their proposed design complies with all requirements as specified herein. If there are deviations from the specification a letter must address each deviation in detail.
4. Equipment shall be manufactured in the United States by employees fully certified by the American Welding Society for the tungsten inert gas (TIG) welding process to standard AWS D1.6. Letters of current welder certification shall be provided with shop drawing submittal.

2.2 MATERIALS OF CONSTRUCTION

A. The components of the Inclined Plate Settlers shall be made from the following minimum material requirements:

1. Plate Settler Frames: Type 304LSS (Minimum 14 gauge thick)
2. Plates: Type 304SS
 - a. Type 316SS (If any portion of the plate is at the air-water interface)

3. Top Flow Control Device (Angle or Tube): Type 304SS (Minimum 24 gauge thick)
 - a. Type 316SS (If any portion of the device is at the air-water interface)
 4. Effluent Troughs: Type 316SS (Minimum 18 gauge thick)
 5. Adjustable V-notch or flat crested Weirs: Type 316SS (Minimum 16 gauge thick)
 - a. V-notch weirs and flat crested weirs must bolt to the effluent troughs with 3/8" Type 316SS through bolt connection a minimum of every 12 inches. Pressure clips shall not be used.
 6. Hardware: Nuts, bolts, fasteners Type 316SS
 7. Material compliance: Any materials submitted that do not meet these minimum standards will not be allowed. All material type & thickness will be confirmed during the submittal process and prior to installation.
 8. Material testing: After installation material will be tested to ensure all material at the air-water interface is Type 316SS and all welds have been passivated to ASTM A-380 standards.
 9. Material thickness confirmation: No material thinner than 18 gauge will be allowed except for the plates.
 10. Weld passivation at the air-water interface: All stainless-steel welds at the air-water interface shall be fully passivated to meet ASTM A-380.
- B. Effluent troughs, weirs, top flow control device, plates, frames, trusses and support beams shall perform under all operating scenarios without buckling, permanent deformation, or yielding.
- C. Plate settler manufacturer shall perform and submit structural analysis and calculations for the entire plate settler system including troughs, plates, top flow control devices, weirs, frames, trusses and support beams to demonstrate and confirm that all aspects of this specification are met. Structural analysis and calculations shall be stamped and signed by a structural engineer registered in the State of Kentucky and submitted with the shop drawing. The analysis and calculations shall include the weight of four 250 lb employees walking and standing on the plate settlers as well as a concentrated live load of 300 lbs placed at the mid span of a single top flow control device at a single point.

2.3 PLATE SETTLER SYSTEM

- A. The plate settler system shall be fabricated in accordance with the details indicated on the drawings and the requirements specified herein.
- B. All components of the inclined plate settlers that are not completely submerged under normal operation shall be constructed of Type 316L stainless steel.
- C. All plate settler system components shall be fabricated from Type 304 and/or 316 stainless steel.
- D. All stainless steel components at the air-water interface shall be Type 316 with a minimum thickness of 24 gauge. This includes the effluent troughs, adjustable v-notch weirs, baffles, top flow control device, frame, etc.
- E. The plate length and spacing shall be as specified in Process Table 1.6.B above. The entire system shall be designed to evenly distribute the flow to every plate and to remove the effluent evenly from the top of the plate pack.
- F. The influent water shall primarily enter the inclined plate settlers through feed orifices in the side of the plates to minimize sludge re-entrainment. Feed openings shall be sized and located to maintain laminar flow and not to disturb settling solids.
- G. The plate settler assemblies shall be self-supporting and shall not exceed a maximum allowable deflection $L/360$ based on all dead loads created by plates, troughs and frame assembly, a solids

loading of 30 lbs per plate along with a concentrated live load of 300 lbs at a single point placed at the midpoint of a single top flow control device.

2.4 PLATE SETTLER FRAME

- A. The plate settler frame shall be fabricated from stainless steel tubing with a minimum thickness of 0.0747 inches (14 gauge) of adequate size to achieve the deflection criteria set forth in 2.3.G.

2.5 BAFFLES

- A. The baffles being located at the air-water interface shall be constructed of Type 316L stainless steel with a minimum thickness of 0.0480 in. 18 gauge.

2.6 PLATES

- A. The individual plates shall be constructed of flat 24-gauge minimum thickness Type 304 or 316 stainless steel components designed to handle 30 lbs of solids loading per plate. Provide L-grade material for all welded components.
- B. The plates shall not be exposed to the air-water interface. .
- C. The top of the all plates shall slant toward the effluent end of the basin.
- D. The plates shall be designed structurally for the following conditions:
 - 1. The plate shall be designed to handle a 30 lb solids loading evenly distributed over the plate. The plate shall also be designed to handle a 15 lb point load on the midpoint of the bottom hem without failing, buckling, yielding, or creating a permanent deformation. Once the 15 lb load is removed, the plate shall exhibit limited hysteresis.

2.7 TOP FLOW CONTROL DEVICE

- A. Each plate shall be equipped with an integral Type 304 stainless steel top flow control device to ensure that there is an even flow distribution across the entire surface area of the plate.
- B. Plate settler systems that utilize a top flow tube at the air-water interface shall be Type 304 stainless steel with a minimum thickness of 0.0235 in. (24 gauge).
- C. The top flow control device shall have a minimum thickness of 0.0235 in. (24 gauge) and provide a suitable walking surface for routine cleaning and maintenance. Any top flow control device at the air-water interface shall be no less than 0.0235 in. (24 gauge) in thickness. Plate settlers that utilize material at this location less than 0.0235 in. (24 gauge) shall not be allowed.
- D. The top flow control angle shall protect all surfaces of the plate. No exposed unprotected portions of the plate shall extend past the top flow control angle.
- E. Top flow control device must allow personnel to walk on the plates without the use of a temporary walking surface, such as plywood. Top flow control device shall support a concentrated live load of

300 lbs placed at the mid span of a single top flow control device at a single point without buckling, permanent deformation or yielding. If the any buckling, permanent deformation or yielding occurs the entire plate pack shall be replaced at no cost to the Owner. See Specification Section 3.1 for field testing requirements.

2.8 EFFLUENT TROUGHS & V-NOTCH WEIRS

- A. The effluent troughs and adjustable v-notch weirs shall be constructed of Type 316L stainless steel with a minimum thickness of 0.0480 in. (18 gauge). The v-notch weirs shall be securely bolted to the effluent troughs with 3/8" Type 316SS through bolt connections a minimum of every 12 inches.
- B. Each trough shall be equipped with an adjustable weir for leveling during initial installation and to provide an even flow distribution during operation. The weirs shall be manufactured from 0.0480 in. (18 gauge) minimum Type 316 stainless steel.
- C. The v-notch weir shall be designed so each plate has two individual v-notches for even flow distribution. Plate settler systems that do not have weirs for adjustability and flow control shall not be allowed.
- D. V-notch weirs shall operate at a minimum water elevation of 4 inches above the top flow control angle at design flow. Flat crested weirs shall be designed to maintain a water level above the top tube at all flows.
- E. Troughs located above the plate settlers obstructing access to the tops of the plates shall not be accepted.

2.9 CROSS COLLECTION FLUME

- A. All effluent troughs shall feed into a cross collection flume. This cross collection flume shall feed into a center total effluent trough sized for 11 MGD that transitions to a single round conduit which connects to a single 36" effluent pipe stubbed out 1 foot from the wall via a custom flanged connection provided by the inclined plate settler manufacturer.

2.10 TRUSS

- A. The plate settlers in each basin are to be supported by a stainless steel truss or painted carbon steel truss (prime coated at factory) that spans the entire basin width without the use of intermediate support columns. The support truss shall be constructed from AISC wide flange beam shapes. A stiffened seat connection shall be anchored to the basin wall to provide a bearing support for a horizontal slip connection at each end of the truss which will provide no additional concentrated moments to the existing basin walls. .. Manufacturer shall include stainless shims to level plate cartridges after placement onto the truss as needed. All connections must use 17-4 pH H1150 stainless steel bolts with calculations showing adequate bolt size and quantity. Calculations according to the AISC Steel Construction Manual 14th edition (LRFD) must be provided to show adequate member sizes for supporting material weight of plate settler assemblies, water weight when troughs are completely filled, 30 lb per plate of solids buildup, four 250 lb operator loads during routine cleaning, and seismic loading. All applicable ASCE 7-10 load combinations are to be analyzed for compliance.
 - 1. Below are the minimum to be used in designing the truss and calculating all stresses and safety factors.

- a. Weight of plates, supports, troughs, brackets, trusses, and other ancillary items.
- b. Solids loading. 30 lbs per plate distributed evenly over plate surface
- c. Operator loads during routine cleaning (4 people). 1,000 lbs (4 X 250 lbs) (Located at) worst case location on truss for shear, moment, and axial force design of truss elements).
- d. Weight of water in all troughs.
- e. Basins can be backfilled from the effluent pipe, which is the worst-case loading since the basin would be empty, and all troughs would be full.
- f. Concentrated live load of 300 lbs at mid span of a single top flow control device at a single point.
- g. Buckling, permanent deformation or yielding shall not occur under any operating scenarios.

B. If the truss is a painted steel truss it shall be painted per the following guidelines:

- 1. Blasting: SSPC-SP10/NACE 2 near white blast cleaning with a 1.5-2.0 mil surface blast profile
- 2. Shop Primer: TNEMEC Potapox primer 3.0-4.0 dry mils (or approved equal with NSF 61 certification and same thickness).
- 3. Field Finish Coat 1: TNEMEC Potapox finish 3.0-4.0 dry mils (or approved equal with NSF 61 certification and same thickness).
- 4. Field Finish Coat 2: TNEMEC Potapox finish 3.0-4.0 dry mils (or approved equal with NSF 61 certification and same thickness).
- 5. Contractor is responsible for applying the final two coats in the field per TNEMEC specifications after the truss has been installed in the basin and before the plate settler system is installed.
- 6. The contract shall provide a 3rd party TNEMEC paint expert inspection (or 3rd part approved equal paint manufacturer paint expert inspection) and written certification that the paint was applied per factory specifications and meets the above specification requirements.
- 7. The finish coats of paint shall be applied in the field after installation of the truss and allowed to cure per manufacturer's recommendations.
- 8. All nicks and scrapes from the installation process shall be addressed per the above painting requirements prior to adding the final finish coats of paint.

2.11 HARDWARE

- A. All field assembly bolts and anchor bolts, nuts, and washers shall be Type 316 stainless steel.
- B. All submerged connections shall utilize Type 316 stainless steel nylon insert locknuts.
- C. NSF-61 approved anti-seize lubricant shall be applied to the threads of all stainless steel bolts before assembly at the factory and field assembly.

2.12 FABRICATION

- A. All welded joints that will be fully or partially submerged shall be sealed watertight with continuous welds. All welding shall be performed in accordance with AWS standards by welders fully certified by the American Welding Society for the tungsten inert gas (TIG) welding process standard AWS D1.6. Letters of current welder certification shall be provided with the shop drawing submittal.
- B. All welds shall be passivated to ASTM A-380 standards.

2.13 BASIN 4 OVERFLOW PIPE

- A. The existing Basin 4 overflow pipe (20" DI) shall be removed to the wall flange. The plate settler manufacturer shall incorporate a stainless steel pipe or duct of equal cross sectional area into the plate settler system to extend the overflow pipe to the north side of Basin 4 where it can function as intended without interfering with plate settler performance. The existing cover grating shall be reused by the plate settler manufacturer if possible or replaced with similar cover grating. Maintain same overflow elevation as existing overflow. See project drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The Contractor shall install the inclined plate settler equipment in strict accordance with the manufacturer's recommendations.
- B. Install and level the plate pack units and troughs in accordance with the manufacturer's recommendations and the Drawings. All plate settler support's anchor locations shall be leveled to within +/- 1/8 of an inch. Exercise care in erecting and leveling the plate settlers, troughs, and weir plates so that the units are at the elevations shown on the Drawings or specified herein and have deflections within the manufacturer's specified limits.
- C. After installation, all v-notch weirs must be leveled to within 1/16 of an inch of target elevation as shown on the manufacturer's drawings.
- D. NSF-61 approved anti-seize thread lubricant shall be applied to the male threads of all stainless steel bolts at the time of the assembly.
- E. After installation, each plate settler unit shall be field tested by the Contractor by placing a 300 lb concentrated live load at the mid span of a single top flow control device at a single point and leaving it in place for 1 minute without buckling, permanent deformation, or yielding. The concentrated live load test shall be conducted by placing the 300 lb weight on the edge of a wedge at the midpoint of a single top flow control device. This test shall be repeated for a single top flow control device for each plate settler pack in each basin as selected by the Owner and Engineer. Use of plywood, flat sheet metal, or any other device meant to spread the point load over multiple flow control devices shall not be allowed. Contractor shall document the field test results with a table identifying each test location (basin number, plate pack number, and plate number) and the test results as well as documenting the results with photographs labeled for the basin number and location within the basin (plate pack number and plate number). If a field test fails the entire plate pack shall be replaced at no cost to the Owner.
- F. The walls in Basins 2 and 3 to which the inclined plate settler system shall be attached are tapered. The inclined plate settler manufacturer shall take account of this taper and provide anchors and connectors which accommodate the wall taper. Contractor and manufacturer shall confirm wall taper by measuring taper in the field (during November 1 to April 15 time period) before preparing shop drawings.

3.2 WARRANTY

- A. The supplier shall guarantee in writing that the equipment furnished is appropriate for the intended

service and shall be free of manufacturing and fabrication defects in material and workmanship for a period of 1 year after the equipment is satisfactorily placed in service. If the equipment is not placed in service within 6 months of delivery, the 1 year guarantee period shall commence 6 months after delivery.

3.3 MANUFACTURER'S SERVICES

- A. Manufacturer's Field Services: The CONTRACTOR shall provide the following services in addition to any other services specified herein, and required by these Specifications.
1. Pre-installation training service: A factory-trained manufacturer's representative shall be provided for (1) trip and (1) eight hour day of onsite service to review equipment submittals and installation instructions.
 2. Onsite field service: A factory-trained manufacturer's representative shall be provided for (8) trips each with (3) eight hour days onsite to provide installation review, instruction, and supervision. The installation services shall be coordinated between the CONTRACTOR and the manufacturer.
 3. Start-up & O&M Training: A factory-trained manufacturer's representative shall be provided for (1) trip with (2) eight hour days onsite to provide start-up and O&M training services. The start-up and O&M services shall be coordinated between the CONTRACTOR and the manufacturer.
 4. After installation supervision and field testing services by the manufacturer, the CONTRACTOR shall submit to the ENGINEER, a certification letter on the manufacturer's letterhead and signed by the manufacturer certifying that the equipment was installed per the manufacturer's recommendations.
 5. The manufacturer shall provide start-up reports covering installation inspection and start-up activities.
 6. The manufacturer shall provide operator training to all required plant personnel.
- B. All costs, including travel, lodging, meals and incidentals for manufacturer service shall be included in the CONTRACTOR'S bid.

END OF SECTION 464300

SECTION 464380 - FLOW-THROUGH CLARIFIER EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. There shall be furnished a total of two (2) 90-foot diameter clarifier mechanisms for installation in the outdoor drinking water treatment basins shown on the Contract Drawings. The units shall be designed to collect settled solids that have previously been subjected to rapid mix and flocculation steps and rake them to the mechanism center for removal via sludge pumps.
- B. Each clarifier shall be a stationary center column supported unit with a center drive mechanism provided for rotation of the rake arms and blades. Each basin shall have a circular, raked area 90 feet in diameter with a side water depth of 16.0 feet and a freeboard of 2.0 feet. The clarifier bottom shall have a slope of 1-inch in 12-inches as shown on the drawings. The existing clarifier grout shall be used and no new grout will need to be swept in with the new clarifier rake arms and blades.
- C. Influent that has previously been chemically conditioned and flocculated will enter the basin at the influent end as shown on the Contract Drawings. The flow will proceed across the clarification zone, through the inclined plate settlers, and into the effluent launders. Settled solids shall be positively raked to the center of each clarifier mechanism and discharged into the sludge pocket.
- D. Each clarifier mechanism shall include: stationary center column support structure, sludge collector center drive assembly with torque control, sludge collector rake arms with segmented blades, drive torque cage, platform, and all necessary assembly items including anchor bolts.
- E. Each clarifier mechanism component shall be designed to withstand with a prudent safety factor all stresses that may occur during fabrication, erection, intermittent, or continuous 24 hour per day operation.
- F. Except where specifically indicated otherwise, all submerged and non-submerged fabricated carbon steel members shall have a minimum thickness of 1/4-inch unless indicated otherwise in these specifications and shall be properly prepared and coated per the painting section of these specifications. All carbon steel shall conform to ASTM A-36 requirements, carbon steel plate shall conform to ASTM A283C requirements, and all carbon steel pipe shall have an ASTM A-53 Grade B designation.
- G. All connections, fasteners, and anchor bolts shall 304 stainless steel.
- H. Contractor and manufacturer shall field verify existing clarifier structure, walkway access bridge, and operating platform measurements prior to preparation and submittal of clarifier shop drawings.

1.2 WARRANTY

- A. The mechanism shall be warranted for three (3) years from the time the mechanism is put into service. The drive main bearing shall be warranted for ten (10) years.

1.3 QUALITY ASSURANCE

- A. ClearStream Environmental, Inc. clarifier rakes and DBS Manufacturing, Inc. drives were the basis of design for clarifiers on this project. The clarifier equipment manufacturer shall modify his standard equipment to meet the minimum values specified for dimensions, design, and the intent of this specification.
- B. The clarifier equipment shall be manufactured by ClearStream Environmental, Inc. of Sandy, Utah or approved equal. The drive unit shall be manufactured by DBS Manufacturing, Inc. of Atlanta, Georgia, or approved equal.
- C. **To be considered an equal all aspects and criteria of this specification must be met at a minimum. Deviations from the requirements of this specification will not be allowed.**
- D. Manufacturers must be regularly engaged in the manufacture of circular flow-through clarifier equipment for drinking water treatment plants as specified herein, must demonstrate that their equipment fully meets the specified design, and must demonstrate that they have clarifiers in actual service in the United States of America for a period of not less than 10 years.
- E. Manufacturers shall show evidence of quality assurance in manufacturing and supplying equipment essential in details to the equipment herein specified. This assurance shall be met by certification to the quality system requirement of ISO 9001 or equivalent standard as accepted by the Owner/Engineer.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The clarifier mechanism shall be of the center-drive type rotating clockwise, supported on a stationary center column, with the flow entering at one end of the basin and flowing across the clarifier to the other end of the basin. The clarifier shall be designed to remove sludge uniformly from the bottom of the basin.
- B. The new clarifier mechanism shall be installed with the existing clarifier floor (slope of 1-inch in 12-inches) remaining intact. Grout will not be swept in with the new clarifier mechanism.
- C. The project design is based on sludge collection equipment designed and manufactured by ClearStream Environmental, Inc. of Sandy, Utah and drive equipment designed and manufactured by DBS Manufacturing, Inc. of Atlanta, GA as listed in this section.
- D. Should equipment other than the specified equipment be proposed by the contractor, it shall be the responsibility of the contractor to perform any required redesign and coordination associated

with, but not limited to, mechanical equipment layout, electrical wiring, conduit and controls, and structural work, at no additional cost to the contract.

- E. All greases, oils, and lubricants used in the gearing, motor, etc. shall be food grade, NSF 61 approved, and suitable for use in a drinking water treatment plant.
- F. Major Components of the clarification equipment shall include but not be limited to:
 - 1. Center drive mechanism, gear motor and overload alarm,
 - 2. Control panel and electrical controls,
 - 3. Center support and platform,
 - 4. Center drive cage,
 - 5. Truss rake arms with segmented rake blades and squeegees,
 - 6. Fasteners and anchor bolts,
 - 7. And all other components necessary for a complete operating system.

2.2 GENERAL DESIGN CRITERIA

A. Design flows (MGD)

- 1. Average Daily 6 MGD each clarifier
- 2. Peak 11MGD (rated capacity) each clarifier

B. Equipment Design Criteria:

- 1. Sludge Collector Diameter (feet): 90'0"
- 2. Side Water Depth (feet): 16'0"
- 3. Floor Slope 1:12
- 4. Freeboard (feet): 2'
- 5. Stationary Center Column Dia. (feet): 3'
- 6. Rake arm tip speed (feet/minute): 8-10 ft /min
- 7. Torque Requirements (ft-lbs)
 - a) Continuous Operating: 51,000 ft-lbs
 - b) Maximum Overload: 102,000 ft-lbs
 - c) Yield: 195,000 ft-lbs

C. Drive Design Requirements:

- 1. Mechanism design shall be such that there are no chains, sprockets or bearings below or in contact with the liquid.
- 2. Drive shall be ¾ HP, 208V, 3-phase.
- 3. Gearing shall be designed and rated per the current American Gear Manufacturers Association Standards.
- 4. Drive shall have a minimum operating life of 20 years at the continuous torque and speed rating listed above.
- 5. Drive shall include a low maintenance (LM) feature for condensate control.
- 6. Shall be designed to convey heavy silt and sludge in the event the on site storage reservoirs need to be bypassed indefinitely and all primary settling needs to be performed in the clarifiers.

- D. Fabricated assemblies shall be shipped in the largest sections permitted by carrier regulations and properly match marked for ease of construction.
- E. Fabricated and Structural Steel shall be per ASTM A36 standards
- F. Minimum metal thickness shall be ¼” for all submerged plate and members unless otherwise specified.
- G. Submittal Requirements:
 - 1. Mechanism
 - a) General arrangement drawings showing:
 - 1) All major clarifier tank and clarifier mechanism dimensions and elevations,
 - 2) Anchor bolts locations,
 - 3) Mechanism loadings on the tank,
 - b) Engineering calculations showing the mechanism components meet the design torque requirements listed above
 - 2. Drive
 - a) Calculations shall clearly specify the values used for the following design parameters for Surface Durability and Strength rating:
 - 1) Number of Pinions
 - 2) Actual face widths
 - 3) Tooth geometry factor (I and J factors)
 - 4) Load distribution factor
 - 5) Allowable contact stress
 - 6) Allowable bending stress
 - 7) Pinion pitch diameter
 - 8) Tooth diametrical pitch
 - 9) Hardness ratio factor
 - 10) Elastic coefficient
 - 11) Life factor

2.3 EQUIPMENT DESCRIPTION

A. DRIVE MECHANISM

- 1. General: The drive mechanism shall consist of an electric motor, a primary reduction unit, a secondary (intermediate) reduction unit, and an enclosed final reduction unit consisting of a pinion and an internal tooth gear. The drive mechanism shall employ a low maintenance (LM) feature for condensate control. The drive unit output torque shall be limited by a torque overload protection device.
- 2. All components shall be directly coupled. Use of worm gears, belts, or chains, is not allowed.
- 3. The drive unit shall be a Model D42-CF by DBS Manufacturing, Inc. of Atlanta, GA or approved equal.
- 4. Primary Reduction Unit: The primary reduction unit shall be a hydrostatic unit driving the intermediate gear reducer.
 - a. The primary reduction unit shall consist of a hydraulic gear pump and a hydraulic motor.

- b. The primary reduction unit shall have an integral hydraulic manifold that incorporates a hydraulic pressure relief valve to give protection against overload, a flow control valve, a valve cavity for a by-directional option, two ¼” NPT instrumentation ports, and a port for a hydraulic filter.
 - c. All hydraulic components and hydraulic lines shall be enclosed in a steel housing of sufficient size to contain the minimum 7 gallons of hydraulic oil. The housing shall serve as the reservoir for the hydraulic oil.
 - d. A disposable spin-on type hydraulic filter shall be provided to filter the hydraulic oil.
 - e. The hydraulic pump drive shaft must be vertical to permit vertical mounting of the electric motor.
- 5. Secondary (Intermediate) Reduction Unit: The primary reduction unit shall be mounted on the top of the final reduction unit and properly registered to maintain accurate centers for the final reduction gearing.
 - a) The secondary (intermediate) reduction unit shall have sufficient bearing capacity to fully support the pinion gear without a lower support bearing.
 - b) The L10 life of the primary gearbox bearings shall be in excess of 100,000 hours at 51,000 ft-lbs operating torque.
 - c) The primary reducer shall be AGMA rated for 10 million cycles, when drive is operating at the continuous output torque of 51,000 ft-lbs.
 - d) The primary reduction unit shall be coated with two part epoxy paint for high corrosion resistance.
- 6. Final Reduction Unit:
 - a) The final reduction housing shall be manufactured from A36 steel plate. All welds shall conform to applicable specifications of the ASME. After welding, all mounting and mating surfaces shall be machined to insure proper fit and alignment of the drive pinion and mating gear. The base plate on which the gear and bearing is mounted shall be flat within 0.005”. The steel plate to which the intermediate pinion drive gearbox is mounted shall be a minimum of 1.25” thick.
 - b) The final reduction unit gear shall be machined to AGMA grade 6 or higher. Gear teeth shall have a core hardness of 250 to 300 BHN, and be induction hardened to 55 Rc. The main gear set shall be rated per AGMA Standard 2001-C95 for 20 years at a continuous torque load of at least 51,000 ft. lbs. Gear pitch diameter shall be a minimum of 42”.
 - c) The final reduction unit pinion shall be made of heat-treated alloy steel and shall be mounted on the output shaft of the intermediate reduction gearbox. The gear teeth shall be induction hardened to 55 to 60 Rc.
 - d) The bearing shall have a seal to prevent contamination of the bearing raceway. The bearing shall have a L10 life in excess of 100 years.
 - e) The final reduction housing shall employ a hermetic seal and a neoprene seal between the housing and the main gear driven rotating member to prevent passage of air or water into the final reduction housing.
 - f) The final reduction housing shall employ a desiccant filter with sufficient capacity to absorb any moisture entering the final reduction housing for a period for 5 years.
- 7. Electric Motor: The drive motor shall be Mill & Chemical Duty, TEFC, 1.15 Service Factor, Class F insulation.
- 8. All lubrication shall be of the totally enclosed grease design and lubricants shall be NSF 61 approved.
- 9. The drive shall be designed for the specified continuous torque rating. Continuous torque shall be defined as the minimum torque at which the drive mechanism may operate continuously 24 hours per day, 365 days per year, for 20 years, at the maximum specified

sludge collector arm speed. Main gear calculations shall be based upon the referenced AGMA standards for rating the pitting resistance and bending strength.

10. Torque indication and overload protection:
 - a) The torque overload protection device shall be attached to the primary reduction unit, and activated by the torque reaction of the primary reduction unit.
 - b) The torque load of the drive unit shall be indicated on a stainless steel 6 inch diameter torque gauge in ft-lbs.
 - c) The torque overload protection device shall activate an alarm switch, a motor cutout switch, and provide contact closures for remote alarm and motor cut-out. The alarms and motor cutout switches in the device shall be factory calibrated and set to the required torque. The settings shall be as follows:
 - (1) Alarm switch set at 40% of design torque
 - (2) Motor cutout switch set at 85% of design torque
 - (3) Back-up shear pin set at 100% of design torque
 - d) The switches shall be mounted in a NEMA 4X metallic enclosure with an integral conduit box and terminals.
 - e) Amperage and current sensing drives are not acceptable.
 - f) An alarm horn and light shall be furnished by the equipment manufacturer and installed on the mechanism bridge by the Contractor. The alarm shall be enclosed in a weatherproof housing with a non-corrodible industrial type horn, relay, and reset button. The alarm unit shall be wired for operation on 110 volt, single-phase current. Coordinate the alarm with the controls called out on the electrical drawings to achieve both functions described here and those called out in electrical work.
 - g) In addition to alarm and cutoff, the drive unit is also protected by a shear pin.

B. CENTER DRIVE PLATFORM

1. A new center drive platform shall be furnished by the clarifier manufacturer and installed by the contractor.
2. The center drive platform shall support the necessary loads with sufficient safety factor and shall connect to the existing access walkway/bridge.
3. The center drive platform shall be constructed of aluminum or stainless steel checker plate and be of sufficient size for safe and comfortable operator access during all anticipated maintenance activities (minimum platform size shall be 7'7" x 7'7").
4. The platform shall have aluminum handrail with two horizontal crossbars, aluminum kick plates, and be secured with Allen head inset screws (not rivets).

C. ACCESS WALKWAY/BRIDGE

1. Contractor shall remove, blast, paint, reinstall, and reuse existing painted steel support beams for the access walkway/bridge. See Section 99600 – High Performance Paints and Coatings. Contractor and clarifier manufacturer shall field measure existing clarifier structure, center drive platform, and access walkway/bridge prior to clarifier shop drawing preparation and submittal.

D. STATIONARY CENTER COLUMN

1. A new stationary center column shall be furnished by the clarifier manufacturer and installed by the contractor.

2. The stationary center column shall have a minimum ¼" wall thickness with the diameter as listed in the Equipment Design Criteria (Section 2.2B).
3. The column shall be designed to support the weight of the entire structure resting upon it and to withstand the mechanism design strength criteria.

E. CENTER TORQUE CAGE

1. The center torque cage shall be a steel box truss construction with connections for the sludge removal arms.
2. The cage top shall bolt to the main gear.
3. The cage shall be designed to withstand the mechanism's design torque.

F. SLUDGE COLLECTOR ARMS

1. The sludge collector arms shall be of steel truss construction with segmented steel scraper blades and adjustable stainless steel squeegees.
2. Squeegees shall be 316SS and fastened to the rake blade with 316 stainless steel fasteners.
3. Blades shall properly convey settled sludge to the sludge pocket.
4. The arms shall be adjustable.
5. The existing grout in the bottom of the clarifiers will be used. No new grout needs to be swept in.

G. ANCHOR BOLTS AND FASTENERS

1. Anchor bolts shall be 304 stainless steel and be furnished by the equipment manufacture. All fasteners shall be 304 stainless steel.

H. SURFACE PREPARATION AND COATING

1. Drive mechanisms shall be primed and finished with the manufacturer's standard paint system
2. Submerged steel surfaces shall be prepared according to SSPC-SP5 (white metal blast).
3. All steel surfaces shall receive three (3) coats of NSF-61 approved Hi-Build Epoxy (each coat 4.0-6.0 mils). Contractor to touch up paint in the field.

2.4 SPARE PARTS

- A. The intent of this Specification is to provide uninterrupted operation for a minimum period of two (2) years. To meet this objective, the clarifier manufacturer shall supply any spare parts, excluding lubricants, which are required to meet this time frame.

2.5 WELDING

- A. All welding practices shall be in accordance with the requirements of the American Welding Society (AWS) "Welding in Building Construction". All welders shall be certified in accordance with this AWS specification for any welding work performed under this section.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The clarifier mechanisms shall be installed in accordance with the manufacturer's recommendations. Prior to start-up of the clarifier equipment, a field service engineer employed directly by the clarifier manufacturer shall inspect the assembled equipment, make necessary minor final adjustments and certify the equipment ready for operation.

3.2 SERVICE

- A. The clarifier manufacturer shall supply a factory trained field service representative to inspect the assembled equipment, make necessary minor final adjustments, certify the equipment ready for operation, perform a static torque test, and instruct the owner's personnel in the proper operation and maintenance of the clarifier equipment. As a minimum, the field service representative shall provide four (4) eight (8) hour days of service in four (4) separate trips. Field service representative service visits shall be conducted during installation and at start-up of each of the two (2) clarifiers. Note that the two (2) clarifiers shall be installed and started at different times so the installation and start-up service visit for each of the two (2) clarifiers shall be at different times.
- B. Inspection by a representative of the clarifier manufacturer who is not a direct, full time employee of the manufacturer is not acceptable.
- C. Provide one (1) day for two (2) training sessions prior to the formal start up of the first unit. The unit shall operate continuously with no malfunctions for two weeks prior to acceptance.

3.3 MECHANICAL TESTING AND CERTIFICATION

- A. After start-up and prior to final acceptance, the Contractor shall conduct Owner/Engineer witnessed performance demonstration tests, including a field torque test, on the clarifier mechanisms. The purpose of the torque test is to verify the structural integrity of the mechanism structural steel design and center drive unit. The testing shall be carried out under the supervision of the equipment manufacturer's representative and as approved by the Owner/Engineer before the mechanisms are accepted and placed into operation.
- B. The torque test shall consist of securing the rake arms by cables to anchor bolts installed by the contractor in the tank floor at locations specified by the equipment manufacturer. A load shall be applied to the scraper arm by means of a ratchet lever and cylinder connected to the cable assembly.
- C. The magnitude of the applied load shall be measured by calculating the torque from the distance of the line of action of the cable to the center line of the mechanism. Readings shall be taken at 40%, 85%, and 100% of the drive design torque.
- D. The manufacturer's service representative shall verify that the alarm, motor cut-out, and back up safety motor cut-out switches are properly set and are in proper operation to protect the clarifier mechanism as specified.

- E. After the torque testing is complete, the field service representative shall cause the clarifier mechanisms to perform all mechanical functions that the mechanisms are designed to perform. Tests shall be scheduled with the Owner/Engineer at least two (2) weeks prior to the planned test date.
- F. The field service representative shall submit to the Owner/Engineer a written report stating that the equipment has been checked and is suitable for operation.

END OF SECTION 464380

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

Addendum 1 dated December 11, 2020

Addendum 2 dated December 29, 2020

Addendum 3 dated January 8, 2021



ADDENDUM NO. 1

Fort Thomas Treatment Plant Basin Improvements Phase 2 of WX21117210 Fort Thomas, Kentucky

GRW Project No. 4789

December 11, 2020

SPECIFICATIONS

- 1. Specification 00300 – Bid Form: [Replace specification in its entirety with the attached]**

PRE-BID MEETING MINUTES

1. The Pre-Bid Meeting minutes are attached. The Pre-Bid Meeting was held virtually on December 9, 2020 at 10:00 am.

CONTRACTOR QUESTIONS AND ANSWERS

SET 1

Q1: The bidding requirements say to provide two copies of the bid form and bid bonds. Are these to both be originals and is this required?

A1: Bidders are to submit the original plus one copy of the bid form, bid bonds, and affidavits. All other documents required as part of the bid submittal (i.e. Certification Regarding Debarment, Suspension and Other Responsibility Matters, Certification Regarding Lobbying, Statement of Bidder's Qualifications, Bidder's Experience Record, Proposed Subcontractors) require one original copy only.

Q2: During our demolition phase of basins 1 and 4 in both the clarifiers and the flocculators, are we responsible for removal of any sludge or sand in the bottom of these basins?

If so – can we wash them through any drain lines or do we need to mechanically lift the debris out of the basins? If that is the case, can we get in the basin with skid steer loaders and other rubber tired equipment?

We have found, especially in the flocculation basins, that this sludge can get up to 5 or 6 feet deep.

A2: NKWD staff will take care of cleaning out the basins prior to handing them over to the contractor.



Q3: Are we to reuse the existing grating on the existing bridges to the clarifiers?

A3: Yes.

Q4: In regards to concrete rehabilitation, except for where we cut the concrete columns and beams away from the existing floors and walls, what other concrete rehab is required? Normally we find a schedule of quantities to bid and then field measure what we actually repair. Is there any specific spalling or crack repair required?

A4: This information will be provided in a future addendum which we intend to issue before the end of the year.

GRW Engineers, Inc.

Todd Solomon, PE
Project Manager

Attachments:

Specification Section 00300 – Bid Form
Pre-Bid Meeting Minutes
Plan Holder's List

Section 00300

BID FORM

PROJECT IDENTIFICATION: **Fort Thomas Treatment Plant Basin Improvements – Phase 2 (Phase 2 of WX21117210)**

THIS BID IS SUBMITTED TO:

Northern Kentucky Water District (Owner)
P.O. Box 18640
2835 Crescent Springs Road
Erlanger, Kentucky 41018

THIS BID IS SUBMITTED BY: _____
(Bidder's Company Name)

1. 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 all Work as specified or indicated in the Contract Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.
2. Bidder accepts all of the terms and conditions of the Invitation to Bid and the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 calendar days after the Bid opening, or for such longer period of time to which the Bidder may agree in writing upon request of Owner. Bidder understands that certain extensions to the time for acceptance of this Bid may require the consent of the surety for the Bid Bond.
3. In submitting this Bid, Bidder represents and covenants, as set forth in the Agreement, that:
 - a. Bidder has examined and carefully studied the Contract Documents, the other related data identified in the Contract Documents, and the following Addenda, receipt of all of which is hereby acknowledged:

No. _____ Dated _____
No. _____ Dated _____
No. _____ Dated _____
 - b. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - c. Bidder is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

- d. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary explorations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.
- e. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- f. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- 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 Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Owner is acceptable to Bidder.
- i. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
- j. **[Check the one that applies]**

_____ Bidder is a “resident bidder” as defined in KRS 45A.494(2) of Kentucky’s resident bidder reciprocal preference statute AND submits with this Bid a properly executed and notarized Affidavit that affirms that Bidder meets the resident bidder criteria, which Affidavit is hereby incorporated herein and made a part of this Bid.

OR

_____ Bidder is a “nonresident bidder” as defined in KRS 45A.494(3) of Kentucky’s resident bidder reciprocal preference statute AND its principal place of business as identified its Certificate of Authority to transact business in Kentucky as filed with Kentucky’s Secretary of State or, if Bidder hereby represents and covenants that it is not required to obtain a Certificate of Authority to transact business in Kentucky, its mailing address, is:

- k. Bidder's Organization Number from Kentucky's Secretary of State is #_____ [if applicable] and Bidder is qualified to transact business in the State of Kentucky or hereby covenants to obtain such qualifications prior to award of the Contract.
4. Bidder further represents that this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.
5. The Bidder understands and agrees that during the performance of the Contract, it shall maintain a presence within such proximity of the Site which will allow it to respond to an emergency at the Site within one hour of receiving notice of an emergency, including emergencies occurring during non-working hours. The Bidder shall provide a list of emergency phone numbers for such purposes. If the Bidder does not have such a presence, it may satisfy this requirement by sub-contracting with a sub-contractor that does have such a presence, provided that any such sub-contractor must be approved by the Owner, in its sole discretion, prior to the project pre-construction meeting.
6. Bidder will complete all the Work described in the specifications and drawings for the following price:
- Notes:
1. Bids shall include sales tax, where required, and all other applicable taxes and fees.
 2. A Contract award will be based on the lowest responsive, responsible bidder based on the Base Bid Equipment Manufacturers, unless all bids are rejected. All bids shall not be rejected without proper justification. The Owner reserves the right to select any, all, or none of the alternates. Alternates will not be used to determine the lowest responsive, responsible bidder.

Total Lump Sum Bid (Based on Base Bid Equipment Manufacturers) of:

\$ _____ in numbers

and _____ in words.

Alternative Equipment Information			
Equipment Item	Base Bid Equipment Manufacturer	Alternate Bid Equipment Manufacturer	Lump Sum Add / Deduct
1. Vertical Hyperbolic Flocculators	Invent Environmental Technologies, Inc.	a.	a.
		b.	b.
		c.	c.

- Notes:
- a. The design has been completed using listed Base Bid equipment manufacturers. Should the Owner select other Alternate Bid equipment, the Bidder, at no additional cost to the Owner, shall make any changes to structures, bridges/walkways, baffle walls, concrete walls/columns, piping, controls, electrical, instrumentation, mechanical, architectural, preliminary & final evaluations, engineering design, etc. that may be necessary to accommodate this equipment and provide Computational Fluid Dynamic (CFD) modeling in the case of alternate equipment to the vertical hyperbolic flocculators.
 - b. Space is provided within the above table for BIDDERS to offer lump sum additions or deductions for alternate equipment not listed under the Base Bid equipment manufacturer. BIDDERS are not required to offer alternate equipment. If the BIDDER chooses to offer alternate equipment, Bidder shall enter an amount for each alternate for furnishing and installing the equipment and also must indicate whether the alternate is an add or deduct by circling the word which does apply and crossing out the word which does not apply. If no amount is entered, Bidder agrees to furnish and install any listed alternate equipment at no change in cost. If neither add nor deduct is identified as stated herein, the Bidder agrees to furnish and install the alternate equipment as a deduct. Should the Bidder choose to offer for consideration to the Owner, any alternate manufacturers to those listed above, the Bidder shall provide a detailed submittal of applicable items such as catalog cut sheets, pump curves, hydraulic calculations, specifications, wiring diagrams, technical literature, dimensional drawings, etc., or any other information requested by the Owner. This submittal information shall be provided to the Owner within 72 hours of request for proper evaluation. These submittal items shall be in addition to the submittal requirements listed in the respective technical specifications section of the equipment item or product hereinafter. Alternates will not be evaluated or pre-qualified prior to Bid opening.
 - c. The best, lowest Bidder will be determined based on the equipment being provided by the Base Bid Equipment Manufacturers.

Total Lump Sum Deduct (for removing the Basin 2 & 3 Plate Settlers from the project) of:

\$ _____ in numbers

and _____ in words.

The lump sum deduct for removing the Basin 2 & 3 plate settles from the project will not be used to determine the best, lowest bidder.

7. Bidder agrees that the Work will be substantially complete within 660 calendar days after the date when the Contract Times commence to run as provided in paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.07.B of the General Conditions within 730 calendar days after the date when the Contract Times commence to run.

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

8. References

Contact Person	Company Name	Phone No.	Project Name
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____

SUBMITTED on _____, 2021.

9. Communications concerning this Bid shall be sent to Bidder at the following address:

10. The terms in this Bid, which are defined in the General Conditions included as part of the Contract Documents, have the meanings assigned to them in the General Conditions.

SIGNATURE OF BIDDER

If an Individual

Name (typed or printed): _____

By _____ (SEAL)
(Individual's signature)

doing business as _____

Business address _____

Phone No.: _____ Fax No.: _____

Date _____

If a Partnership

Partnership Name: _____ (SEAL)

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

Name (typed or printed): _____

Business address _____

Phone No. _____ Fax No.: _____

Date _____

If a Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____

Type (General, Professional Service): _____

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

Name (typed or printed): _____

Title: _____ (CORPORATE SEAL)

Attest _____

Business address _____

Phone No. _____ Fax No.: _____

Date _____

If a Limited Liability Company

Company Name: _____ (SEAL)

State of Organization: _____

Type (General, Professional): _____

By _____
Signature of Member or Manager (as applicable) - attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____ (COMPANY SEAL)

Attest _____

Business address _____

Phone No. _____ Fax No.: _____

Date _____

If a Joint Venture

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

Joint Venturer Name: _____ (SEAL)

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

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ Fax No.: _____

Date _____

Joint Venturer Name: _____ (SEAL)

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

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ Fax No.: _____

Date _____

**Fort Thomas Treatment Plant Basin Improvements
Phase 2
NKWD, Erlanger, KY**

**GRW Project No. 4789
Date: December 9, 2020**

1. Please note that the Bidding Documents stand as issued. Nothing discussed during the pre-bid meeting will be construed to have changed the intent of the Bidding Documents. Any potential modification, which may be discussed during the meeting, will not become official until issued in an Addendum.

2. Project Consists of:
 - a. Rapid Mix No. 2
 - i. Demo existing rapid mixer. Furnish and install new rapid mixer.
 - ii. Demo existing support beams. Furnish and install new support beams for plastic cover plates over rapid mix.
 - iii. Install 2" PVC chemical feed pipes (4) on the wall.
 - iv. Demo existing UHMWP anti-friction guides and furnish and install new UHMWP anti-friction guides on stop gate guide channels.
 - v. Furnish and install associated electrical improvements.

 - b. Basin Nos. 1 and 4
 - i. Demo existing horizontal paddlewheel flocculators (3-stage). Furnish and install new vertical hyperbolic flocculators (2-stage). Furnish and install new flocculator bridges/walkways with aluminum grating, handrails and toeplates. Furnish and install new VFDs for new vertical hyperbolic flocculators in chemical building.
 - ii. Demo existing concrete columns and redwood baffles between existing flocculation stages 1 & 2 and 2 & 3
 - iii. Demo existing redwood baffles on existing concrete columns and cross beams between the flocculation zone and the sedimentation zone (but do not demo the concrete columns and cross beams between the flocculation zone and the sedimentation zone).
 - iv. Construct new concrete columns between new flocculation stages 1 & 2 and furnish and install new FRP baffles on the columns. Furnish and install a new 24-inch x 24-inch slide gate with electric actuator in the baffle wall.
 - v. Refurbish the concrete columns and cross beams between the flocculation zone and the sedimentation zone and the concrete tank walls in the flocculation zone. Furnish and install new FRP baffles on the concrete columns and cross members. Furnish and install new a 24-inch x 24-inch slide gate with electric actuator in the baffle wall.

- vi. Demo the existing PVC tube settlers in the sedimentation zone. Furnish and install new stainless steel inclined plate settlers. Relocate existing 20-inch overflow in Basin 4 as part of inclined plate settler installation.
- vii. Demo existing circular clarifier, center column, platform, drive and controls. Furnish and install new circular clarifier, center column, platform, drive and controls. Remove, refurbish and reinstall existing clarifier bridges by blasting and painting the support beams and stair stringers.
- viii. Blast and paint pipe and fittings inside basins
- ix. Furnish and install new davit crane base mounts and fiberglass ladders at locations shown on drawings in Basins 1 and 4.
- x. Demo the existing 8-inch sludge valves and electric actuators. Furnish and install new sludge valves and electric actuators (1 at each basin). Flexible electrical/control cord on the Basin 1 valve. Straight valve stem extension on Basin 4 valve.
- xi. Furnish and install associated electrical improvements and controls including new PLCs in chemical building.
- xii. For Basin 1 only, demo the concrete walls and top slab of the dry vault for the existing horizontal paddlewheel flocculator gears. Retain the concrete columns and cross members embedded in the wall. Construct new concrete cross member. Associated work includes furnishing and installing new aluminum handrail and toe plate and relocating light poles and electrical receptacles.

c. Sodium Hypochlorite Building

- i. Demo existing sodium hypochlorite discharge piping, valves, actuators, electrical and appurtenances from peristaltic pump discharges to pressure relief valves on overhead pipe rack. Furnish and install new tubing inside new PVC carrier pipe from peristaltic pump discharges to pressure relief valves reusing existing overhead pipe rack.
- ii. Remove existing deteriorated fiber-reinforced vinyl ester coating on floor beneath overhead pipe rack and on sides of select peristaltic pump pedestals (220 sq. ft. total; 200 sq. ft. on horizontal surfaces and 20 sq. ft. on vertical surfaces). Furnish and apply new fiber-reinforced vinyl ester coating to protect floor and peristaltic pump pedestals from sodium hypochlorite.

d. Basin Nos. 2 and 3

- i. Demo the existing PVC tube settlers in the sedimentation zone. Furnish and install new stainless steel inclined plate settlers. This work is included as a deductive alternate on the bid form.
- ii. Demo top row of concrete block on wall between sedimentation zone and effluent trough. Construct cast-in-place concrete vertical extension on top of wall.

3. Photos of empty basins & as-built drawings of Basins 1, 2, 3 and 4
4. Contractor will be responsible for obtaining local electrical permit
5. Addendum
 - a. Plan to issue an addendum before end of year
6. Equipment and material specifications include a list of referenced vendors and “or equal”. We will not be adding to the list of referenced vendors in the equipment and material specifications during bidding. To be considered equal all provisions of the specification must be met.
7. Site Visits
 - a. Arrange site visits through Kyle Ryan of Northern Kentucky Water District at 859-426-2713 a minimum of 72 hours in advance of the requested site visit.
 - b. You can’t just show up to the site for a visit.
 - c. Visitors are required to provide and utilize their own facemask and gloves while visiting the site due to the pandemic.
8. Contract Times:
 - a. 660 days for substantial completion
 - b. 730 days for final completion
 - c. Basins may only be taken out of service November 1 through April 15
 - d. Only one basin may be taken out of service at any given time (except for short period of time when work is being completed on Rapid Mix No. 2)
 - e. Must obtain NKWD advance approval before taking a basin out of service
 - f. Work in the Sodium Hypochlorite Building needs to be completed as soon as possible (only one Sodium Hypochlorite peristaltic pump and discharge line may be out of service at any given time).
9. Last day for questions – January 6, 2021 at 5:00 pm EST
 - a. Please email questions to Todd Solomon (tsolomon@grwinc.com) and Joan Drozd (jdrozd@grwinc.com). Questions will be answered via addendum so all plan holders receive the questions and answers.

10. The following items must be submitted with the Bid:
 - a. Bid Form
 - b. Certification Regarding Debarment, Suspension and Other Responsibility Matters - EPA Form 5700-49 (Attachment No. 9 – Section 00810)
 - c. Certification Regarding Lobbying (Attachment No. 10 – Section 00810)
 - d. Statement of Bidder's Qualifications (Attachment No. 1)
 - e. Bidder's Experience Record (Attachment No. 2)
 - f. Proposed Subcontractors (Attachment No. 3)
 - g. Bid Security (Specification Section 00410)
 - h. Non-Collusion Affidavit (Specification Section 00460)
 - i. Required Notarized Affidavit for Bidders, Offerors, and Contractors Claiming Kentucky Resident Bidder Status (Specification Section 00470)

11. Bids are due and will be opened on January 13, 2021 at 2:00 pm EST
 - a. Location: 2835 Crescent Springs Road, Erlanger, Kentucky.
 - b. Bids can be mailed or dropped off at the drive thru window.
 - c. Do not mail or drop off bids to the treatment plant.
 - d. This will be a virtual bid opening due to the pandemic.
 - e. Emailed bids are not allowed.

12. Bid Award:
 - a. Recommendation of Award will need to be approved at NKWD's January 21st Board of Commissioners Meeting.
 - b. This project requires Public Service Commission (PSC) and KIA/DOW approval which can take an additional 90 days following bid opening.
 - c. A Contract award will be based on the lowest responsive, responsible bidder based on the Base Bid Equipment Manufacturers listed on the Bid Form. Alternates will not be used to determine the lowest responsive, responsible bidder. Bidders are not required to offer alternate equipment. Alternates will not be evaluated or pre-qualified prior to bid opening.

13. Engineer's Estimate: \$8,460,000

14. **Question No. 1** – Can bids be emailed?

Answer to Question No. 1: No. NKWD is not set up to receive emailed bids.

15. **Question No. 2** – Can you expand on the requirement to conduct 300 lb field tests on the inclined plate settlers? Who is expected to conduct the 300 lb field tests?

Answer to Question No. 2: The inclined plate settler specification clearly defines the requirements for the 300 lb field tests. The contractor is to conduct the field tests with assistance from the inclined plate settler manufacturer. The 300 lb concentrated live load is to be placed at a single point at the mid-point of a single top flow control device. The field test is to be repeated for a single top flow control device in each plate settler pack. The single point is to be a wedge. If a field test fails the entire plate settler pack shall be replaced at no cost to the Owner.

NKWD-Ft. Thomas Treatment Plant Basin Improvements-Phase 2

Plan Holders

	Company Information	CSI Codes	Contact Information	Status Date Filled	Delivery Method Tracking Number	Sets Issued
50633	Allied Construction Industries 3 Kovach Drive Cincinnati, OH 45215	01006 - Planrooms	Dan Wright Phone: (513) 221-8020 Fax: (513) 221-8023 dwright@aci-construction.org	Filled	Delivery - N/A (Downloads or Other)	
50620	BL Anderson 8887 Eagle Ridge Court West Chester, OH 45069	11000 - Equipment	Dave Wilson Phone: (513) 889-4746 Fax: dwilson@blanderson.com	Filled	Delivery - N/A (Downloads or Other)	
50625	Builders Exchange 9555 Rockside Rd. Suite 300 Valley View, OH 44125	01006 - Planrooms	Cyndi Thornton Phone: (866) 907-6300 Fax: (866) 907-6304 cthorton@bxohio.com	Filled	Delivery - N/A (Downloads or Other)	
50632	Builders Exchange of Kentucky 2300 Meadow Drive Louisville, KY 40218	01006 - Planrooms	Ashlan Briggs Phone: (502) 459-9800 Fax: (502) 459-9803 abriggs@b Kentuck y.com	Filled	Delivery - N/A (Downloads or Other)	
50605	Building Crafts, Inc. 2 Rosewood Drive Wilders, KY 41076	01000 - General Contractor	Brad Miller Phone: (859) 781-9500 Fax: (859) 781-9505 bmiller@buildingcrafts.com	Filled	Delivery - N/A (Downloads or Other)	
50608	ConstructConnect 30 Technology Parkway S Suite 100 Norcross, GA 30092	01006 - Planrooms	Ryan Cahill Phone: (513) 458-8602 Fax: ryan.cahill@constructconnect.com	Filled	Delivery - N/A (Downloads or Other)	
50607	Dodge Data & Analytics 4300 Beltway Place Arlington, TX 76018	01006 - Planrooms	Jayalakshmi L Phone: (866) 260-9240 Fax: jayalakshmi@construction.com	Filled	Delivery - N/A (Downloads or Other)	
50647	Dugan & Meyers LLC 11110 Kenwood Road Cincinnati, OH 45242	01000 - General Contractor	Ted Wagner Phone: (513) 891-4300 Fax: (513) 894-0704 twagner@dugan-meyers.com	Filled	Delivery - N/A (Downloads or Other)	
50639	Electrical Process Solutions LLC. 2140 Schappelle Lane Cincinnati, OH 45240	16000 - Electrical	Wayne Jankovich Phone: (513) 266-3367 Fax: wjankovich@eps-industrial.com	Filled	Delivery - N/A (Downloads or Other)	
50626	Ferguson Plant Division 10039 Industrial Drive Pineville, NC 28134	03200-Supplier	Brooke Myers Phone: (704) 554-0383 Fax: brooke.myers@ferguson.com	Filled	Delivery - N/A (Downloads or Other)	
50630	Glenwood Electric Inc. 12250 Chandler Dr. Walton, KY 41094	16000 - Electrical	Laura Rider Phone: (859) 485-3700 Fax: (859) 485-3701 lsb@glenwoodelectric.com	Filled	Delivery - N/A (Downloads or Other)	
50600	GRW-Louisville 9710 Bunsen Parkway Louisville, KY 40299	00000 Owner 00000 Owner	Todd Solomon Phone: (502)489-8484 Fax: (502)489-8485 tsolomon@grwinc.com	Filled	Delivery - N/A (Downloads or Other)	
50641	Howell Contractors, Inc 955 Congress Park Drive Centerville, OH 45459	01000 - General Contractor	Eric Yerian Phone: (937) 907-1230 Fax: (937) 250-6197 eyerian@howellcontractors.com	Filled	Delivery - N/A (Downloads or Other)	
50648	Judy Construction Company 103 S. Church Street Cynthiana, KY 41031	01000 - General Contractor	Owen Yocum Phone: (859) 234-6900 Fax: (859) 234-3480 owen@judyconstructionco.com	Filled	Delivery - N/A (Downloads or Other)	
50651	MAC Construction & Excavating, Inc. 1908 Unruh Court New Albany, IN 47150	00000 Owner 00000 Owner	April Glover Phone: (812) 941-7895 Fax: estimator@macconstruction.com	Filled	Delivery - N/A (Downloads or Other)	
50649	MAC Industrial Coatings 901 E 3rd Street Mount Vernon, IN 47620	09900 - Paints and Coatings	Daine Goolsby Phone: (812) 306-5987 Fax: (812) 838-4457 dgoalsby@macindustrialservices.net	Filled	Delivery - N/A (Downloads or Other)	

50602	Northern Kentucky Water District 2835 Crescent Springs Rd. Erlanger, KY 41018	00000 Owner 00000 Owner	Amy Kramer Phone: (859) 578-9898 Fax: akramer@nkywater.org	Filled	Delivery - N/A (Downloads or Other)
50603	Northern Kentucky Water District 2835 Crescent Springs Rd. Erlanger, KY 41018	00000 Owner 00000 Owner	Kyle Ryan Phone: (859) 578-9898 Fax: kryan@nkywater.org	Filled	Delivery - N/A (Downloads or Other)
50652	Pace Contracting, LLC 15415 Shelbyville Road Louisville, KY 40245	01001 Prequalified Contractor	Latavia Scott Phone: (502) 815-4142 Fax: (502) 583-6375 lscott@pacecontractingllc.com	Filled	Delivery - N/A (Downloads or Other)
50650	Ragle Inc. 5266 Vann Road Newburgh, IN 47629	01000 - General Contractor	Angela Ward Phone: (812) 853-9558 Fax: (812) 853-9578 award@ragleinc.com	Filled	Delivery - N/A (Downloads or Other)
50645	Smith Contractors, Inc. 1241 Bypass N. Lawrenceburg, KY 40342	01000 - General Contractor	Codee Guffey Phone: (502) 839-4196 Fax: (502) 839-8348 cg@sci82.com	Filled	Delivery - N/A (Downloads or Other)
50653	Structural Systems Repair Group 2824 Stanton Ave. Cincinnati, OH 45206	03000 - Concrete	Andrew Ciborek Phone: (513) 751-7774 Fax: Estimating@ssrg.com	Filled	Delivery - N/A (Downloads or Other)
50601	Sullivan Environmental Technologies, Inc. 2146 Chamber Center Drive Ft. Mitchell, KY 41017	11000 - Equipment	Daniel Sullivan Phone: (859) 426-5178 Fax: (859) 426-5177 dan@sullivanenvtec.com	Filled	Delivery - N/A (Downloads or Other)
50655	The Blue Book P.O. Box 500 Jefferson Valley, NY 10535	01000 - General Contractor	Kathy Stein Phone: (800) 431-2584 Fax: kstein@mail.thebluebook.com	Filled	Delivery - N/A (Downloads or Other)

ADDENDUM NO. 2

Fort Thomas Treatment Plant Basin Improvements Phase 2 of WX21117210 Fort Thomas, Kentucky

GRW Project No. 4789

December 29, 2020

SPECIFICATIONS

- 1. Specification 015000 – Temporary Facilities and Controls – [Delete Items 2.1, J (Project Sign) and 2.1, L (Resident Project Representative’s Field Office)]**

See *bold, italic text* in Item 2.1 in attached revised specification.
- 2. Specification 013213 – Contractor’s Sequence of Construction Schedule – [Add Item 1.1.E Regarding Completing PLC Work and Work in Sodium Hypochlorite Building As Soon As Possible]**

See *bold, italic text* in Item 1.1.E in attached revised specification.
- 3. Specification 464210 – Fiberglass Reinforced Plastic (FRP) Baffle Wall - [Add Item 2.2, I, 1 and revise Items 2.2, F, 1 and 2.2, G, 2]**

See *bold, italic text* in Item 2.2 in attached revised specification.
- 4. Specification 464300 – Inclined Plate Settler System - [Add Item 2.9, B and revise Item 2.10, A]**

See *bold, italic text* in Item 2.9, B and Item 2.10, A in attached revised specification.
- 5. Specification 035550 – Concrete Toppings, Resurfacing, and Rehabilitation - [Modify as follows]**

Edited product references. See attached revised specification.
- 6. Delete Specification 030132 – Concrete Rehabilitation by Patching, Resurfacing and Reforming**
- 7. Specification 40910 - Pre-Qualification Process Control and Instrumentation Systems – [Modify the following]**

As a result of PLC6 changing to a 4th rack of PLC2, delete paragraph 1.1, E, 2, a.

Delete all references to PLC6.

Revised specification not attached. Specification revision will be included in Conformance Specifications.

8. Specification 40910 - Pre-Qualification Process Control and Instrumentation Systems – [Add the following]

Add paragraph 1.1, E, 3. Paragraph shall read as follows:

“This System Integrator will be responsible for updating the PLC tag database and the SCADA HMI screens as a result of the instruments being removed from the Sodium Hypochlorite System. Refer to Sodium Hypochlorite Building Plan – Electrical Demolition, Sheet E-05-101 for additional information.”

Revised specification not attached. Specification revision will be included in Conformance Specifications.

9. Specification 409030 - Measurement and Control Commissioning – [Modify the following]

As a result of PLC6 changing to a 4th rack of PLC2, delete paragraph 1.1, D.

Delete all references to PLC6.

Revised specification not attached. Specification revision will be included in Conformance Specifications.

10. Specification 409443 - Programmable Logic Process Controllers – [Modify the following]

As a result of PLC6 changing to a 4th rack of PLC2, modify paragraph 1.1, C as follows:

“The PLC software shall be provided by the Contractor. For PLC1 and PLC2, software programming shall be performed by a separate Contract (Owner’s SCADA Design and Construction 2020 project).”

Revised specification not attached. Specification revision will be included in Conformance Specifications.

11. Specification 409513 - Process Control Panels and Hardware – [Modify the following]

Modify paragraph 2.1, A, 3, q to reference “Moxa EDS-G512E series” Ethernet switches in lieu of Allen Bradley Stratix 8300.

Revised specification not attached. Specification revision will be included in Conformance Specifications.

12. Specification 409620 - Instrument Lists and Reports – [Modify the following]

As a result of PLC6 changing to a 4th rack of PLC2, modify paragraph 1.1, C as follows:
“PLC1 and PLC2 will have PLC software programming performed by a separate Contract (Owner’s SCADA Design and Construction 2020 project).”

Revised specification not attached. Specification revision will be included in Conformance Specifications.

13. Specification 409620 - Instrument Lists and Reports – [Modify the following]

As a result of PLC6 changing to a 4th rack of PLC2, delete paragraph 1.1, D.

Revised specification not attached. Specification revision will be included in Conformance Specifications.

DRAWINGS

1. Drawing G-00-003 – [Modify the following]

- a. Add sheet S-00-004 General Structural Notes and Typical Details.
- b. Revised drawing attached.

2. Drawing M-01-102 – [Modify the following]

- a. Revise Keynotes 4, 23 and 24.
- b. Add Keynote 29 regarding hand-pull gate at end of plate settler trough.
- c. Add Keynote 30.
- d. Revised drawing attached.

3. Drawing M-01-302 – [Modify the following]

- a. Modify Keynote 14 to read: 14. Install 5,000 psi grout.
- b. Modify Keynote 15 to read: 15. 24” x 24” slide gate with electric actuator, self-contained frame, and actuator pedestal.
- c. In Section 1 eliminated the text “El. 780.50” at two locations.
- d. Add top of baffle elevation of 779.42 at baffle wall between floc zone and sed zone.
- e. Add top of flocculator bridge/walkway elevation of 782.89.
- f. At end of Keynote 19 add the following sentence: Use epoxy anchors with S.S. bolts to anchor angles/beams into original basin concrete floor (not new grout).
- g. Revised drawing attached.

4. Drawing M-01-502 - [Modify the following]

- a. Modify Keynote 4 to read: 4. 24” x 24” slide gate with electric actuator, self-contained frame, and actuator pedestal.

- b. In Keynote 10 change 11.58 to 11.76 and change 8.75 to 9.92.
- c. At the end of Keynote 10 add the following sentence: Top of vertical panels to be 1” below basin water surface elevation.
- d. Modify Keynote 15 to read: 15. Install 5,000 psi grout.
- e. At the end of Keynote 17 add the following sentence: Use epoxy anchors with S. S. bolts to anchor angles/beams into original basin concrete floor (not new grout).
- f. Add Keynote 19 to read: 19. Slide gate frame shall have solid S. S. plate behind valve stem on upstream side of slide gate which is welded or bolted to frame.
- g. Add top of flocculator bridge/walkway elevation of 782.89 to Sections 1, 2, and 3.
- h. Revised drawing attached.

5. Drawing M-02-102 - [Modify the following]

- a. Add removable hand-pull gate at end of plate settler trough and associated Keynote 3.
- b. Revised drawing attached.

6. Drawing M-02-301 – [Modify the following]

- a. Modify Section 1 to show correct section orientation (left and right side of section were reversed).
- b. Revised drawing attached.

7. Drawing M-02-302 – [Modify the following]

- a. Modify Section 1 to show correct section orientation (left and right side of section were reversed).
- b. Modify Section 3, Keynote 4 to show Link-Seal.
- c. Revised drawing attached.

8. Drawing M-03-102 - [Modify the following]

- a. Add removable hand-pull gate at end of plate settler trough and associated Keynote 3.
- b. Revised drawing attached.

9. Drawing M-03-301 – [Modify the following]

- a. Modify Section 1 to show correct section orientation (left and right side of section reversed).
- b. Modify Section 1 to show correct basin number (Basin No. 3).
- c. Revised drawing attached.

10. Drawing M-03-302 – [Modify the following]

- a. Modify Section 1 to show correct section orientation (left and right side of section reversed).
- b. Modify Section 1 to show correct basin number (Basin No. 3).
- c. Modify Section 3, Keynote 4 to show Link-Seal.

- d. Revised drawing attached.

11. Drawing M-04-102 – [Modify the following]

- a. In Keynote 12 change Sheet M-07-102 to M-04-504.
- b. Eliminate the concrete pad shown at the north end of the new flocculator bridge/walkway.
- c. Eliminate the Keynote 8 shown at the south end of the new flocculator bridge/walkway.
- d. Revise Keynotes 4, 23, 24 and 28.
- e. Add Keynote 29 regarding hand-pull gate at end of plate settler trough.
- f. Revised drawing attached.

12. Drawing M-04-301 – [Modify the following]

- a. Eliminate the Keynote 7 shown above the clarifier.
- b. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

13. Drawing M-04-302 – [Modify the following]

- a. Modify Keynote 14 to read: 14. Install 5,000 psi grout.
- b. Modify Keynote 15 to read: 15. 24” x 24” slide gate with electric actuator, self-contained frame, and actuator pedestal.
- c. In Section 1 eliminate the text “El. 780.50” at two locations.
- d. Add top of baffle elevation of 779.42 at baffle wall between floc zone and sed zone.
- e. Add top of flocculator bridge/walkway elevation of 782.89.
- f. At end of Keynote 19 add the following sentence: Use epoxy anchors with S.S. bolts to anchor angles/beams into original basin concrete floor (not new grout).
- g. Revised drawing attached.

14. Drawing M-04-502 – [Modify the following]

- a. Modify Keynote 4 to read: 4. 24” x 24” slide gate with electric actuator, self-contained frame, and actuator pedestal.
- b. In Keynote 10 change 11.58 to 11.76 and change 8.75 to 9.92.
- c. At the end of Keynote 10 add the following sentence: Top of vertical panels to be 1” below basin water surface elevation.
- d. Modify Keynote 15 to read: 15. Install 5,000 psi grout.
- e. At the end of Keynote 17 add the following sentence: Use epoxy anchors with S. S. bolts to anchor angles/beams into original basin concrete floor (not new grout).
- f. Add Keynote 19 to read: 19. Slide gate frame shall have solid S. S. plate behind valve stem on upstream side of slide gate which is welded or bolted to frame.
- g. In Section 1 extend Keynote 13 arrows in center and right side of drawing.
- h. In Section 2 extend Keynote 13 on left side of drawing and eliminate Keynote 18 on right side of section just inside the basin.
- i. In Section 3 extend the arrow on the “Top of Concrete El. 778.50” note.
- j. Add top of flocculator bridge/walkway elevation of 782.89 to Sections 1, 2, and 3.

- k. Revised drawing attached.

15. Drawing M-05-601 – [Modify the following]

- a. Revise Keynote 1 by changing the text “flow meters” to “pressure relief valves” at the end of the first and second sentences.
- b. Add the following General Note: 2. Reuse existing overhead pipe rack and secure new piping and tubing to existing pipe rack.
- c. Revised drawing attached.

16. Drawing M-05-602 – [Modify the following]

- a. Revise Keynote 4 by adding the following text to the end of the last sentence “at ends of 2” PVC casing pipe”.
- b. Add the following General Note: 2. Reuse existing overhead pipe rack and secure new piping and tubing to existing pipe rack.
- c. Revised drawing attached.

17. Drawing M-06-101 – [Modify the following]

- a. Remove new piping and support brackets from plan and section views which are not supposed to be shown on this demolition sheet.
- b. Revised drawing attached.

18. Drawing M-06-102 – [Modify the following]

- a. Add new pipe support brackets on plan and section views and in keynotes.
- b. Revised drawing attached.

19. Drawing S-00-002 – [Modify the following]

- a. Revised name of detail #1
- b. Added Details #2, 4 and 5
- c. Relabeled previous detail 2 to detail 3.
- d. Revised drawing attached.

20. Drawing S-00-003 – [Modify the following]

- a. Modified note for toeboard on Typical OSHA Guardrail elevation view.
- b. Revised drawing attached.

21. Added Drawing S-00-004

- a. New drawing attached.

- 22. Drawing S-01-101 – [Modify the following]**
- Added “GENERAL SHEET NOTES” to reference the Process drawings for equipment demolition.
 - Changed existing structural items and process items to gray to more clearly show existing and new structural items.
 - Revised drawing attached.
- 23. Drawing S-01-102 – [Modify the following]**
- Changed existing structural items and process items to gray to more clearly show existing and new structural items.
 - Revised drawing attached.
- 24. Drawing S-01-301 – [Modify the following]**
- Added “GENERAL SHEET NOTES” to reference the Process drawings for equipment demolition.
 - Changed existing structural items and process items to gray to more clearly show existing and new structural items.
 - Deleted note #3 pertaining to Process equipment.
 - Revised drawing attached.
- 25. Drawing S-01-302 – [Modify the following]**
- Changed existing structural items and process items to gray to more clearly show existing and new structural items.
 - Sheet Keynote #1 corrected beam size from W12x34 to W12x35
 - Revised Sheet Keynotes #2, 3 & 7
 - Added note #8 to address the need for existing concrete repair and corrosion protection.
 - Revised drawing attached.
- 26. Drawing S-01-501 – [Modify the following]**
- Added “GENERAL SHEET NOTES” to reference the Process drawings for equipment demolition.
 - Changed existing structural items and process items to gray to more clearly show existing and new structural items.
 - Revised Sheet Keynote #3&4 to include the correct NSF 61 approved product.
 - Added Sheet Keynote #6
 - Revised drawing attached.
- 27. Drawing S-01-502 – [Modify the following]**
- Changed existing structural items and process items to gray to more clearly show existing and new structural items.
 - Added dimensions between columns

- c. Revisions to Sheet Keynotes #1, 2, & 3.
- d. Revised section #2 to not show beams between columns
- e. Deleted errant notes on section #1 & 2
- f. Revised drawing attached

28. Drawing S-02-101 – [Modify the following]

- a. Plan was on a non-printing layer. It is now shown.
- b. Added “GENERAL SHEET NOTES” to reference the Process drawings for equipment demolition.
- c. Changed existing structural items and process items to gray to more clearly show existing and new structural items.
- d. Revised drawing attached.

29. Drawing S-02-102 – [Modify the following]

- a. Changed existing structural items and process items to gray to more clearly show existing and new structural items.
- b. Revised drawing attached.

30. Drawing S-02-301 – [Modify the following]

- a. Added “GENERAL SHEET NOTES” to reference the Process drawings for equipment demolition.
- b. Changed existing structural items and process items to gray to more clearly show existing and new structural items.
- c. Revised drawing attached.

31. Drawing S-02-302 – [Modify the following]

- a. Changed existing structural items and process items to gray to more clearly show existing and new structural items.
- b. Revised drawing attached.

32. Drawing S-03-101 – [Modify the following]

- a. Added “GENERAL SHEET NOTES” to reference the Process drawings for equipment demolition.
- b. Changed existing structural items and process items to gray to more clearly show existing and new structural items.
- c. Revised drawing attached.

33. Drawing S-03-102 – [Modify the following]

- a. Changed existing structural items and process items to gray to more clearly show existing and new structural items.

- b. Revised drawing attached.

34. Drawing S-03-301 – [Modify the following]

- a. Added “GENERAL SHEET NOTES” to reference the Process drawings for equipment demolition.
- b. Changed existing structural items and process items to gray to more clearly show existing and new structural items.
- c. Revised drawing attached.

35. Drawing S-03-302 – [Modify the following]

- a. Changed existing structural items and process items to gray to more clearly show existing and new structural items.
- b. Revised drawing attached.

36. Drawing S-04-101 – [Modify the following]

- a. Added “GENERAL SHEET NOTES” to reference the Process drawings for equipment demolition.
- b. Changed existing structural items and process items to gray to more clearly show existing and new structural items.
- c. Add Sheet Keynote #3 for the flocculator drive support removal and filling void left by removing drive shaft.
- d. Revised drawing attached.

37. Drawing S-04-102 – [Modify the following]

- a. Changed existing structural items and process items to gray to more clearly show existing and new structural items.
- b. Revised drawing attached.

38. Drawing S-04-301 – [Modify the following]

- a. Added “GENERAL SHEET NOTES” to reference the Process drawings for equipment demolition.
- b. Changed existing structural items and process items to gray to more clearly show existing and new structural items.
- c. Deleted note #3 pertaining to Process equipment.
- d. Revised drawing attached.

39. Drawing S-04-302 – [Modify the following]

- a. Changed existing structural items and process items to gray to more clearly show existing and new structural items.
- b. Sheet Keynote #1 change incorrect beam size from W12x34 to W12x35
- c. Revise Sheet Keynotes #2, 3 and 7

- d. Added note #8 to address the need for existing concrete repair and corrosion protection.
- e. Revised drawing attached.

40. Drawing S-04-501 – [Modify the following]

- a. Added “GENERAL SHEET NOTES” to reference the Process drawings for equipment demolition.
- b. Changed existing structural items and process items to gray to more clearly show existing and new structural items.
- c. Revised Sheet Keynote #3 to include the Sika Guard 62 corrosion protection coating.
- d. Revised Sheet Keynote #4 to include the correct NSF 61 approved product.
- e. Revised drawing attached.

41. Drawing S-04-502 – [Modify the following]

- a. Changed existing structural items and process items to gray to more clearly show existing and new structural items.
- b. Added dimensions between columns
- c. Revision to Sheet Keynotes #1, 2, & 3.
- d. Revised section #2 to not show beams between columns
- e. Revised drawing attached.

42. Drawing S-06-101 – [Modify the following]

- a. Added “GENERAL SHEET NOTES” to reference the Process drawings for equipment demolition.
- b. Changed existing structural items and process items to gray to more clearly show existing and new structural items.
- c. Revised drawing attached.

43. Drawing S-06-102 – [Modify the following]

- a. Changed existing structural items and process items to gray to more clearly show existing and new structural items.
- b. Revised drawing attached.

44. Drawing E-00-100, Electrical Site Plan – [Modify the following]

- a. Keynote #6 shall be modified to refer to routing conductors/conduit to new SCADA System PLC2 in lieu of PLC6.
- b. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

- 45. Drawing E-00-501, Electrical Details I – [Modify the following]**
- a. See Detail 7, Trench and Pavement Repair Detail, this trench detail is a representation. Conduits are illustrated as single row; however multiple rows may be installed. In addition, detail incorrectly references asphalt pavement for the top layer, the existing parking lot and drives are concrete. Patch back with concrete only, match existing depth of concrete.
 - b. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.
- 46. Drawing E-00-601, One Line Diagram Modifications – [Modify the following]**
- a. Keynote #3 shall be changed to read “3. Note Not Used.”.
 - b. Keynote #5 shall reference Sludge Valve in lieu of Sedimentation Valve. Change Keynote #5 to read “5. Existing Sludge Valve Actuator shall be replaced with new. Contractor shall provide new disconnect switch and final connection to new Sludge Valve Actuator. Replace existing feeder breaker with new breaker as shown on Sheet E-00-602.”
 - c. Feeder 5E shall reference “Sludge Valve No. 4” in lieu of “Sedimentation Valve No. 4”.
 - d. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.
- 47. Drawing E-00-602, One Line Diagram New Work – [Modify the following]**
- a. Feeder 5E shall reference “Basin No. 4- Sludge Valve” in lieu of “Basin No. 4 – Sedimentation Valve”.
 - b. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.
- 48. Drawing E-00-701, Control Circuits I – [Modify the following]**
- a. For Clarifier Drive Control Circuit, controls shall be sent “To PLC2” in lieu of “To PL6”. Refer to other modifications with regard to changing from PLC6 to PLC2.
 - b. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.
- 49. Drawing E-00-702, Control Circuits II – [Modify the following]**
- a. For Flocculator Drive Control Circuit, Ethernet cable shall be sent “To PLC2” in lieu of “To PLC6”. Refer to other modifications with regard to changing from PLC6 to PLC2.
 - b. For Rapid Mix No. 2 Control Circuit, control and signal conductors shall be sent “To PLC2” in lieu of “To PLC6”. Refer to other modifications with regard to changing from PLC6 to PLC2
 - c. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

50. Drawing E-01-102, Basin No. 1 Plan – Electrical New Work – [Modify the following]

- a. Keynote #34 shall be modified to refer to routing conductors/conduit to new SCADA System PLC2 in lieu of PLC6.
- b. Keynote #37 shall be modified to refer to routing conductors/conduit to new SCADA System PLC2 in lieu of PLC6.
- c. Keynotes #38 and #40 incorrectly reference Sheet E-07-102. Change notes to reference Sheet E-06-102.
- d. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

51. Drawing E-04-101 Basin No. 4 Plan – Electrical Demolition – [Modify the following]

- a. Keynote #11 incorrectly references Keynote #14. Change Keynote #11 to read, “11. Remove and properly dispose of conduit/conductors for the existing sludge valve actuator back to existing junction box (Keynote #13). Power and control conductors shall be reused for new sludge valve actuator (Sheet E-04-102).
- b. The existing receptacle adjacent to Basin No. 4 Clarifier has been incorrectly labeled with Keynote #7. Change this Keynote #7 tag to Keynote #16 tag. Keynote #16 shall be added and shall read ”16. Remove and properly dispose of the existing duplex receptacle and associated conduit/conductors.”
- c. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

52. Drawing E-04-102, Basin No. 4 Plan – Electrical New Work – [Modify the following]

- a. Keynote #28 shall be modified to refer to routing conductors/conduit to new SCADA System PLC2 in lieu of PLC6.
- b. Keynote #32 shall be modified to refer to routing conductors/conduit to new SCADA System PLC2 in lieu of PLC6.
- c. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

53. Drawing E-05-101, Sodium Hypochlorite Building Plan – Electrical Demolition – [Include the following]

- a. Please note: all work within this building shall be completed as early as possible in the Project Schedule.
- b. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

54. Drawing E-05-101, Sodium Hypochlorite Building Plan – Electrical Demolition – [Modify the following]

- a. Keynote #7, conductors shall be removed back to the terminal blocks within the PLC cabinet. Conductors between terminal blocks and PLC modules shall remain. Update PLC cabinet wiring diagrams accordingly.
- b. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

55. Drawing E-06-102, Rapid Mix Building – Area A Plan – Electrical New Work – [Modify the following]

- a. Keynote #3 shall be modified to read “3. Existing SCADA System PLC2 within Control Panel, CP-2. PLC2 (Allen Bradley PLC5 and associated I/O chassis) shall be replaced with new Allen Bradley Controllogix units. Refer to Instrumentation Drawings (I-Sheets) for additional information.”
- b. Keynote #16 shall be modified to refer to routing conductors/conduit to new SCADA System PLC2 in lieu of PLC6.
- c. Keynote #20 shall be modified to refer to routing conductors/conduit to new SCADA System PLC2 in lieu of PLC6.
- d. Keynote #21 shall be modified to refer to routing conductors/conduit to new SCADA System PLC2 in lieu of PLC6.
- e. Keynote #37 shall be modified to refer to routing conductors/conduit to new SCADA System PLC2 in lieu of PLC6.
- f. Refer to Plan View, the Keynotes #2 and #3 need locations swapped to correspond to actual room layout.
- g. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

56. Sheet E-06-103, Rapid Mix Building – Area B Plan – Electrical New Work – [Modify the following]

- a. Keynote #2 shall be modified to read “3. Existing SCADA System PLC2 within Control Panel, CP-2. PLC2 (Allen Bradley PLC5 and associated I/O chassis) shall be replaced with new Allen Bradley Controllogix units. Refer to Instrumentation Drawings (I-Sheets) for additional information.”
- b. Keynote #9 shall be modified to refer to routing conductors/conduit to new SCADA System PLC2 in lieu of PLC6.
- c. Keynote #12 shall be modified to refer to routing conductors/conduit to new SCADA System PLC2 in lieu of PLC6. In addition, Keynote #12 shall reference existing control panel, CP-2 in lieu of CP-6.
- d. Keynote #13 shall be modified to refer to routing conductors/conduit to new SCADA System PLC2 in lieu of PLC6.

- e. Keynote #14 shall be modified to refer to routing conductors/conduit to new SCADA System PLC2 in lieu of PLC6. In addition, Keynote #14 shall reference existing control panel, CP-2 in lieu of CP-6.
- f. Keynote #15 shall be modified to refer to routing conductors/conduit to new SCADA System PLC2 in lieu of PLC6. In addition, Keynote #15 shall reference existing control panel, CP-2 in lieu of CP-6.
- g. Refer to Plan View, the Keynotes #1 and #2 need locations swapped to correspond to actual room layout.
- h. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

57. Drawing I-00-501, Instrumentation Details – [Modify the following]

- a. Contractor shall provide additional support as required to rigidly mount gauge assembly.
- b. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

58. Drawing I-00-502, Existing SCADA System Control Panel Layouts – [Modify the following]

- a. PLC 1 Rack 1 and PLC 2 Rack 1 shall be changed to a 13-slot chassis. Modify layout for both control panels accordingly.
- b. Detail #2, Keynote #15 shall reference PLC2 Rack 3 in lieu of PLC6 Rack 0.
- c. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

59. Drawing I-00-601, Plant Networking Diagram – [Replace the drawing]

- a. PLC 1 Rack 1 and PLC 2 Rack 1 are shown as 13-slot chassis.
- b. PLC6 shall become a 4th rack to PLC2.
- c. Modification to ethernet switch manufacturer.
- d. Modification to Sheet Keynotes to reflect these changes.
- e. Please note: all PLC work shall be completed as early as possible in the Project Schedule. Programming of all PLCs will be performed by a separate Contract (Owner's SCADA Design and Construction 2020 project).
- f. Revised drawing attached.

60. Drawing I-00-602 through I-00-608, Process & Instrumentation Diagrams – [Modify the following]

- a. I/O shown on these sheets shall be routed to PLC2 in lieu of PLC6.
- b. Revised drawings not attached. Drawing revisions will be made on Conformance Drawings.

61. **Drawing I-00-603, Process & Instrumentation Diagram – Flocculator Basin No. 1 – [Modify the following].**
 - a. Flocculator VFDs shall have L-O-R switches in lieu of H-O-A switches.
 - b. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

62. **Drawing I-00-604, Process & Instrumentation Diagram – Flocculator Basin No. 1 & Drawing I-00-607, Process & Instrumentation Diagram - Flocculator Basin No. 4 – [Modify the following]**
 - a. Gate No. 1 and No. 2 locations shall be swapped. In addition, swap identification of I/O tags as well.
 - b. Revised drawings not attached. Drawing revisions will be made on Conformance Drawings.

63. **Drawing I-00-701, Existing SCADA System Control Panel, CP-1 Modifications I – [Modify the following]**
 - a. Change PLC1 Rack 1 to 13-slot chassis. Provide additional slot filler modules for additional slots.
 - b. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

64. **Drawing I-00-713, Existing SCADA System Control Panel, CP-1 Modifications XIII – [Modify the following]**
 - a. Modules on this sheet shall reference PLC1 Rack 2 in lieu of PLC1 Rack 3.
 - b. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

65. **Drawing I-00-714, Existing SCADA System Control Panel, CP-1 Modifications XIV – [Modify the following]**
 - a. Modules on this sheet shall reference PLC1 Rack 2 in lieu of PLC1 Rack 3.
 - b. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

66. **Drawing I-00-715, Existing SCADA System Control Panel, CP-1 Modifications XV – [Modify the following]**
 - a. Modules on this sheet shall reference PLC1 Rack 2 in lieu of PLC1 Rack 3.
 - b. Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

67. **Drawing I-00-716, Existing SCADA System Control Panel, CP-2 Modifications I– [Replace the drawing]**
- Change PLC2 Rack 1 to 13-slot chassis. Provide additional slot filler modules for additional slots.
 - Change identification of PLC6 to PLC2 Rack 3. Modify modules for this chassis.
 - Renumbered Sheet Keynotes.
 - Revised drawing attached.
68. **Drawing I-00-724, Existing SCADA System Control Panel, CP-2 Modifications IX – [Modify the following]**
- Clarification: FP21-1300 Caustic Storage XFR Valve Panel is an existing panel and not new as is indicated by “bold” text.
 - Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.
69. **Drawing I-00-726, Existing SCADA System Control Panel, CP-2 Modifications XI – [Modify the following]**
- PLC2 Rack 1 Module 6 shall reference a 16-point output module in lieu of 8-point.
 - Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.
70. **Drawing I-00-732, PLC6 Points List – [Modify the following]**
- Sheet name and Title of Schedule shall be changed to PLC2 – Rack 3 Points List.
 - Revised drawing not attached. Drawing revisions will be made on Conformance Drawings.

CONTRACTOR QUESTIONS AND ANSWERS

SET 2

- Q1: New concrete columns in the existing flocculation basins need a detail on the rebar and concrete attachment to exist floor, along with column rebar details.
- A1: This detail has been added to revised sheet S-00-002 which is part of this addendum.

Q2: Sheet M-01-102 and M-04-102 have spot elevations for the grout shown along the walls and at the slide gates. But the elevations at the mid span of the outer walls don't appear correct. They are listed as 766.17 on the immediate right side of the baffle wall and 765.33 on the immediate left side of the baffle wall. Is there this immediate drop off in the grout requiring a form?

A2: Spot elevations are correct. Form will be needed.

Q3: Looks like a concrete pad at the bottom of all new stairs around Mixing Basins 1 and 4. 9 total. Need details of those pads. Shown on S-01-102 and S-01-302, and also on S-04 drawings.

A3: A detail has been added on new sheet S-00-004 which is part of this addendum.

Q4: Sheet M-06-102 indicates 4 each 2 inch chemical feed pipes but don't indicate how they tie in to existing or where they go after they leave the Rapid Mix Basin.

A4: These pipes are for future use and will not be connected to any other pipes at this time.

Q5: Sheet E-00-100 indicates the buried electrical conduit going across the roads and parking and the trench detail indicates them side by side in a trench backfilled with stone. E-00-501.

Two of the runs have 12 conduits. Do we put them in a very wide trench or would stacking them in a ductbank be an option?

Also the roads in the plant are all concrete pavement yet the details indicates concrete base and asphalt surface. Is the asphalt required? E-00-501.

A5: See revisions in Addendum.

SET 3

Q1: What is the last day that you accept questions?

A1: January 6, 2021 at 5:00 pm EST.

Q2: Are the 8" sludge valves on pressure lines?

A2: There is 20 feet of water head upstream of the valve and 0 feet of head downstream from the valve as indicated in Specification Section 462012 – 8-inch Sludge Valves, Item 2.1, N.

Q3: Note 5 on plan sheet M-02-302 calls for a wall pipe with the water collar against the wall. Will the collar need to be drilled to accept anchors to assist in holding the wall pipe in place?

At the same location will the area where the wall pipe meets the wall will a gasket be required or will this area be caulked?

A3: Yes. Drill wall pipe collar for anchors to hold wall pipe in place. Use epoxy anchors (NSF 61 approved) with stainless steel bolts and nuts to secure wall pipe to concrete wall. Use minimum of 12 anchors. This note also applies to the wall pipe collar shown on sheet M-03-302.

An NSF 61 approved caulk or gasket shall be applied between the concrete wall and the wall pipe collar. This note also applies to the wall pipe collar shown on sheet M-03-302.

Q4: Note 28 on Plan Sheet M-04-102 refers to a 20" DI Pipe relocation. Our interpretation of this note is that it is a relocation of the existing pipe which will be reused or whatever is required for the relocation it will be provided by the plate settler mfg. Is this correct?

A4: In Basin 4 the existing 20" overflow pipe is to be replaced and relocated within the new plate settler system as described in Specification Section 464300 – Inclined Plate Settler System, Item 2.13. The existing cover grating is to be reused if possible or replaced with similar cover grating if it can't be reused.

GRW Engineers, Inc.



Todd Solomon, PE
Project Manager

Attachments:

Specification Section 015000
Specification Section 013213
Specification Section 464210
Specification Section 464300
Specification Section 035550

Construction Drawing G-00-003
Construction Drawing M-01-102
Construction Drawing M-01-302
Construction Drawing M-01-502



Construction Drawing M-02-102
Construction Drawing M-02-301
Construction Drawing M-02-302
Construction Drawing M-03-102
Construction Drawing M-03-301
Construction Drawing M-03-302
Construction Drawing M-04-102
Construction Drawing M-04-302
Construction Drawing M-04-502
Construction Drawing M-05-601
Construction Drawing M-05-602
Construction Drawing M-06-101
Construction Drawing M-06-102
Construction Drawing S-00-002
Construction Drawing S-00-003
Construction Drawing S-00-004
Construction Drawing S-01-101
Construction Drawing S-01-102
Construction Drawing S-01-301
Construction Drawing S-01-302
Construction Drawing S-01-501
Construction Drawing S-01-502
Construction Drawing S-02-101
Construction Drawing S-02-102
Construction Drawing S-02-301
Construction Drawing S-02-302
Construction Drawing S-03-101
Construction Drawing S-03-102
Construction Drawing S-03-301
Construction Drawing S-03-302
Construction Drawing S-04-101
Construction Drawing S-04-102
Construction Drawing S-04-301
Construction Drawing S-04-302
Construction Drawing S-04-501
Construction Drawing S-04-502
Construction Drawing S-06-101
Construction Drawing S-06-102
Construction Drawing I-00-601
Construction Drawing I-00-716

SECTION 013213 - CONTRACTORS SEQUENCE OF CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.1 CONTRACTOR'S CONSTRUCTION SEQUENCE, SCHEDULE & PROVISIONS

The Contractor shall be responsible for all planning, coordination and execution of the work. The sequence of work shall provide assurances that reliable treatment plant operation will be maintained and such sequences shall be approved by the Owner. No cost or schedule adjustments shall be given for changes to the construction sequence not approved by the Owner.

The Contractor's proposed construction sequence schedule must allow the Owner to maintain full operation of their existing water treatment plant during the construction period of the proposed expansion to the existing facilities.

The contractor shall be responsible for all damages brought about by the disruption of the operation if such disruptions are a direct cause of Contractor negligence and/or a failure of the Contractor to coordinate their work effort to minimize and/or eliminate disruptions in service.

Some general constraints to the Contractor's construction sequence are noted as follows:

- A. "In Basin" Construction Period - No work can begin that requires taking a plant basin out of service until November 1 and must be back in service by April 15. Only one basin may be out of service at any given time during the "In Basin" Construction period. No deviations from this criteria will be allowed unless approved by Owner in advance.
- B. The Fort Thomas Water Treatment Plant consists of four (4) treatment basins each capable of treating 11 MGD. The Fort Thomas Plant shall be capable of FULL production (44 MGD) between April 15 and November 1 each year. The Contractor shall not anticipate any shutdowns or reduced plant capacity during this time period unless approved in writing by Owner in advance. At no time during the November 1 to April 15 "in basin" construction period can the plant capacity be reduced below 33 MGD unless approved in advance by the Owner. The only exceptions are the following:
 - 1. The plant capacity may be reduced to 22 MGD during the time period in which the work in Rapid Mix #2 is being performed. The Contractor shall obtain Owner approval for the time period during which construction will be conducted on Rapid Mix #2. The Contractor must minimize to the highest degree possible the length of time in which the Rapid Mix #2 is out of service. Note that construction on Rapid Mix #2 can only be conducted between November and April 15.
- C. Only one (1) sodium hypochlorite peristaltic pump may be taken out of service at any given time to replace the discharge piping. Note that this does not include the spare sodium hypochlorite peristaltic pump that is on standby.
- D. Contractor shall provide all temporary piping and pumping which may be required for construction of the treatment plant.
- E. ***PLC work and work in Sodium Hypochlorite building shall be completed as soon as possible.***

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 013213

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

This section specifies administrative and procedural requirements for temporary services and facilities, including such items as temporary utility services, temporary construction and support facilities, and project security and protection.

- A. Use Charges: No cost or usage charges for temporary services or facilities are chargeable to the Owner or Engineer. Cost or use charges for temporary services or facilities will not be accepted as a basis of claims for a change-order extra.
- B. Temporary utility services required for use at the project site include but are not limited to the following:
 - 1. Water service and distribution.
 - 2. Temporary electric power and light.
 - 3. Telephone service.
 - 4. Storm and sanitary sewer.
 - 5. Provide adequate utility capacity at each stage of construction. Prior to availability of temporary utilities at the site, provide trucked-in services for start-up of construction operations.
 - 6. Obtain and pay for temporary easements required to bring temporary utilities to the project site, where the Owner's permanent easement cannot be utilized for that purpose.
 - 7. High speed internet service.
- C. Temporary construction and support facilities required for the project include but are not limited to the following:
 - 1. Temporary heat.
 - 2. Field offices and storage sheds.
 - 3. Temporary roads and paving.
 - 4. Sanitary facilities, ~~including drinking water.~~
 - 5. Dewatering facilities and drains.
 - 6. Temporary enclosures.
 - 7. ~~Project identification,~~ bulletin boards **with wage rates and signs.**
 - 8. Waste disposal services.
 - 9. Construction aids and miscellaneous general services and facilities.
 - 10. Alternate temporary services and facilities, equivalent to those specified, may be used, subject to acceptance by the Engineer.
- D. Security and protection facilities and services required for the project include but are not limited to the following:
 - 1. Environmental protection.
 - 2. Alternate security and protection methods or facilities, equivalent to those specified, may be used, subject to acceptance by the Engineer.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-01 Specification sections, apply to the Work of this Section.

1.3 PROPERTY PROTECTION

- A. Care is to be exercised by the Contractor in all phases of construction, to prevent damage and/or injury to the Owner's and/or other property. Payments for the repair and restoration are limited as set forth in the "Conflict With or Damage to Existing Utilities Facilities" of the Supplementary General Conditions.
- B. All exposed existing piping must be immediately supported to prevent damage. Prior to completion of each day's work, such piping must be adequately covered by the Contractor and approved by the Owner's representative.
- C. The Contractor shall avoid unnecessary injury to trees and shall remove only those authorized to be removed by written consent of the Owner. Fences, gates, and terrain damaged or disarranged by the Contractor's forces shall be immediately restored in their original condition or better.

1.4 CONSTRUCTION WARNING SIGNS

- A. The Contractor shall provide construction warning signs for each location where they are working in the state highway right-of-way or in City or County streets. They will further provide flagmen as required and shall abide by all Department of Highways safety rules, including size, type and placement of construction signs. All signs shall be of professional quality.

1.5 ACCESS ROADWAYS

- A. The Contractor shall construct all access roadways needed during construction, and the planned access roadways for the completed project. The Contractor shall maintain access roadways continuously during the construction period.
- B. The Contractor shall maintain all existing roadways within the project site which are used for any purpose by their construction operations. The degree and frequency of maintenance shall be adequate to keep existing roadways in a condition at least equal to their condition prior to construction. Road maintenance shall include daily dust control and grading as necessary on all roads and sweeping of paved roads every other day.

1.6 RESPONSIBILITY FOR TRENCH SETTLEMENT

- A. The Contractor shall be responsible for any settlement caused by the construction, that occurs within one (1) year after the final acceptance of this Contract by the Owner. Repair of any damage caused by settlement shall meet the approval of the Owner.

1.7 WASTE DISPOSAL

- A. The Contractor shall dispose of waste, including hazardous waste, off-site in accordance with all applicable laws and regulations.

1.8 CONTRACTOR'S TRAILERS AND MATERIAL STORAGE

- A. The location of the Contractor's and Subcontractor's office and work trailers and parking areas on the project site shall be subject to the Owner's approval.
- B. The location of the Contractor's and Subcontractor's material storage yards on the project site shall be subject to the Owner's approval.

1.9 QUALITY ASSURANCE

- A. Regulations: Comply with requirements of local laws and regulations governing construction and local industry standards, in the installation and maintenance of temporary services and facilities, including but not limited to the following:
 - 1. Obtain all permits as required by governing authorities.
 - 2. Obtain and pay for temporary easements required across property other than that of Owner.
 - 3. Comply with applicable codes.
 - a. In addition, comply with "Environmental Impact" commitments the Owner or previous Owners of the site may have made to secure approval to proceed with construction of the project.
- B. Inspections: Inspect and test each service before placing temporary utilities in use. Arrange for required inspections and tests by governing authorities, and obtain required certifications and permits for use.

1.10 JOB CONDITIONS

- A. General: Provide each temporary service and facility ready for use at each location when the service or facility is first needed to avoid delay in performance of the Work. Maintain, expand as required, and modify temporary services and facilities as needed throughout the progress of the Work. Do not remove until services or facilities are no longer needed, or are replaced by the authorized use of completed permanent facilities.

With the establishment of the job progress schedule, establish a schedule for the implementation and termination of service for each temporary utility. At the earliest feasible time, and when acceptable to the Owner and Engineer, change over from the use of temporary utility service to the use of the permanent service, to enable removal of the temporary utility and to eliminate possible interference with completion of the Work.

- B. Conditions of Use: Operate temporary services and facilities in a safe and efficient manner. Do not overload temporary services or facilities, and do not permit them to interfere with the

progress of the Work. Do not allow unsanitary conditions, public nuisances or hazardous conditions to develop or persist on the site.

1. Temporary Utilities: Do not permit the freezing of pipes, flooding or the contamination of water sources.
2. Temporary Construction and Support Facilities: Maintain temporary facilities in such a manner as to prevent discomfort to users. Take necessary fire prevention measures. Maintain temporary support facilities in a sanitary manner so as to avoid health problems and other deleterious effects.
3. Security and Protection: Maintain site security and protection facilities in a safe, lawful and publicly acceptable manner. Take necessary measures to prevent erosion of the site.

PART 2 - PRODUCTS

2.1 MATERIALS, EQUIPMENT AND SERVICES

- A. General: Provide new materials and equipment for temporary services and facilities; used materials and equipment that are undamaged and in serviceable condition may be used, if acceptable to the Engineer. Provide only materials and equipment that are recognized as being suitable for the intended use, by compliance with appropriate standards.
- B. Temporary Electricity:
 1. Provide temporary electrical service for construction needs, power to all construction trailers, and for lighting and heating facilities, throughout construction period.
 2. Service shall be adequate for construction use by all trades during construction period.
 3. Contractor shall make all necessary arrangements with the power company to obtain this service. They shall furnish, erect, and maintain the service pole, wires, main switch, panelboards, outlets, lights and metering facilities as required by the power company and as necessary to provide electrical service throughout the construction site.
 4. Contractor shall be responsible for payment of all monthly billing charges for temporary electric power. Contractor shall pay costs of equipment, materials, furnishing, installing, maintenance and removal of temporary electric service facilities.
 5. Contractor shall pay costs of equipment, furnishing, installing, maintenance and removal of temporary service facilities.
 6. Maintenance of temporary electric service shall be the sole responsibility of the General Contractor.
- C. Temporary Lighting:
 1. Furnish and install temporary lighting required for:
 - a. Construction needs.
 - b. Safe and adequate working conditions.
 - c. Public Safety.
 - d. Security lighting.
 - e. Temporary office and storage area lighting.

2. As each building is enclosed, temporary lighting shall be furnished to provide not less than 10 foot-candles in all areas.
3. Service Periods:
 - a. Security lighting: All hours of darkness.
 - b. Safety lighting:
 - c. Within construction area: All times that authorized personnel are present.
 - d. Public areas: At all times.
4. Costs of installation and operation: Contractor shall pay all installation, maintenance and removal costs of temporary lighting.
5. Maintenance of temporary lighting service (replacement of bulbs, etc.) shall be the sole responsibility of the General Contractor.

D. Temporary Heating and Ventilating

1. Furnish and install temporary heat and ventilation in enclosed areas throughout construction period required to:
 - a. Facilitate progress of work.
 - b. Protect work and products against dampness and cold.
 - c. Prevent moisture condensation on surfaces.
 - d. Provide suitable ambient temperatures and humidity levels for installation and curing of materials.
 - e. Provide adequate ventilation to meet health regulations for safe working environment.
 - f. Heat and ventilate temporary field offices for Contractor and for Engineer, and other storage and construction buildings.
 - g. Allow beneficial occupancy of project, or portion of project, prior to final completion, including air conditioning.
2. Temperatures required in buildings:
 - a. Generally, 24 hours a day: Minimum 40 degrees F. (4.5 degrees C.).
 - b. 24 hours a day during placing, setting and curing of cementitious materials: As required by specification section for each product.
 - c. 24 hours a day, seven (7) days prior to, and during, placing of interior finishes; woodwork, flooring, painting and finishing: As required by specification section for each product.
 - d. 24 hours a day after application of finishes, and until Substantial Completion: Minimum 70 degrees F. (21 degrees C.).
 - e. Storage areas: As required by Specification Section for each product.
3. Ventilation Required:
 - a. General: Prevent hazardous accumulations of dusts, fumes, mists, vapors or gases in areas occupied during construction.
 - b. Provide local exhaust ventilation to prevent harmful dispersal of hazardous substances into atmosphere of occupied areas.

- c. Dispose of exhaust materials in a manner that will not result in harmful exposure to persons.
 - d. Ventilate storage spaces containing hazardous or volatile materials.
 - e. Provide adequate ventilation for:
 - 1) Curing installed materials.
 - 2) Dispersal of humidity.
 - 3) Ventilation of temporary sanitary facilities.
 - f. Duration of operation:
 - 1) At all times personnel occupies an area subject to hazardous accumulations of harmful elements.
 - 2) Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful elements.
 - 3) For curing installed materials: As required by specification section for respective materials.
 - 4) For humidity dispersal: As needed to provide suitable ambient conditions for work.
4. Contractor shall pay costs of installation, operation, maintenance and removal of temporary heat and ventilation.

E. Temporary Telephone and Fax Service:

- 1. Furnish and install temporary telephone service for construction needs throughout construction periods.
- 2. Pay costs for temporary telephone service including installation, maintenance, and removal.
- 3. Pay service costs for all local telephone service.
- 4. Pay costs of toll charges related to construction of the Project.
- 5. Do not use Owner's existing telephone system.

F. Temporary Water:

- 1. Contractor shall make their own arrangements at their own expense for obtaining the water supply necessary for construction purposes.
- 2. Contractor shall pay costs of the furnishing, maintaining and removing all temporary water service equipment, fixtures, hose, piping, etc.

G. Protection and Security:

- 1. Provide barricades, lanterns and other such signs and signals as may be necessary to warn of the dangers in connection with open excavation and obstructions.
- 2. Provide an adequate and approved system to secure the project area at all times, especially during non-construction periods; General Contractor shall be solely responsible for taking proper security measures.
- 3. Contractor shall pay all costs for protection and security systems.

H. Sanitary Facilities:

1. The Contractor shall furnish, install and maintain ample sanitary facilities for the workmen. As the needs arise, enclosed temporary toilets, in sufficient number, shall be placed as directed by the Engineer. Permanent toilets installed under this Contract shall not be used during construction. Drinking water shall be provided from a proven safe source so piped or transported as to be kept clean and fresh and served from single service containers of satisfactory types.

I. Temporary Protection:

1. Temporary Enclosures:

- a. Furnish and install temporary enclosures at doorways, windows and other openings in exterior walls, as necessitated by weather and other conditions, and when required for the progress of the Work. Temporary doors shall be substantially built and hung, equipped with proper hinges, locks and other necessary hardware and shall be removed and reset whenever required to accommodate the work of other trades requiring their removal. All enclosures shall be maintained in good repair and removed when no longer needed. Door and window frames and sills shall be protected as necessary to prevent damage to items during construction.

2. Temporary Covering:

- a. Provide substantial temporary wood covering over all floor openings for ducts, shafts, equipment, etc., using rough planking at least two (2) inches thick, cleated together and made sufficiently strong and put in place wherever required.

3. Temporary Railing:

- a. Temporary railing shall be provided on stairs and around wells, pits and other locations where needed, to prevent accidents or injury to persons.

~~J. Project Sign:~~

- ~~1. The Contractor shall provide sign(s), as detailed hereinafter, near the site of the work. The sign(s) shall set forth the description of the work and the names of the Owner, Engineer, and Contractor, and other information as required.~~
- ~~2. The sign shall be constructed of 3/4 inch thick APA A B Exterior grade or marine plywood. Posts shall be 4" x 4" of fencing type material. Prime all wood with white primer.~~
- ~~3. The sign shall be maintained in good condition until completion of the project.~~

K. Contractor's Field Office:

1. Each Contractor shall establish and maintain a field office on this project and have available at the office a responsible representative who can officially receive instructions from the Engineer. The Contractor's Field Office shall be provided in accordance with Section 01 52 13.

~~L. Resident Project Representative's Field Office:~~

- ~~1. The Contractor shall furnish and maintain a field office for the exclusive use of the Resident Project Representative at a location designated by the Engineer and shall be in accordance with the requirements of Section 01 52 13.~~

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Use qualified tradesmen for installation of temporary services and facilities. Locate temporary services and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the Work.
- B. Relocate, modify and extend services and facilities as required during the course of work so as to accommodate the entire work of the Project.

3.2 REMOVAL

- A. Completely remove temporary materials, equipment, and offices upon completion of construction.
- B. Repair damage caused by installation, and restore to specified or original condition.

END OF SECTION 015000

SECTION 035550 - CONCRETE TOPPING, RESURFACING, AND REHABILITATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification describes the patching exterior vertical or horizontal surfaces with a polymer-modified, portland cement mortar/concrete.

1.2 QUALITY ASSURANCE

- A. Manufacturing qualifications: The manufacturer of the specified product shall be ISO 9001 certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis.
- B. Contractor qualifications: Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have received product training by a manufacturer's representative.
- C. Install materials in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. All materials must be delivered in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers. Damaged material must be removed from the site immediately.
- B. Store all materials off the ground and protect from rain, freezing or excessive heat until ready for use.
- C. Condition the specified product as recommended by the manufacturer.

1.4 JOB CONDITIONS

- A. Environmental Conditions: Do not apply material if it is raining or snowing or if such conditions appear to be imminent. Minimum application temperature 40°F (5°C) and rising.
- B. Protection: Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified material.

1.5 SUBMITTALS

- A. Submit two copies of manufacturer's literature, to include: Product Data Sheets, and appropriate Material Safety Data Sheets (MSDS).

1.6 WARRANTY

- A. Provide a written warranty from the manufacturer against defects of materials for a period of one (1) year, beginning with date of substantial completion of the project.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. **SikaTop 111 Plus**, as manufactured by Sika Corporation, is considered to conform to the requirements of this specification.

2.2 MATERIALS

- A. Polymer-modified Portland cement mortar:
 - 1. Component A shall be a liquid polymer emulsion of an acrylic copolymer base and additives.
 - a. pH: 4.5-6.5
 - b. Film Forming Temperature: 73°F max.
 - c. Tear Strength: 950-psi min.
 - d. Elongation at Break: 500% min.
 - e. Particle Size: less than 0.1 micron
 - 2. Component A shall contain an organic, penetrating corrosion inhibitor which has been independently proven to reduce corrosion in concrete via ASTM G3 (half-cell potential tests). The corrosion inhibitor shall not be calcium nitrite, and shall have a minimum of 5 years of independent field testing to document performance on actual construction projects.
 - 3. Component B shall be a blend of selected portland cements, specially graded aggregates, admixtures for controlling setting time, water reducers for workability, and an organic accelerator.
 - 4. The materials shall be non-combustible, both before and after cure.
 - 5. The materials shall be supplied in a factory-proportioned unit.
 - 6. The polymer-modified, portland cement mortar must be placeable from 1/2-in. to 1-in. in depth per lift for horizontal applications.
- B. To prepare a polymer-modified portland cement concrete: aggregate shall conform to ASTM C-33. The factory-proportioned unit shall be extended with 42-lb. max. of a 3/8 in. (No.8 distribution per ASTM C-33, Table II) clean, well-graded, saturated surface dry aggregate, having low absorption and high density. Aggregate must be approved for use by the engineer.

2.3 PERFORMANCE CRITERIA

- A. Typical Properties of the mixed polymer-modified, portland cement mortar:
 - 1. Working Time: Approximately 30 minutes

2. Finishing Time: 50-120 minutes
3. Color: concrete gray

B. Typical Properties of the cured polymer-modified, portland cement mortar:

1. Compressive Strength (ASTM C-109 Modified)
 - a. 1 day: 2500 psi min. (17.2 MPa)
 - b. 7 day: 5500 psi min. (37.9 MPa)
 - c. 28 day: 7000 psi min. (48.3 MPa)
2. Flexural Strength (ASTM C-293) @ 28 days: 1500 psi (10.3 MPa)
3. Splitting Tensile Strength (ASTM C-496) @ 28 days 700 psi (4.8 MPa)
4. Bond Strength (ASTM C-882 Modified) @ 28 days: 2500 psi (17.2 MPa)
5. The portland cement mortar shall not produce a vapor barrier.
6. Density(wet mix): 136 lbs. / cu. ft. (2.18 kg/l)
7. Permeability (AASHTO T-277 @ 28 days Approximately 500 Coulombs)

Note: Tests above were performed with the material and curing conditions @71°F - 75°F and 45-55% relative humidity.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Areas to be repaired must be clean, sound, and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means. Mechanically prepare the concrete substrate to obtain a surface profile of +/- 1/16" (CSP 5 or greater as per ICRI Guidelines) with a new exposed aggregate surface. Area to be patched shall not be less than 1/2" in depth.
- B. Where reinforcing steel with active corrosion is encountered, sandblast the steel to a white metal finish to remove all contaminants and rust. Where corrosion has occurred due to the presence of chlorides, the steel shall be high pressure washed after mechanical cleaning. Prime steel with 2 coats of Sika Dur 32 as directed by manufacturer.

3.2 MIXING AND APPLICATION

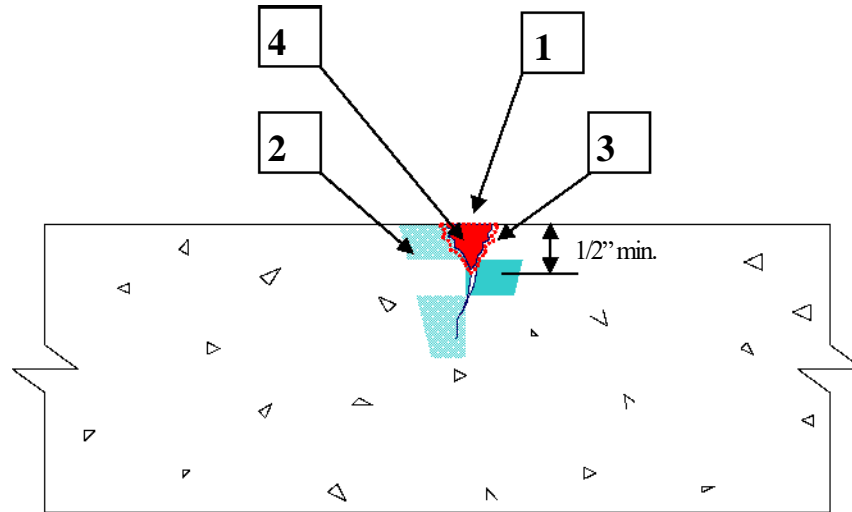
- A. Mechanically mix in appropriate sized mortar mixer or with a Sika jiffy paddle and low speed (400-600 rpm) drill. Pour approximately 4/5 gal Component A into the mixing container. Add Component B while continuing to mix. Mix to a uniform consistency for a maximum of three minutes. Add remaining Component A to mix if a more loose consistency is desired. Should smaller quantities be needed, be sure the components are measured in the correct ratio and that the Component B is uniformly blended before mixing the components together. Mix only that amount of material that can be placed in 30 minutes. Do not retemper material.
- B. Mixing of the polymer-modified portland cement concrete: Pour all (1-gal) of Component A into the mixing container. Add Component B while continuing to mix. Add correct amount of the pre-approved coarse aggregate, and continue mixing to a uniform consistency. Mixing time should be 3 minutes maximum.

- C. Placement Procedure: At the time of application, the substrate should be saturated surface dry with no standing water. Mortar and/or concrete must be scrubbed into substrate filling all pores and voids. While the scrub coat is still wet, force material against edge of repair, working toward center. If repair area is too large to fill while scrub coat is still wet use Sika Dur 32 in lieu of scrub coat (See Spec Component SC-200). After filling, consolidate, then screed. Allow mortar or concrete to set to desired stiffness, then finish with trowel, manual or power, for smooth surface. Broom or burlap drag for rough surface. Areas where the depth of the repair is less than 1-inch shall be repaired with polymer-modified portland cement mortar. In areas where the depth of the repair is greater than 1 inch, the repair shall be made with polymer-modified portland cement concrete.
- D. As per ACI recommendations for portland cement concrete, curing is required. Moist cure with wet burlap and polyethylene, a fine mist of water or a water-based* compatible curing compound. Moist curing should commence immediately after finishing and continue for 48 hours. Protect newly applied material from rain, sun, and wind until compressive strength is 70% of the 28-day compressive strength. To prevent from freezing cover with insulating material. Setting time is dependent on temperature and humidity.
- E. *Pretesting of curing compound is recommended.
- F. Adhere to all procedures, limitations and cautions for the polymer-modified portland cement mortar in the manufacturers current printed technical data sheet and literature.

3.3 CLEANING

- A. The uncured polymer-modified portland cement mortar can be cleaned from tools with water. The cured polymer - modified portland cement mortar can only be removed mechanically.
- B. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

SikaTop[®] 111 Plus Crack Repair

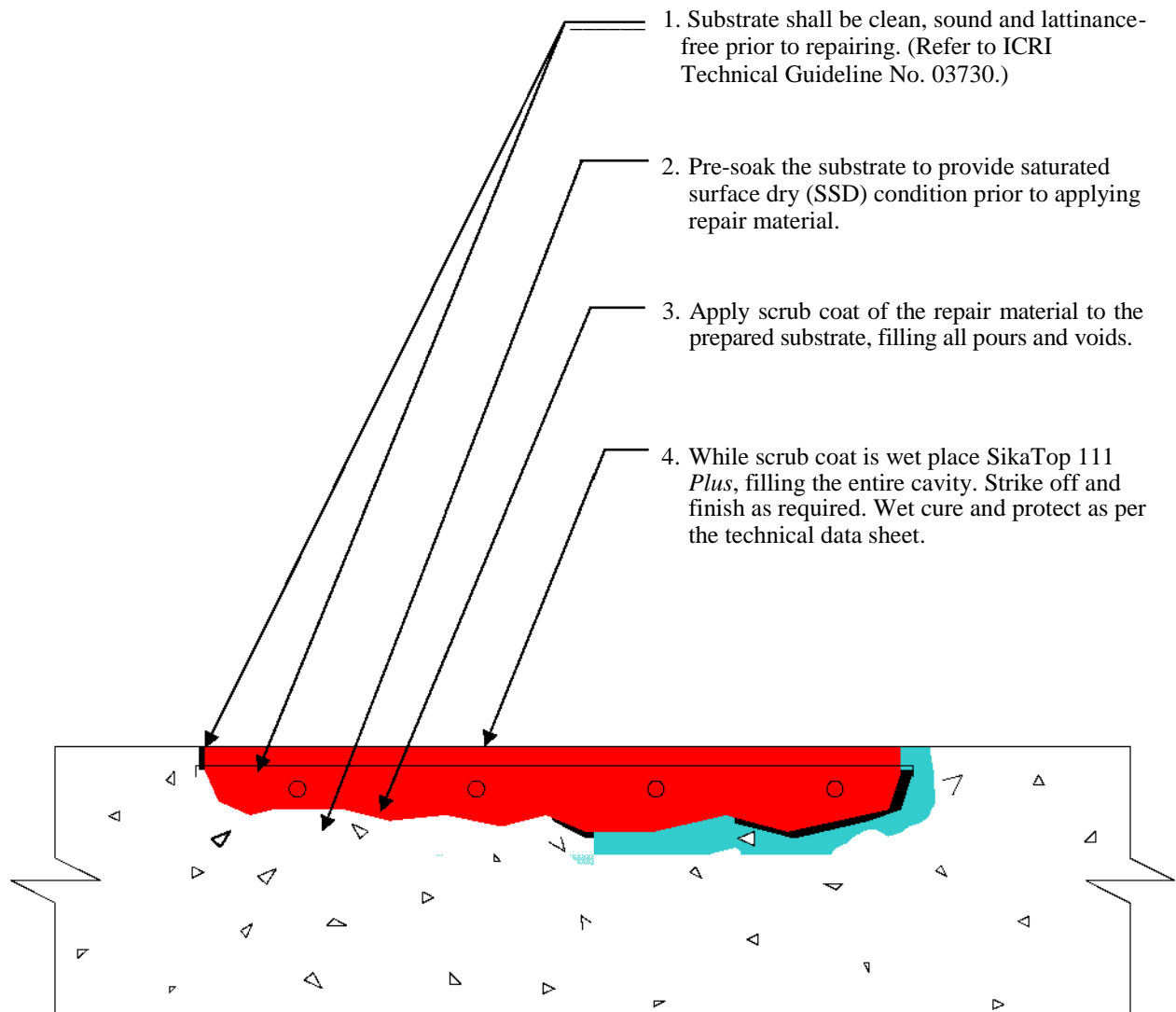


1. Substrate shall be clean, sound and lattinance-free prior to repairing.
2. Pre-soak the substrate to provide saturated surface dry (SSD) condition prior to applying repair material.
3. Apply scrub coat of the repair material to the prepared substrate.
4. While scrub coat is wet place SikaTop 111 *Plus*, filling the entire cavity. Strike off and finish as required. Wet cure and protect as per the technical data sheet.

Concrete Restoration Systems by Sika Corporation, 201 Polito Avenue, Lyndhurst, NJ 07071

SC-026

SikaTop® 111 Plus Hand-applied Repair



Note:

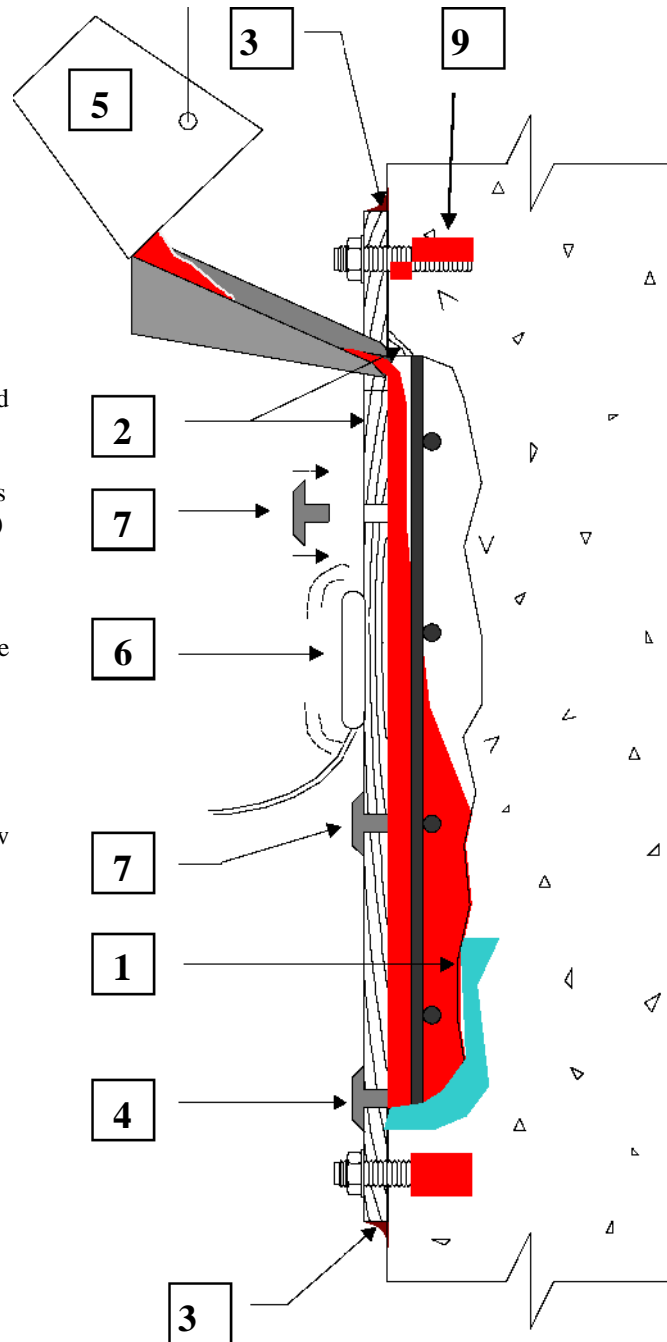
1. If repair area is too large to fill while scrub coat is still wet, use Sika Dur 32 in lieu of the scrub coat. (See Spec Component SC-200)
2. If reinforcing steel is located within the repair location refer to Spec Component SC-201
3. For applications greater than 1" in depth, add 3/8" coarse aggregate in accordance to the technical data sheet.

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SC-026

SikaTop[®] 111 Plus Form & Pour Repair

1. Substrate shall be clean, sound and lamination-free prior to repairing. (Refer to ICRI Technical Guideline No. 03730.)
2. Fit form, provide vent holes and chip spot for pour box. Apply release agent to form, or use plastic lined plywood.
3. Anchor form and seal perimeter with bead of Sikaflex 1a, let cure.
4. Fill with water to check for water tightness and to provide saturated surface dry (SSD) substrate. Let drain to no free standing water.
5. Mix and place SikaTop 111 Plus as per the technical data sheet.
6. Vibrate form while pouring SikaTop 111 Plus.
7. Vent holes to be capped when steady flow is evident.
8. Strip form when appropriate.
9. Dry pack anchor holes with SikaGrout 212.



Note:

1. If reinforcing steel is located within the repair location refer to Spec Component SC-201
2. For applications greater than 1" in depth, add 3/8" coarse aggregate in accordance to the technical data she

SECTION 464210 - FIBERGLASS REINFORCED PLASTIC (FRP) BAFFLE WALL

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

The work covered by this section shall include materials and installation for the slide-guide fiberglass reinforced plastic (FRP) baffle wall system and direct “bolt to concrete column” system to be installed in a drinking water treatment plant, which includes but is not limited to:

- A. FRP baffle wall panels
- B. FRP slide-guide angles
- C. Base plates, angles, and beams
- D. Stainless steel fasteners and connections

1.2 QUALITY ASSURANCE

- A. Contractor shall be responsible for verifying all field dimensions for development and approval of the manufacturer’s drawings.
- B. Baffle system components (excluding any associated concrete items) shall be provided by a single manufacturer to insure coordination and compatibility of parts.
- C. Manufacturer of baffle wall system shall have full responsibility for products and design. Split responsibility of materials and design is not acceptable.
- D. Manufacturer of baffle wall system shall have completed within the last five years a minimum of five (5) projects of similar type to that required in this scope.
- E. Manufacturer shall be ISO9001 certified.
- F. NSF 61 certification.

1.3 PERFORMANCE TESTING

- A. Materials shall comply with Federal and Local laws, ordinances, applicable codes, standards, regulations, and regulatory agency requirements including:
 - 1. ASTM D 638, Standard Test Method for Tensile Properties of Plastics
 - 2. ASTM D 790, Standard Test Method for Flexural Properties of Plastics
 - 3. ASTM D 570, Standard Test Method for Water Absorption of Materials
 - 4. ASTM D 256, Standard Test Method for Izod Impact (Notched)

1.4 DESIGN CRITERIA

Design load, considered as uniform loading over the entire wall, shall include fluid flow pressure plus any dynamic pressure associated with mechanical equipment.

- A. Design Load: The load for design would be the greater of water differential or wind load but not a combination of the two.
 - 1. Water Differential: 6 inches
 - 2. Wind Load: 10 Lbs./SF Uniform Load (*Minimum load per ASCE 2000*)
- B. Deflection Limits and Factors of Safety
 - 1. Baffle Panels: $L/D = 90$ (not to exceed 2.75"); Factor of Safety = 2.0

1.5 SUBMITTALS

Submittals shall include, but not be limited to:

- A. Dimensioned drawings including layouts; connection and framing details; fastener types and spacing; product description, and installation guidelines.
- B. Material certifications.

PART 2 - PRODUCTS

2.1 MANUFACTURER(S)

- A. The standard for design, characteristics, and performance shall be based on materials and components provided by:
 - 1. Enduro Composites, Inc., (713) 358-4000, www.endurocomposites.com.
 - 2. or approved equal.

2.2 MATERIALS - FRP Baffle Panels, Slide-Guide Angles, Slide-Guide End Attachments, Base Plates, Angles and Beams

- A. Potable Water Certification:
 - 1. All fiberglass components shall be third party certified to meet ANSI/NSF Standard 61.
 - 2. All fiberglass components including baffle panels, structural framing, angles, beams, channels, and other components used shall be individually certified.
 - 3. The baffle components shall each be rated to provide a designated maximum surface area to volume ratio of 490 sq cm/L or more.
- B. FRP structural materials shall exhibit these minimum physical properties:

Tensile Strength	48,000 psi	ASTM D 638
Flexural Strength	58,000 psi	ASTM D 790
Flexural Modulus	2,000,000 psi	ASTM D 790
Izod Impact (Notched)	25	ASTM D 256
Water Absorption	0.25% maximum	ASTM D 570

C. FRP Baffle Panels and Deflector Baffles

1. FRP baffle panels shall be a ribbed profile in 2.75" depth x 24" height coverage (full panel dimension).
2. FRP baffle panels shall be a minimum of 1/4" (.25 inch) thick.
3. FRP baffle panels shall have (top) horizontal ribs that slope downward not less than 10 degrees to minimize sediment build-up.
4. FRP baffle panels between flocculation zones 1 and 2 shall be designed to slide into slide-guide angles at each panel end. Minimal bolting of panels is required when using slide-guide angles.
5. FRP baffle panels between flocculation zone 2 and the sedimentation zone shall be bolted in a vertical orientation directly onto existing horizontal concrete beams at each end using three epoxy anchors with stainless steel bolts at each end (epoxy anchor and stainless steel bolt size to be determined by baffle manufacturer).
6. FRP baffle panels shall comply with the structural requirements in Section 1.4 Design Criteria.
7. FRP material shall include glass fiber reinforcements 50% (minimum) of the material weight embedded within UV Stabilized Polyester Resin. Color shall be standard gray.
8. FRP material shall have a surfacing veil on both top and bottom sides.
9. Factory cut edges and drilled holes shall be sealed with NSF 61 approved material.
10. All baffle panels shall be Enduro Composites "H" series or approved equal.

D. FRP Slide-Guide Angles

1. FRP slide-guide angles shall comply with the structural requirements in Section 1.4 Design Criteria.
2. FRP slide-guide angles shall be a minimum of 3/8" (.375 inch) thickness and 90 degrees.
 - a. Installing contractor shall field attach FRP slide-guide angles to new concrete columns and walls between flocculation zones 1 and 2 using epoxy anchors with stainless steel bolts at intervals recommended by FRP baffle manufacturer but not less than every 18-inches.
3. FRP material shall include glass fiber reinforcements 50% (minimum) of the material weight embedded within UV Stabilized Polyester Resin. Color shall be standard gray.
4. FRP material shall have a surfacing veil on both top and bottom sides.
5. Factory cut edges and drilled holes shall be sealed with NSF 61 approved material.

E. Slide Gate Penetrations (indicated on drawings)

1. Slide gate penetrations (shown on drawings) shall be accommodated by the baffle manufacturer and the Contractor to provide a baffle wall which is neatly, cleanly, and squarely installed up to and contacting the slide gate frame.

F. Openings in Baffle Wall (15-inch by 15-inch)

1. Each opening (15-inches wide by 15-inches high) in the baffle wall shall be reinforced with FRP and/or stainless steel beams, baseplates, and/or angles as determined by the FRP baffle manufacturer. **Angles, beams, and/or baseplates which are anchored to the floor shall be anchored in the original basin floor (not the new grout) with epoxy anchors and stainless steel bolts which are NSF 61 approved.**

G. Deflector Baffles (20-inch by 20-inch)

1. Deflector baffles (as required and detailed on the plan drawings) shall be **designed and** factory fabricated by the FRP baffle system manufacturer.
2. Deflector baffles shall be anchored and reinforced with FRP and/or stainless steel angles, beams, and/or baseplates as determined by the FRP baffle manufacturer. **Angles, beams, and/or baseplates shall be anchored in the original basin floor (not the new grout) with**

epoxy anchors and stainless steel bolts which are NSF 61 approved.

3. Deflector baffles shall be positioned 12 inches in front of the 15-inch by 15-inch opening in the baffle wall.
4. Baffles shall be “H” series by Enduro Composites or approved equal.

H. Hardware

1. All anchors shall be epoxy adhesive type (sized by baffle manufacturer & NSF 61 certified) with stainless steel bolts for attaching the slide guide angles, attached FRP panel directly to concrete cross members, and mounting the deflector baffles. Wedge or expansion anchors are not allowed.
2. All fasteners and other structural hardware shall be 316 Stainless Steel.

I. ***Baffle Bottoms***

1. ***Baffle bottoms adjacent to the floor shall be cut by the manufacturer to fit the contours of the basin floor (including the new grout being added) and to touch the basin floor. Contour cuts on baffle bottoms shall be sealed at factory with NSF 61 approved sealing product.***

PART 3 – EXECUTION

3.1 MATERIAL HANDLING

- A. At the time of delivery, all materials shall be inspected for shipping damage. The freight company and the Manufacturer shall be notified immediately of any damage or quantity shortages.
- B. The Contractor shall protect FRP materials from cuts, scratches, gouges, abrasions, and impacts. When lifting crated FRP materials, spreader bars shall be used (not wire slings unless materials are fully protected). FRP components shall not be dragged across one another unless separated by a non-scratching spacer.

3.2 INSTALLATION

- A. Before placing and attaching components, the contractor must confirm the alignment and location of concrete columns, bearing surfaces, etc. All bearing surfaces must be level, flat, clean and free of debris.
- B. Erection shall proceed according to sequence shown on the approved drawings.
- C. Contractor shall install pads, curbs or piers to modify uneven or sloped concrete surfaces to create a flat, level surface for baffle system attachment.
- D. Contractor shall field cut materials as required and shown on the Manufacturer’s drawings.
- E. Contractor shall seal field cut edges and drilled holes with NSF 61 approved material.
- F. Contractor shall install slide-guide angles onto concrete columns and walls as required on the approved layout drawings. Field modifications (cuts, copes, holes, etc.) unless shown on the drawings are not allowed without the manufacturer’s written approval. Shim FRP slide-guide angles only with approved materials.
- G. Before placement of baffle panels, contractor shall check alignment and location of concrete columns, walls, and FRP slide-guide angles.
- H. Contractor shall adjust FRP baffle panels for proper bearing and alignment, slide them into the slide-guide angles, and fasten them to the slide-guide angles at intervals as shown on the approved layout drawings.
- I. Refer to manufacturer’s installation instructions and drawings for attachment requirements, fastener selection and procedure. Contractor shall adjust panels for proper bearing and alignment before fastening (as required).

- J. Contractor shall place and fasten other miscellaneous components or hardware as shown on the approved drawings.
- K. The baffle wall between flocculation zones 1 and 2 is directly beneath the flocculator bridge/walkway. If the flocculator bridge/walkway is installed prior to the baffle wall then the top sections of the FRP baffle panels and slide guide angles will have to be installed as follows: 1) install the downstream slide guide angle, 2) install the FRP baffle panel, and 3) install the upstream slide guide angle to complete the installation.
- L. Rebar in the basin concrete walls, floors, columns and cross beams shall not be breached, cut, or damaged during installation of the anchors for the FRP baffle wall system.

END OF SECTION 464210

SECTION 464300 – INCLINED PLATE SETTLER SYSTEM

PART 1 - GENERAL

1.1 WORK OF THIS SECTION

- A. SCOPE: This section covers furnishing of a complete plate settler system as specified herein. The plate settler equipment shall be designed for installation in basins having the dimensions indicated herein and on the drawings. The CONTRACTOR and Manufacturer shall field verify existing basin structure and equipment measurements before preparing and submitting the shop drawings. Sludge collecting equipment that will be installed within the basins below the plate settlers is covered in other sections. The CONTRACTOR and Manufacturer shall coordinate the inclined plate settler shop drawing with the clarifier shop drawing to ensure that the top of the clarifier rake arms do not conflict with the bottom of the inclined plate settlers or interfere with the operation or performance of the inclined plate settlers.
- B. CONTRACTOR: Shall furnish all labor, materials, equipment, and incidentals as shown, specified and required to provide a complete plate settler system as specified herein.
- C. GENERAL: Equipment furnished under this section shall be fabricated and assembled in full conformity with drawings, specifications, engineering data, instructions, and recommendations by equipment manufacturer.
- D. MANUFACTURER of the plate settler equipment shall be vested with unit responsibility for the proper function of the complete plate settler system as specified. The equipment covered by this specification is intended to be standard equipment of proven ability as manufactured by reputable concerns having extensive experience in the production of such equipment.

1.2 REFERENCES

- A. The following is a list of standards which are referenced in this section:
 - 1. American Society for Testing and Materials (ASTM)
 - 2. ASTM A240 – Type 304L & 316L Stainless Steel
 - 3. ASTM A992 GR50KSI Steel
 - 4. American National Standards Institute (ANSI)
 - 5. American Welding Society (AWS)

1.3 SUBMITTALS

- A. Submit for approval the following:
 - 1. Provide shop drawing submittals for review electronically in PDF format and include tabbed sections defining scope, process calculations, mechanical and structural calculations, catalog cuts, and drawings. Each shop drawing shall be submitted for review as a single PDF document. After review and acceptance of a shop drawing submittal, provide final version of shop drawing in electronic PDF format and also provide four (4) complete paper copies of accepted shop drawing

- manuals in white 3-ring binders and include tabbed sections defining scope, process calculations, mechanical and structural calculations, catalog cuts, and drawings.
2. All structural design calculations shall be prepared by the manufacturer and sealed by a professional engineer licensed in Kentucky.
 3. Manufacturer's literature, illustrations, specifications, and engineering data including the total weight of each unit (wet and dry), structural loads at supports (wet and dry), connection details, and performance data.
 4. Drawings shall show dimensions, the overall arrangement of equipment and materials of construction.
 5. Literature and certified shop drawings describing the equipment and showing all important details of construction and dimensions. Dimensions shall show overall size and space requirements including that for installation, leveling, dismantling and maintenance.
 6. Cross sections and details to show that all components are in conformance with the intent of the specification and are satisfactory from the standpoint of design and physical arrangement.
 7. All information required for the detailed design and location of all connecting or adjacent structural and/or mechanical items, such as foundations, anchor bolts, steel supports, piping, conduit, etc. Any recommended or required deviations from the dimensions and locations of connecting or adjacent items as shown in the Drawings shall be described completely in the submittal.
 8. Weight of the equipment (dry and wet) and its distribution on the supports.

B. Operation and Maintenance Manuals

1. Provide Operation and Maintenance Manual submittals for review electronically in PDF format. Each Operation and Maintenance Manual shall be submitted for review as a single PDF document. After review and acceptance of an Operation and Maintenance Manual, provide final version of Manual in electronic PDF format and also provide (4) complete paper copies of reviewed Operation and Maintenance manuals. Paper manuals shall be in a white 3-ring binder with tabbed sections to include reinforced 8.5" x 11" paper, 11" x 17" B-size drawings when practical, and individually sleeved D-size drawings.
2. The manual shall include Equipment Introduction and Operation, Warranty, Troubleshooting, Maintenance, and Drawings.
3. Field start-up reports as described in paragraph 3.3 (Manufacture's Services) shall be submitted after start-up for owner's insertion into approved O&M manual.

C. NSF-61 Compliance

1. To ensure public safety, the plate settler system shall be certified by NSF/ANSI Standard 61. Systems that do not have NSF-61 certification will not be accepted.

1.4 QUALITY ASSURANCE

- A. Basis of Design: The structural, mechanical and process design for the inclined plate settlers are based on information provided by the first-listed inclined plate settler manufacturer. The cost of any changes and modifications resulting from the use of other approved inclined plate settler equipment shall be borne solely by the CONTRACTOR. Fundamental changes in the configuration of the plate settler system will not be allowed. The CONTRACTOR shall submit drawings and supporting documents, identifying all proposed changes, to the ENGINEER for review and acceptance. Supporting documents shall delineate all proposed changes including complete structural calculations stamped and signed by a Professional Engineer licensed in Kentucky.
- B. The manufacturer shall be solely and fully responsible for the warrant, mechanical design, and structural design adequacy of all the provided components under this Section.

- C. The second naming of a manufacturer in this specification is not an indication that the manufacturer's standard equipment is acceptable instead of the specified component features. Naming is only an indication that the manufacturer may have the capability of engineering and supplying a system as specified. Manufacturers shall not quote, submit, or supply any material, not in full compliance with this specification.
- D. This specification has been prepared on the basis of the specific requirements for this application. These specifications may require modification of the manufacturer's standard equipment design and it will be mandatory that all manufacturers meet all requirements of this specification. Equipment manufacturers shall modify their standard designs and recommended operational parameters to meet all requirements of this specification and as shown on the drawings.
- E. Structural Design
 - 1. The structural design of the plate settler system shall be in accordance with the requirements of the current edition of the International Building Code (IBC).
 - 2. Inclined Plate Settler support frames shall be designed for the worst-case load conditions of an empty basin and full effluent troughs.
 - 3. The inclined plate settler arrangement shown on the Contract Drawings is based on design information provided by the first-listed Inclined Plate Settler Manufacturer. The actual installation requirements including the location of structural supports shall be based upon shop drawings submitted by the CONTRACTOR and reviewed by the ENGINEER based upon the requirements specified herein.
- F. Responsibilities
 - 1. The Plate Settler Manufacturer is responsible for delivery of equipment and supplies required under these specifications. The CONTRACTOR is responsible for proper coordination and integration of all equipment required for installation in the basins, plate pack assemblies, support beams and columns, piping, and all other associated work shown on the drawings and specified in the Contract Documents. The CONTRACTOR and Manufacturer are responsible for ensuring that the plate settler system shall be properly coordinated and will function as a unit in accordance with these specifications. The CONTRACTOR and Manufacturer shall bear ultimate responsibility for equipment coordination, installation, operation, and guarantees.
- G. Workmanship
 - 1. Workmanship in the fabrication of the inclined plate settlers shall be first-class, including the following requirements: The assembled plate packs shall have members that are straight and true. Structural distortions, warps, and other defects shall not be present in the plate pack assemblies before or after installation in the sedimentation basins. All exterior surfaces and edges of the plate packs shall be smooth. Sharp corners shall be ground round and smooth.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Plates shall be factory installed in the frame, and shall be shipped as one plate pack assembly. All equipment shall be shipped with suitable in transit protection. Special handling instructions shall be included.
- B. Stainless steel lifting jigs shall be provided to ensure proper lifting locations are followed.
- C. Plate packs shall be shipped on flatbed trucks to allow access by crane provided by the

CONTRACTOR.

- D. Equipment shall be stored and protected in accordance with the manufacturer's recommendations.

1.6 SYSTEM DESCRIPTION

- A. The plate settlers shall be designed for operation in the sedimentation basin as indicated on the Contract Drawings. The equipment shall be designed for the following conditions as listed in the Process Table below.

B. PROCESS TABLE

Service	24 hr
Number of Basins	4
Inside Basin Width (ft)	90
Inside Basin Length (ft)	90
Side Water Depth (ft)	16.2 (clarifier edge) to 19.95 (clarifier center)
Minimum Flow (MGD) per Basin	1.0
Design Flow (MGD) per Basin	11.0
Peak Hydraulic Flow (MGD) per Basin	11.0
Minimum Effective Projected Horizontal Surface Area (ft ²) per Basin	27,282-sf
Design Loading Rate (gpm/ft ²)	0.28 gpm/ft ²
Plate Efficiency (<i>Ten State Standard</i>)	80%
Nominal parallel distance between plates (in.)	1.86 to 2.0
Plate Inclination Measured from the Horizontal	55 degrees
Plate Width (ft)	4.5
Plate Length (ft)*	9.5 to 10.0
Number of plate rows per basin	12 to 14
Minimum number of plates per basin	1,320
Minimum number of effluent troughs per basin	9 including center total effluent trough (number of effluent troughs must be odd including the center total effluent trough)
Number of cross collection flumes per basin	1
Weir loading rate at design flow (gpd/ft)	22,727 (<i>maximum</i>)
Raw Water Characteristics Prior To Flocculation	
Temperature, Fahrenheit	33-90
Influent Turbidity, NTU	2-100
Effluent Turbidity, NTU	1.0
pH	5.5 – 8.0

*Plate length is the finished settling length at 55 degrees used to derive the number of plates required to achieve the minimum effective projected horizontal surface area.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. The equipment shall be manufactured by:

1. Jim Myers & Sons, Inc. (JMS), of Charlotte, NC,
2. Meurer Research, Inc. (MRI), of Golden CO
3. or approved equal.

Inclusion in the acceptable equipment manufacturer list above does not eliminate the requirement to fully comply with all aspects of this specification.

B. The inclined plate settler design for this project is based on JMS inclined plate settlers.

C. **The equipment described by this specification defines minimum equipment requirements. All unforeseen costs associated with approved equal equipment manufacturers shall be the sole responsibility of the Contractor.**

D. **The use of an approved equal equipment manufacturer does not negate the requirement of full compliance with all aspects and criteria of this specification. Deviations from these specification requirements will not be allowed.**

E. **To be considered an equal all aspects and criteria of this specification must be met at a minimum.**

F. The equipment shall be the product of a manufacturer engaged in the design and manufacture of similar equipment in successful operation in similar applications. The manufacturer shall have a minimum of 10 years of United States municipal water experience with 10 installations of the same type of equipment as specified herein with documented successful operation.

G. Manufacturers shall submit the following with the shop drawing:

1. A list of at least 10 previous installations in the US municipal water market, including contact information and project information for projects of similar size and design as this project.
2. Preliminary drawings and process calculations specific to this project.
3. A letter stating that their proposed design complies with all requirements as specified herein. If there are deviations from the specification a letter must address each deviation in detail.
4. Equipment shall be manufactured in the United States by employees fully certified by the American Welding Society for the tungsten inert gas (TIG) welding process to standard AWS D1.6. Letters of current welder certification shall be provided with shop drawing submittal.

2.2 MATERIALS OF CONSTRUCTION

A. The components of the Inclined Plate Settlers shall be made from the following minimum material requirements:

1. Plate Settler Frames: Type 304LSS (Minimum 14 gauge thick)
2. Plates: Type 304SS
 - a. Type 316SS (If any portion of the plate is at the air-water interface)

3. Top Flow Control Device (Angle or Tube): Type 304SS (Minimum 24 gauge thick)
 - a. Type 316SS (If any portion of the device is at the air-water interface)
 4. Effluent Troughs: Type 316SS (Minimum 18 gauge thick)
 5. Adjustable V-notch or flat crested Weirs: Type 316SS (Minimum 16 gauge thick)
 - a. V-notch weirs and flat crested weirs must bolt to the effluent troughs with 3/8" Type 316SS through bolt connection a minimum of every 12 inches. Pressure clips shall not be used.
 6. Hardware: Nuts, bolts, fasteners Type 316SS
 7. Material compliance: Any materials submitted that do not meet these minimum standards will not be allowed. All material type & thickness will be confirmed during the submittal process and prior to installation.
 8. Material testing: After installation material will be tested to ensure all material at the air-water interface is Type 316SS and all welds have been passivated to ASTM A-380 standards.
 9. Material thickness confirmation: No material thinner than 18 gauge will be allowed except for the plates.
 10. Weld passivation at the air-water interface: All stainless-steel welds at the air-water interface shall be fully passivated to meet ASTM A-380.
- B. Effluent troughs, weirs, top flow control device, plates, frames, trusses and support beams shall perform under all operating scenarios without buckling, permanent deformation, or yielding.
- C. Plate settler manufacturer shall perform and submit structural analysis and calculations for the entire plate settler system including troughs, plates, top flow control devices, weirs, frames, trusses and support beams to demonstrate and confirm that all aspects of this specification are met. Structural analysis and calculations shall be stamped and signed by a structural engineer registered in the State of Kentucky and submitted with the shop drawing. The analysis and calculations shall include the weight of four 250 lb employees walking and standing on the plate settlers as well as a concentrated live load of 300 lbs placed at the mid span of a single top flow control device at a single point.

2.3 PLATE SETTLER SYSTEM

- A. The plate settler system shall be fabricated in accordance with the details indicated on the drawings and the requirements specified herein.
- B. All components of the inclined plate settlers that are not completely submerged under normal operation shall be constructed of Type 316L stainless steel.
- C. All plate settler system components shall be fabricated from Type 304 and/or 316 stainless steel.
- D. All stainless steel components at the air-water interface shall be Type 316 with a minimum thickness of 24 gauge. This includes the effluent troughs, adjustable v-notch weirs, baffles, top flow control device, frame, etc.
- E. The plate length and spacing shall be as specified in Process Table 1.6.B above. The entire system shall be designed to evenly distribute the flow to every plate and to remove the effluent evenly from the top of the plate pack.
- F. The influent water shall primarily enter the inclined plate settlers through feed orifices in the side of the plates to minimize sludge re-entrainment. Feed openings shall be sized and located to maintain laminar flow and not to disturb settling solids.
- G. The plate settler assemblies shall be self-supporting and shall not exceed a maximum allowable deflection $L/360$ based on all dead loads created by plates, troughs and frame assembly, a solids

loading of 30 lbs per plate along with a concentrated live load of 300 lbs at a single point placed at the midpoint of a single top flow control device.

2.4 PLATE SETTLER FRAME

- A. The plate settler frame shall be fabricated from stainless steel tubing with a minimum thickness of 0.0747 inches (14 gauge) of adequate size to achieve the deflection criteria set forth in 2.3.G.

2.5 BAFFLES

- A. The baffles being located at the air-water interface shall be constructed of Type 316L stainless steel with a minimum thickness of 0.0480 in. 18 gauge.

2.6 PLATES

- A. The individual plates shall be constructed of flat 24-gauge minimum thickness Type 304 or 316 stainless steel components designed to handle 30 lbs of solids loading per plate. Provide L-grade material for all welded components.
- B. The plates shall not be exposed to the air-water interface. .
- C. The top of the all plates shall slant toward the effluent end of the basin.
- D. The plates shall be designed structurally for the following conditions:
 - 1. The plate shall be designed to handle a 30 lb solids loading evenly distributed over the plate. The plate shall also be designed to handle a 15 lb point load on the midpoint of the bottom hem without failing, buckling, yielding, or creating a permanent deformation. Once the 15 lb load is removed, the plate shall exhibit limited hysteresis.

2.7 TOP FLOW CONTROL DEVICE

- A. Each plate shall be equipped with an integral Type 304 stainless steel top flow control device to ensure that there is an even flow distribution across the entire surface area of the plate.
- B. Plate settler systems that utilize a top flow tube at the air-water interface shall be Type 304 stainless steel with a minimum thickness of 0.0235 in. (24 gauge).
- C. The top flow control device shall have a minimum thickness of 0.0235 in. (24 gauge) and provide a suitable walking surface for routine cleaning and maintenance. Any top flow control device at the air-water interface shall be no less than 0.0235 in. (24 gauge) in thickness. Plate settlers that utilize material at this location less than 0.0235 in. (24 gauge) shall not be allowed.
- D. The top flow control angle shall protect all surfaces of the plate. No exposed unprotected portions of the plate shall extend past the top flow control angle.
- E. Top flow control device must allow personnel to walk on the plates without the use of a temporary walking surface, such as plywood. Top flow control device shall support a concentrated live load of

300 lbs placed at the mid span of a single top flow control device at a single point without buckling, permanent deformation or yielding. If the any buckling, permanent deformation or yielding occurs the entire plate pack shall be replaced at no cost to the Owner. See Specification Section 3.1 for field testing requirements.

2.8 EFFLUENT TROUGHS & V-NOTCH WEIRS

- A. The effluent troughs and adjustable v-notch weirs shall be constructed of Type 316L stainless steel with a minimum thickness of 0.0480 in. (18 gauge). The v-notch weirs shall be securely bolted to the effluent troughs with 3/8" Type 316SS through bolt connections a minimum of every 12 inches.
- B. Each trough shall be equipped with an adjustable weir for leveling during initial installation and to provide an even flow distribution during operation. The weirs shall be manufactured from 0.0480 in. (18 gauge) minimum Type 316 stainless steel.
- C. The v-notch weir shall be designed so each plate has two individual v-notches for even flow distribution. Plate settler systems that do not have weirs for adjustability and flow control shall not be allowed.
- D. V-notch weirs shall operate at a minimum water elevation of 4 inches above the top flow control angle at design flow. Flat crested weirs shall be designed to maintain a water level above the top tube at all flows.
- E. Troughs located above the plate settlers obstructing access to the tops of the plates shall not be accepted.

2.9 CROSS COLLECTION FLUME

- A. All effluent troughs shall feed into a cross collection flume. This cross collection flume shall feed into a center total effluent trough sized for 11 MGD that transitions to a single round conduit which connects to a single 36" effluent pipe stubbed out 1 foot from the wall via a custom flanged connection provided by the inclined plate settler manufacturer.
- B. ***Removable stainless steel hand-pull gates shall be furnished and installed at one end of the cross collection flume in each basin. When the hand-pull gate is removed the entire cross section of the cross collection flume shall be exposed. The hand-pull gate shall seal tightly to the end of the flume when installed. When the hand-pull gate is removed it will allow the basin to be filled by backfilling through the basin effluent pipe and plate settler trough/flume. Hand-pull gates to be Mueller Hydro-Gate or equal.***

2.10 TRUSS

- A. The plate settlers in each basin are to be supported by a stainless steel truss or painted carbon steel truss (prime coated at factory) that spans the entire basin width without the use of intermediate support columns ***between the basin floor and the truss***. The support truss shall be constructed from AISC wide flange beam shapes. A stiffened seat connection shall be anchored to the basin wall to provide a bearing support for a horizontal slip connection at each end of the truss which will provide no additional concentrated moments to the existing basin walls. ***Truss wall connections at the common wall between Basins 2 and 3 may need to be off-set to avoid interference and to comply with anchor spacing requirements.*** Manufacturer shall include stainless steel shims to level plate

cartridges after placement onto the truss as needed. All connections must use 17-4 pH H1150 stainless steel bolts with calculations showing adequate bolt size and quantity. Calculations according to the AISC Steel Construction Manual 14th edition (LRFD) must be provided to show adequate member sizes for supporting material weight of plate settler assemblies, water weight when troughs are completely filled, 30 lb per plate of solids buildup, four 250 lb operator loads during routine cleaning, and seismic loading. All applicable ASCE 7-10 load combinations are to be analyzed for compliance.

1. Below are the minimum to be used in designing the truss and calculating all stresses and safety factors.
 - a. Weight of plates, supports, troughs, brackets, trusses, and other ancillary items.
 - b. Solids loading. 30 lbs per plate distributed evenly over plate surface
 - c. Operator loads during routine cleaning (4 people). 1,000 lbs (4 X 250 lbs) located at worst case location on truss for shear, moment, and axial force design of truss elements.
 - d. Weight of water in all troughs.
 - e. Basins can be backfilled from the effluent pipe, which is the worst-case loading since the basin would be empty, and all troughs would be full.
 - f. Concentrated live load of 300 lbs at mid span of a single top flow control device at a single point.
 - g. Buckling, permanent deformation or yielding shall not occur under any operating scenarios.

B. If the truss is a painted steel truss it shall be painted per the following guidelines:

1. Blasting: SSPC-SP10/NACE 2 near white blast cleaning with a 1.5-2.0 mil surface blast profile
2. Shop Primer: TNEMEC Potapox primer 3.0-4.0 dry mils (or approved equal with NSF 61 certification and same thickness).
3. Field Finish Coat 1: TNEMEC Potapox finish 3.0-4.0 dry mils (or approved equal with NSF 61 certification and same thickness).
4. Field Finish Coat 2: TNEMEC Potapox finish 3.0-4.0 dry mils (or approved equal with NSF 61 certification and same thickness).
5. Contractor is responsible for applying the final two coats in the field per TNEMEC specifications after the truss has been installed in the basin and before the plate settler system is installed.
6. The contract shall provide a 3rd party TNEMEC paint expert inspection (or 3rd part approved equal paint manufacturer paint expert inspection) and written certification that the paint was applied per factory specifications and meets the above specification requirements.
7. The finish coats of paint shall be applied in the field after installation of the truss and allowed to cure per manufacturer's recommendations.
8. All nicks and scrapes from the installation process shall be addressed per the above painting requirements prior to adding the final finish coats of paint.

2.11 HARDWARE

- A. All field assembly bolts and anchor bolts, nuts, and washers shall be Type 316 stainless steel.
- B. All submerged connections shall utilize Type 316 stainless steel nylon insert locknuts.
- C. NSF-61 approved anti-seize lubricant shall be applied to the threads of all stainless steel bolts before assembly at the factory and field assembly.

2.12 FABRICATION

- A. All welded joints that will be fully or partially submerged shall be sealed watertight with continuous welds. All welding shall be performed in accordance with AWS standards by welders fully certified by the American Welding Society for the tungsten inert gas (TIG) welding process standard AWS D1.6. Letters of current welder certification shall be provided with the shop drawing submittal.
- B. All welds shall be passivated to ASTM A-380 standards.

2.13 BASIN 4 OVERFLOW PIPE

- A. The existing Basin 4 overflow pipe (20" DI) shall be removed to the wall flange. The plate settler manufacturer shall incorporate a stainless steel pipe or duct of equal cross sectional area into the plate settler system to extend the overflow pipe to the north side of Basin 4 where it can function as intended without interfering with plate settler performance. The existing cover grating shall be reused by the plate settler manufacturer if possible or replaced with similar cover grating. Maintain same overflow elevation as existing overflow. See project drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The Contractor shall install the inclined plate settler equipment in strict accordance with the manufacturer's recommendations.
- B. Install and level the plate pack units and troughs in accordance with the manufacturer's recommendations and the Drawings. All plate settler support's anchor locations shall be leveled to within +/- 1/8 of an inch. Exercise care in erecting and leveling the plate settlers, troughs, and weir plates so that the units are at the elevations shown on the Drawings or specified herein and have deflections within the manufacturer's specified limits.
- C. After installation, all v-notch weirs must be leveled to within 1/16 of an inch of target elevation as shown on the manufacturer's drawings.
- D. NSF-61 approved anti-seize thread lubricant shall be applied to the male threads of all stainless steel bolts at the time of the assembly.
- E. After installation, each plate settler unit shall be field tested by the Contractor by placing a 300 lb concentrated live load at the mid span of a single top flow control device at a single point and leaving it in place for 1 minute without buckling, permanent deformation, or yielding. The concentrated live load test shall be conducted by placing the 300 lb weight on the edge of a wedge at the midpoint of a single top flow control device. This test shall be repeated for a single top flow control device for each plate settler pack in each basin as selected by the Owner and Engineer. Use of plywood, flat sheet metal, or any other device meant to spread the point load over multiple flow control devices shall not be allowed. Contractor shall document the field test results with a table identifying each test location (basin number, plate pack number, and plate number) and the test results as well as documenting the results with photographs labeled for the basin number and location within the basin (plate pack number and plate number). If a field test fails the entire plate pack shall be replaced at no cost to the Owner.

- F. The walls in Basins 2 and 3 to which the inclined plate settler system shall be attached are tapered. The inclined plate settler manufacturer shall take account of this taper and provide anchors and connectors which accommodate the wall taper. Contractor and manufacturer shall confirm wall taper by measuring taper in the field (during November 1 to April 15 time period) before preparing shop drawings.

3.2 WARRANTY

- A. The supplier shall guarantee in writing that the equipment furnished is appropriate for the intended service and shall be free of manufacturing and fabrication defects in material and workmanship for a period of 1 year after the equipment is satisfactorily placed in service. If the equipment is not placed in service within 6 months of delivery, the 1 year guarantee period shall commence 6 months after delivery.

3.3 MANUFACTURER'S SERVICES

- A. Manufacturer's Field Services: The CONTRACTOR shall provide the following services in addition to any other services specified herein, and required by these Specifications.
 - 1. Pre-installation training service: A factory-trained manufacturer's representative shall be provided for (1) trip and (1) eight hour day of onsite service to review equipment submittals and installation instructions.
 - 2. Onsite field service: A factory-trained manufacturer's representative shall be provided for (8) trips each with (3) eight hour days onsite to provide installation review, instruction, and supervision. The installation services shall be coordinated between the CONTRACTOR and the manufacturer.
 - 3. Start-up & O&M Training: A factory-trained manufacturer's representative shall be provided for (1) trip with (2) eight hour days onsite to provide start-up and O&M training services. The start-up and O&M services shall be coordinated between the CONTRACTOR and the manufacturer.
 - 4. After installation supervision and field testing services by the manufacturer, the CONTRACTOR shall submit to the ENGINEER, a certification letter on the manufacturer's letterhead and signed by the manufacturer certifying that the equipment was installed per the manufacturer's recommendations.
 - 5. The manufacturer shall provide start-up reports covering installation inspection and start-up activities.
 - 6. The manufacturer shall provide operator training to all required plant personnel.
- B. All costs, including travel, lodging, meals and incidentals for manufacturer service shall be included in the CONTRACTOR'S bid.

END OF SECTION 464300

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- G-00-001 COVER SHEET
- G-00-002 VICINITY MAP, GENERAL NOTES, SHEET NUMBERING LEGEND,
- G-00-003 SHEET INDEX
- G-00-004 CIVIL STANDARD ABBREVIATIONS, LEGENDS, SYMBOLS AND LINETYPES

CIVIL

- C-00-100 SITE PLAN - STRUCTURE DESIGNATION

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- M-01-102 BASIN NO. 1 PLAN - NEW EQUIPMENT
- M-01-301 BASIN NO. 1 SECTION - DEMOLITION
- M-01-302 BASIN NO. 1 SECTION - NEW EQUIPMENT
- M-01-501 BASIN NO. 1 SECTION - DEMOLITION
- M-01-502 BASIN NO. 1 SECTION - NEW EQUIPMENT
- M-01-503 BASIN NO. 1 SLUDGE VALVE PLAN & SECTION - DEMOLITION
- M-01-504 BASIN NO. 1 SLUDGE VALVE PLAN & SECTION - NEW EQUIPMENT
- M-01-701 BASIN NO. 1 DEMOLITION PHOTOS
- M-02-101 BASIN NO. 2 PLAN - DEMOLITION
- M-02-102 BASIN NO. 2 PLAN - NEW EQUIPMENT
- M-02-301 BASIN NO. 2 SECTION - DEMOLITION
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- M-03-102 BASIN NO. 3 PLAN - NEW EQUIPMENT
- M-03-301 BASIN NO. 3 SECTIONS - DEMOLITION
- M-03-302 BASIN NO. 3 SECTIONS - NEW EQUIPMENT
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- M-04-503 BASIN NO. 4 SLUDGE VALVE PLAN & SECTION - DEMOLITION
- M-04-504 BASIN NO. 4 SLUDGE VALVE PLAN & SECTION - NEW EQUIPMENT
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- M-05-102 SODIUM HYPOCHLORITE BUILDING PLAN - NEW EQUIPMENT
- M-05-601 SODIUM HYPOCHLORITE CHEMICAL FEED - DEMOLITION
- M-05-602 SODIUM HYPOCHLORITE CHEMICAL FEED - NEW EQUIPMENT
- M-05-701 SODIUM HYPOCHLORITE - DEMOLITION PHOTOS
- M-05-702 SODIUM HYPOCHLORITE - DEMOLITION PHOTOS
- M-05-703 SODIUM HYPOCHLORITE - DEMOLITION PHOTOS
- M-06-101 RAPID MIX NO. 2 PLAN & SECTIONS - DEMOLITION
- M-06-102 RAPID MIX NO. 2 PLAN & SECTIONS - NEW EQUIPMENT

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- S-00-002 GENERAL STRUCTURAL NOTES AND DETAILS
- S-00-003 TYPICAL GUARD RAIL DETAILS
- S-00-004 GENERAL STRUCTURAL NOTES AND TYPICAL DETAILS
- S-01-101 BASIN NO.1 - PLAN - DEMOLITION
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- S-01-301 BASIN NO. 1 SECTION - DEMOLITION
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- I-00-501 INSTRUMENTATION DETAILS
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- I-00-503 TYPICAL PLC WIRING DETAILS
- I-00-601 PLANT NETWORKING DIAGRAM
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- I-00-701 EXISTING SCADA SYSTEM CONTROL PANEL, CP-1 MODIFICATIONS I
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- I-00-732 PLC6 POINTS LIST

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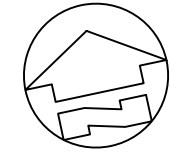
**FT THOMAS WATER TREATMENT PLANT
 BASIN IMPROVEMENTS - PHASE 2
 NORTHERN KENTUCKY WATER DISTRICT**

NO.	REVISIONS	DATE	BY	DESIGNED	DRAWN	REVIEWED	APPROVED
1	ADDENDUM NO 2	12/29/20	TLS	TLS	RLT	TLS	JLH

DATE: DECEMBER, 2020
 SCALE: NTS
 SHEET NO. G-00-003

SCALE CHECK: THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

BID SET

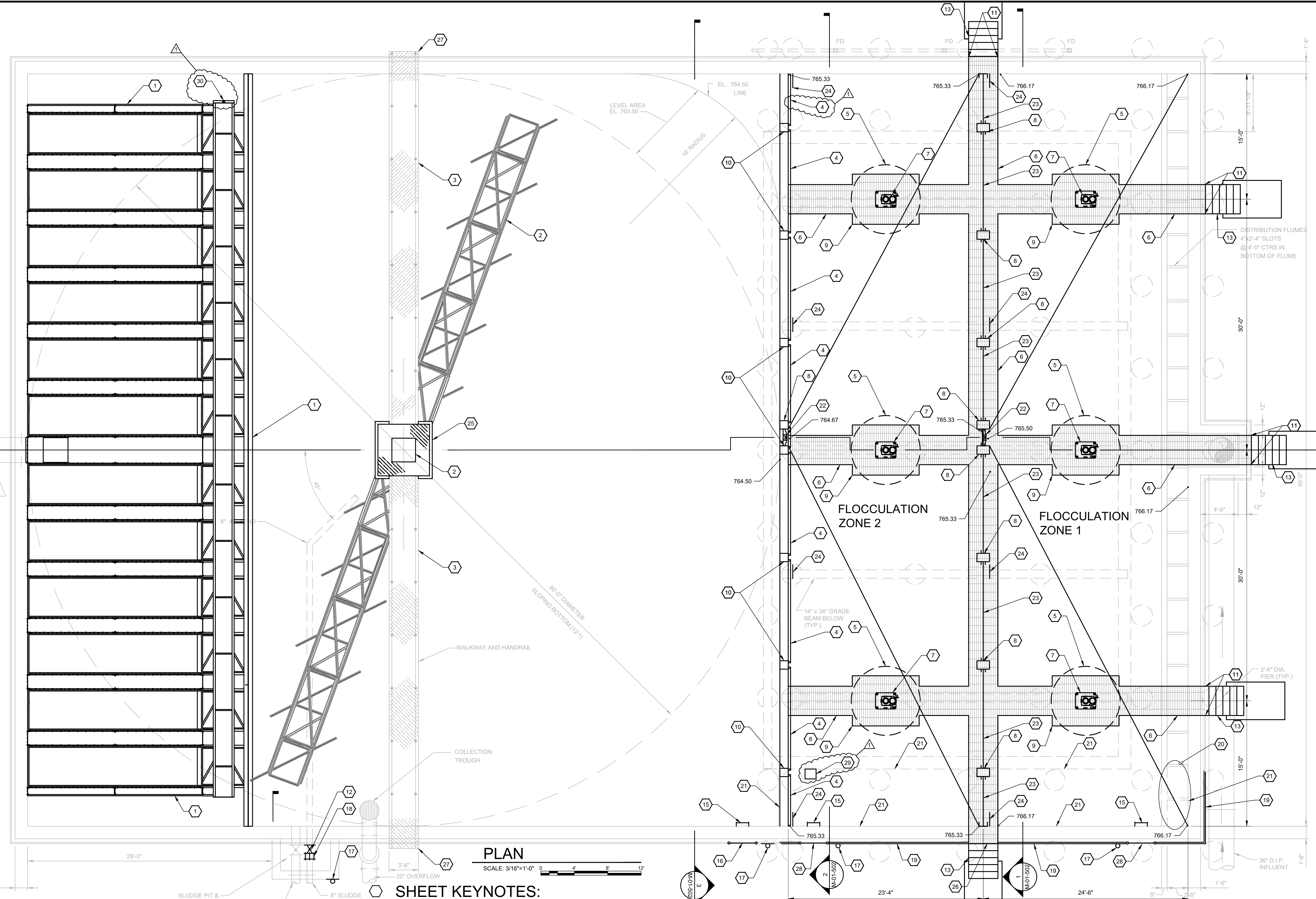


1
M-01-302

36" D.I.P. EFFLUENT
36" BUTTERFLY VALVE
W/VALVE BOX

1
M-01-502

36" D.I.P. INFLUENT



PLAN
SCALE: 3/16"=1'-0"

SHEET KEYNOTES:

- 1. INSTALL NEW STAINLESS STEEL PLATE SETTLER SYSTEM WITH SUPPORT TRUSS.
- 2. INSTALL NEW CLARIFIER EQUIPMENT, INCLUDING DRIVE, PLATFORM, CENTER COLUMN AND RAKE.
- 3. REMOVE, REFURBISH AND REINSTALL EXISTING CLARIFIER BRIDGE BEAMS, (PAINTED STEEL).
- 4. INSTALL NEW FRP BAFFLES VERTICALLY. ATTACH TO UPSTREAM FACE OF REFURBISHED CONCRETE COLUMNS AND CROSS MEMBERS. INSTALL FRP BAFFLE ANCHORS TO AVOID CONCRETE REINFORCING STEEL.
- 5. INSTALL NEW FLOCCULATOR.
- 6. INSTALL NEW 42" WIDE GRATED WALKWAY W/ALUMINUM HANDRAILS, TOE PLATE, AND GRATING.
- 7. INSTALL NEW FLOCCULATOR DRIVE SYSTEM.
- 8. INSTALL NEW CONCRETE COLUMNS.
- 9. INSTALL NEW 6" x 8" PLATFORM AROUND FLOCCULATOR W/ALUMINUM HANDRAILS, TOE PLATE, AND GRATING.
- 10. REFURBISH AND REUSE EXISTING CONCRETE COLUMNS AND CROSS MEMBERS.
- 11. CAP ENDS OF EXISTING CUT HANDRAILS (42" WIDE).
- 12. INSTALL NEW 8" SLUDGE VALVE (PLUG VALVE) AND ELECTRIC ACTUATOR. ALSO SEE SHT. M-01-504.
- 13. INSTALL NEW ALUMINUM STEPS. SEE STRUCTURAL SHEETS.
- 14. FILL HOLES IN WALL LEFT BY HORIZONTAL FLOCCULATOR DRIVE SHAFTS WITH CONCRETE.
- 15. INSTALL NEW FRP ACCESS LADDER. (LOCATION TO BE FIELD VERIFIED WITH NKWD STAFF PRIOR TO INSTALLATION).
- 16. INSTALL NEW 42" WIDE ALUMINUM SWING GATE IN EXISTING HANDRAIL. CENTERED ON ACCESS LADDER. (LOCATION TO BE FIELD VERIFIED WITH NKWD STAFF PRIOR TO INSTALLATION).
- 17. INSTALL NEW DAVIT CRANE WALL MOUNTED BASE. (LOCATION TO BE FIELD VERIFIED WITH NKWD STAFF PRIOR TO INSTALLATION. REMOVE AND REPLACE SOIL AS NEEDED).
- 18. INSTALL NEW 8" FLANGED COUPLING ADAPTER.
- 19. INSTALL NEW ALUMINUM HANDRAIL AND TOE PLATE.
- 20. REOPEN INLET TROUGH AND DISTRIBUTION SLOTS ON BOTTOM OF TROUGH TO FLOW BY REMOVING CONCRETE.
- 21. APPLY CORROSION INHIBITOR TO REBAR EXPOSED AT SAW CUT AT BASIN WALL AND BASIN FLOOR.
- 22. 24" x 24" SLIDE GATE WITH SELF CONTAINED FRAME AND ELECTRIC ACTUATOR.
- 23. INSTALL NEW FRP BAFFLES USING SLIDE GUIDE ANGLES ATTACHED TO INSIDE FACE OF CONCRETE COLUMNS WITH 1 S.S. EPOXY ANCHOR EVERY 18". FRP PANELS ARE ORIENTED HORIZONTALLY AND SLIDE INTO SLIDE GUIDE ANGLES. (INSTALL FRP BAFFLE ANCHORS TO AVOID CONCRETE REINFORCING STEEL).
- 24. 20" x 20" FRP DEFLECTOR BAFFLE MOUNTED WITH FRP OR S.S. ANGLES OR BEAMS AND LOCATED 12" FROM 15" x 15" CUT OUT IN LARGE FRP BAFFLE WALL. USE EPOXY ANCHORS WITH S.S. BOLTS TO ANCHOR ANGLES/BEAMS INTO ORIGINAL BASIN CONCRETE FLOOR (NOT NEW GROUT).
- 25. NEW ALUMINUM HANDRAIL WITH ALUMINUM TOE PLATE ON NEW PLATFORM TO MATCH EXISTING.
- 26. 42" WIDE GAP IN HANDRAIL FOR WALKWAY.
- 27. REMOVE, REFURBISH AND REINSTALL EXISTING STAIR STRINGER (PAINTED STEEL).
- 28. INSTALL NEW 42" WIDE ALUMINUM SWING GATE IN HANDRAIL. CENTERED ON ACCESS LADDER (LOCATION TO BE FIELD VERIFIED WITH NKWD STAFF PRIOR TO INSTALLATION).
- 29. FILL IN SUMP PUMP SUMP WITH NON-SHRINK GROUT.
- 30. INSTALL REMOVABLE S.S. HAND-PULL GATE AT END OF TROUGH.

GRW PROJECT NO. 4789
CLIENT PROJECT NO. 184-4006

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BASIN NO. 1 PLAN
NEW EQUIPMENT
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

NO.	DATE	BY	DESIGNED	DRAWN	REVIEWED	APPROVED
1	12/29/20	TLS	TLS	RLT	TLS	JLH

REVISIONS

NO. 1
DESCRIPTION: ADDENDUM NO. 2

DATE: DECEMBER, 2020

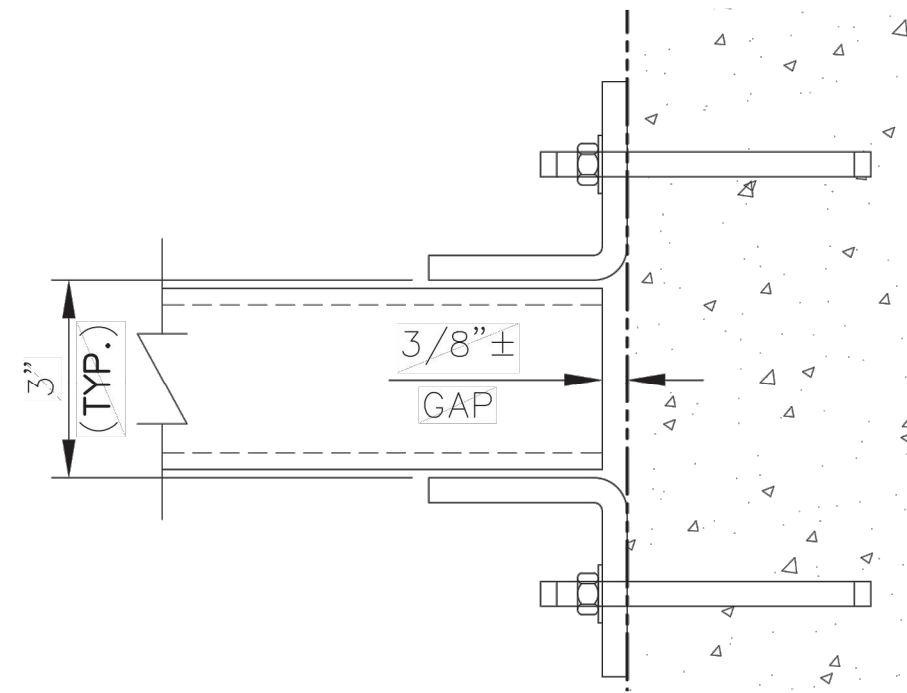
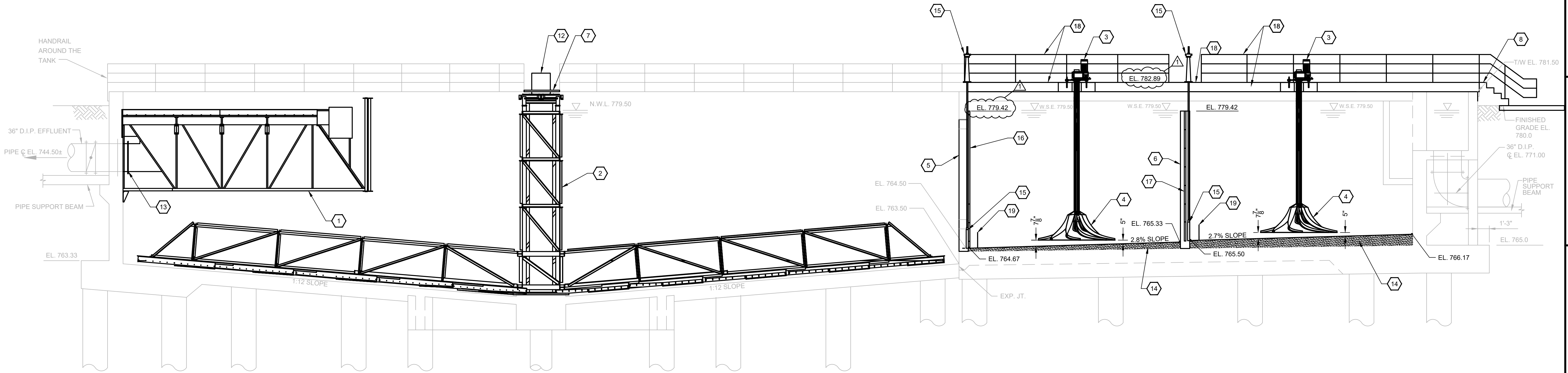
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SHEET NO. M-01-102

PLOTTED BY: rthacker

PRINTED: 12/29/20 @ 7:29AM

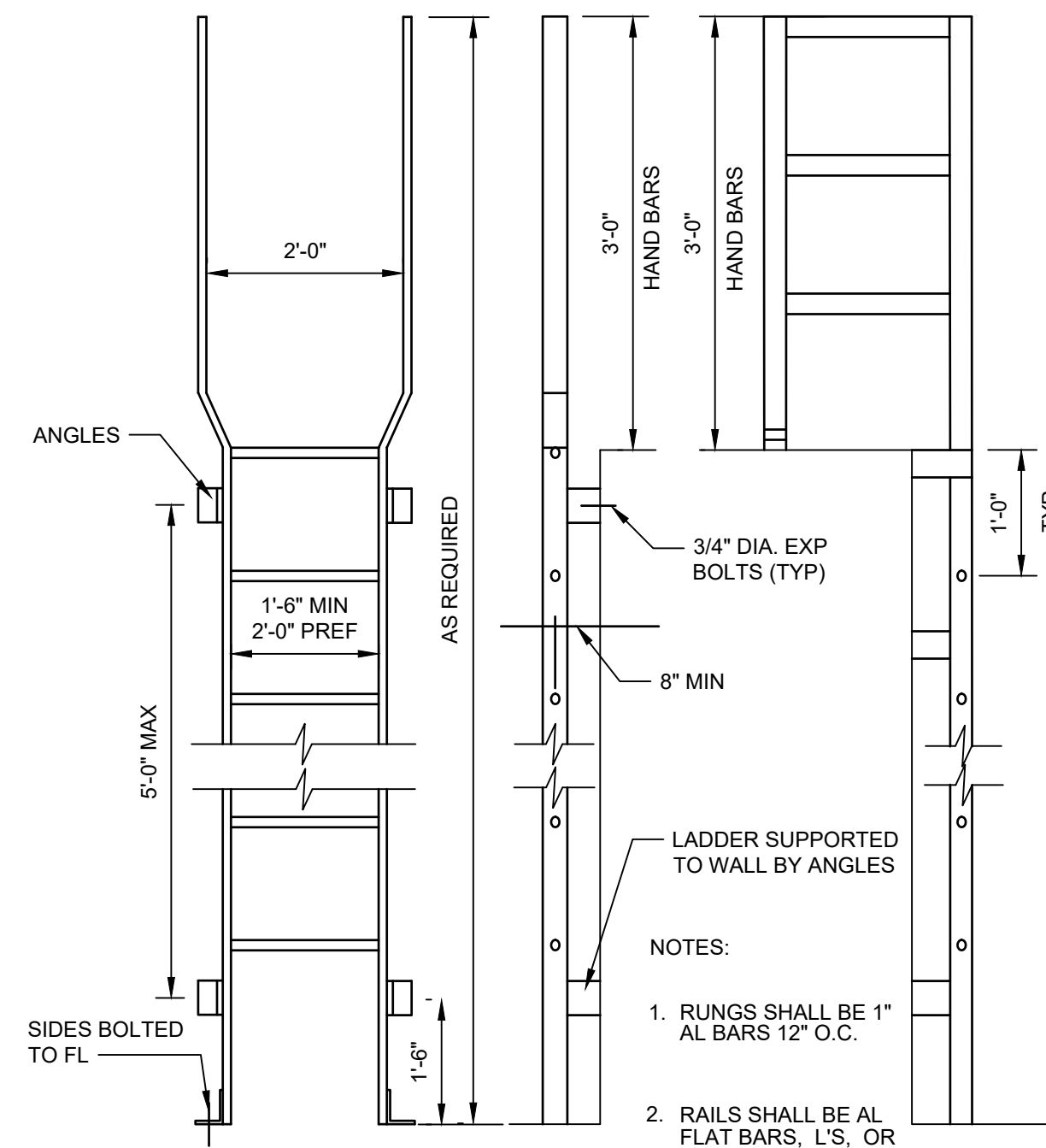
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SLIDE GUIDE ANGLES DETAIL

NOT TO SCALE

1 SECTION
 SCALE: 3/16"=1'-0"



FIBERGLASS ACCESS LADDER DETAIL

NOT TO SCALE

SHEET KEYNOTES:

- INSTALL NEW STAINLESS STEEL PLATE SETTLER SYSTEM W/SUPPORT TRUSS. PLATE SETTLERS AND PLATE SETTLER WEIRS TO BE SET TO MAINTAIN A 779.50 WATER SURFACE ELEVATION (2 FEET OF FREE BOARD).
- INSTALL NEW CLARIFIER MECHANISM, INCLUDING CENTER COLUMN AND RAKE.
- INSTALL NEW FLOCCULATOR DRIVE SYSTEM.
- INSTALL NEW FLOCCULATOR WITH 5" CLEARANCE FROM FLOOR.
- REFURBISH AND REUSE EXISTING CONCRETE COLUMNS AND CONCRETE CROSS MEMBERS.
- INSTALL NEW CONCRETE COLUMNS.
- REFURBISH AND REUSE EXISTING CLARIFIER BRIDGE BEAMS (PAINTED STEEL).
- INSTALL NEW ALUMINUM STEPS. SEE STRUCTURAL SHEETS.
- NOT USED.
- NOT USED.
- NOT USED.
- INSTALL NEW CLARIFIER DRIVE AND PLATFORM.
- CONNECT DISCHARGE FROM PLATE SETTLERS TO NEW 1" STUB OF 36" DI PIPE EXTENDING FROM WALL. NEW 1" LONG 36" DI PIPE STUB TO BE FL X PE AND SECURED TO WALL WITH EX. BOLTS (STUDS) AND NEW NUTS.
- INSTALL 6000 PSI GROUT.
- 24" x 24" SLIDE GATE WITH ELECTRIC ACTUATOR, SELF CONTAINED FRAME, AND ACTUATOR PEDESTAL.
- INSTALL NEW FRP BAFFLES ON UPSTREAM FACE OF COLUMNS AND CROSS BEAMS.
- INSTALL NEW FRP BAFFLES ON INSIDE FACE OF COLUMNS USING SLIDE GUIDE ANGLES. SEE DETAIL THIS SHEET.
- INSTALL NEW 42" WIDE GRATED WALKWAY W/ALUMINUM HANDRAILS, TOE PLATE, AND GRATING SEE STRUCTURAL SHEETS.
- 20" x 20" FRP DEFLECTOR BAFFLE MOUNTED WITH FRP OR STAINLESS STEEL ANGLES OR BEAMS AND LOCATED 12" FROM 15" x 15" CUT OUT IN LARGE FRP BAFFLE WALL. USE EPOXY ANCHORS WITH S.S. BOLTS TO ANCHOR ANGLES/BEAMS INTO ORIGINAL BASIN CONCRETE FLOOR (NOT NEW GROUT).

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BASIN NO. 1 SECTION
NEW EQUIPMENT
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

NO.	REVISIONS	DATE	BY	DESIGNED	TLS	DRAWN	RLT	REVIEWED	TLS	APPROVED	JLH
1	ADDENDUM NO. 2	12/29/20	TLS								

DATE: DECEMBER, 2020
 SCALE: 3/16" = 1'
 SHEET NO. M-01-302

SCALE CHECK: THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

BID SET

SHEET KEYNOTES:

- NEW CAST IN PLACE CONCRETE COLUMNS FOR FRP BAFFLE WALL.
- NEW HORIZONTAL PERFORATED FRP BAFFLES (EACH 2' HIGH) WITH 2-1/2" DIAMETER HOLES WITH TOTAL HOLE AREA EQUAL TO 2.5% OF CROSS SECTIONAL AREA OF FLOW (36 SQ. FT.). PERFORATED BAFFLES BEGIN AT 5' ABOVE BASIN FLOOR AND END AT 1" BELOW THE BASIN WATER SURFACE ELEVATION.
- NEW FRP BAFFLE SLIDE GUIDE ANGLE BOLTED TO CENTER OF CONCRETE COLUMN WITH 1 S.S. EPOXY ANCHOR EVERY 18 INCHES. FRP PANELS SLIDE INTO SLIDE GUIDE ANGLES AND ARE THEN BOLTED TO SLIDE GUIDE ANGLES.
- 24" X 24" SLIDE GATE WITH ELECTRIC ACTUATOR, SELF CONTAINED FRAME, AND ACTUATOR PEDESTAL.
- REHAB/REUSE EXISTING CONCRETE COLUMNS AND CONCRETE CROSS MEMBERS.
- NEW ALUMINUM HANDRAIL WITH ALUMINUM TOE PLATE.
- APPLY CORROSION INHIBITOR TO REBAR EXPOSED AT SAW CUT.
- NEW HORIZONTAL SOLID FRP BAFFLES (EACH 2' HIGH) TO A HEIGHT OF 5' ABOVE BASIN FLOOR.
- NEW CAST IN PLACE CONCRETE COLUMN FOR NEW 24" X 24" SLIDE GATE.
- NEW VERTICAL FRP BAFFLES (EACH 2' WIDE) WITH 2 1/2" DIAMETER HOLES IN TOP PORTION OF BAFFLES WITH TOTAL HOLE AREA EQUAL TO 2.5% OF CROSS SECTIONAL AREA OF FLOW (36 SQ. FT.). VERTICAL PANELS ARE 11.76 FEET TALL. THE TOP 9.92 FEET OF THE PANELS ARE PERFORATED. PERFORATIONS IN PANELS BEGIN AT A HEIGHT OF 5 FEET ABOVE THE BASIN FLOOR. THE LOWER PORTION OF THE VERTICAL PANELS ARE SOLID. THE LOWER END OF THE VERTICAL PANEL IS LOCATED AT MID-POINT OF EXISTING LOWER CONCRETE BEAM (3.17 FEET ABOVE BASIN FLOOR). ATTACH VERTICAL FRP PANELS DIRECTLY TO CONCRETE CROSS MEMBERS WITH STAINLESS STEEL EPOXY ANCHORS PER MANUFACTURERS INSTRUCTIONS. MINIMUM 6 ANCHORS PER PANEL. TOP OF VERTICAL PANELS TO BE 1" BELOW BASIN WATER SURFACE ELEVATION.
- NEW HORIZONTAL SOLID FRP BAFFLES FROM BASIN FLOOR TO BOTTOM OF EXISTING LOWER CONCRETE BEAM (2.67 FEET ABOVE BASIN FLOOR). ATTACH FRP PANELS TO FRP ANGLES WITH STAINLESS STEEL BOLTS PER MANUFACTURER INSTRUCTIONS. MINIMUM 6 BOLTS PER PANEL.
- FRP ANGLES ATTACHED TO CONCRETE SIDEWALLS AND CONCRETE COLUMNS USING STAINLESS STEEL EPOXY ANCHORS PER MANUFACTURER INSTRUCTIONS.
- INSTALL NEW 42" WIDE ALUMINUM GRATED WALKWAY WITH ALUMINUM HANDRAILS, TOE PLATE, AND GRATING SHEETS.
- INSTALL NEW ALUMINUM STEPS. SEE STRUCTURAL SHEETS.
- INSTALL 5000 PSI GROUT.
- 15" X 15" BAFFLE CUT OUT WITH FRP OR STAINLESS STEEL ANGLE OR BEAM REINFORCING.
- 20" X 20" FRP DEFLECTOR BAFFLE MOUNTED WITH FRP OR STAINLESS STEEL ANGLES OR BEAMS (USE EPOXY ANCHORS WITH S.S. BOLTS TO ANCHOR ANGLES/BEAMS INTO ORIGINAL BASIN CONCRETE FLOOR (NOT NEW GROUT)).
- INSTALL NEW DAVIT CRANE WALL MOUNTED BASE.
- SLIDE GATE FRAME SHALL HAVE SOLID S.S. PLATE BEHIND VALVE STEM ON UPSTREAM SIDE OF SLIDE GATE WHICH IS WELDED OR BOLTED TO FRAME.

GRW PROJECT NO. 4789
CLIENT PROJECT NO. 184-4006

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**BASIN NO. 1 SECTION
NEW EQUIPMENT
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT**

GENERAL NOTES

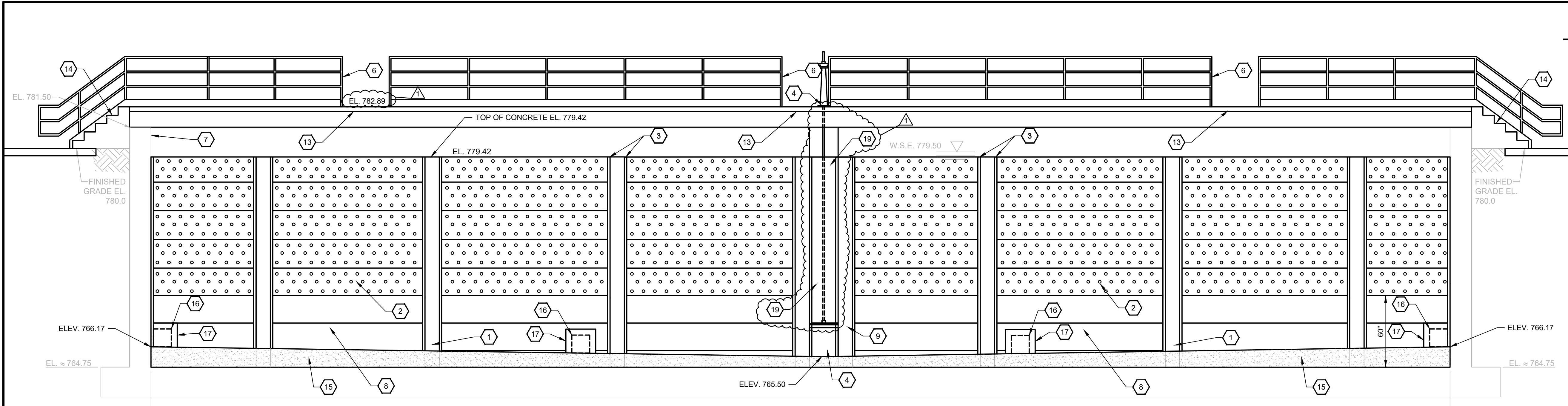
- CONTRACTOR TO FIELD MEASURE EXISTING CONCRETE COLUMNS AND CROSS MEMBERS TO BE REFURBISHED AND COORDINATE WITH FRP BAFFLE AND SLIDE GATE SHOP DRAWINGS.
- FRP BAFFLES TO BE FLUSH WITH BOTTOM OF BASIN. NO GAPS BETWEEN FRP BAFFLES. TOP OF FRP BAFFLES TO BE 1" BELOW NORMAL WATER SURFACE ELEVATION.

DESIGNED	TLS	BY	TLS
		DATE	12/29/24
		DRAWN	TLS
		REVIEWED	TLS
		APPROVED	JLH
		NO.	ADDENDUM NO. 2

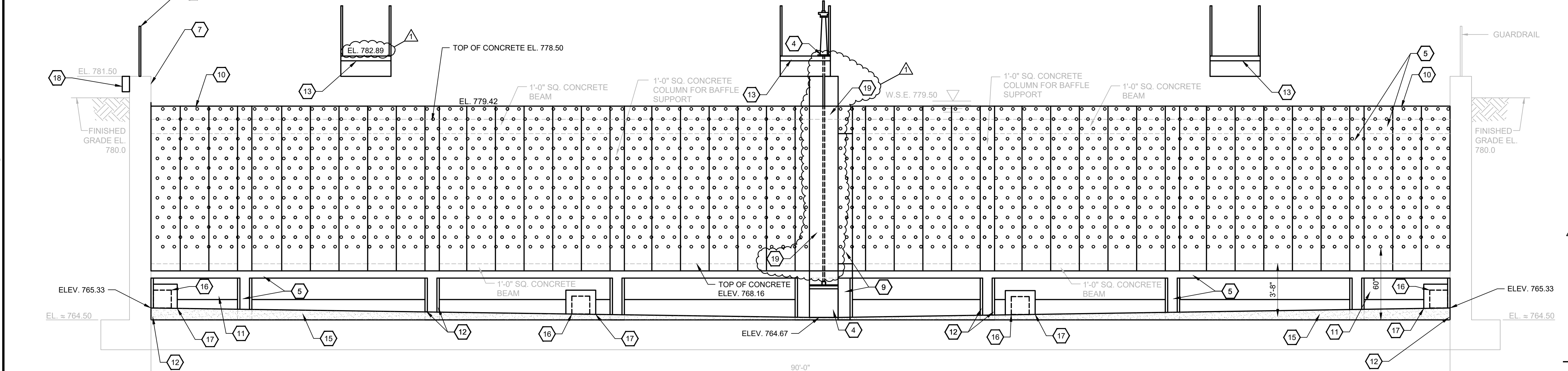
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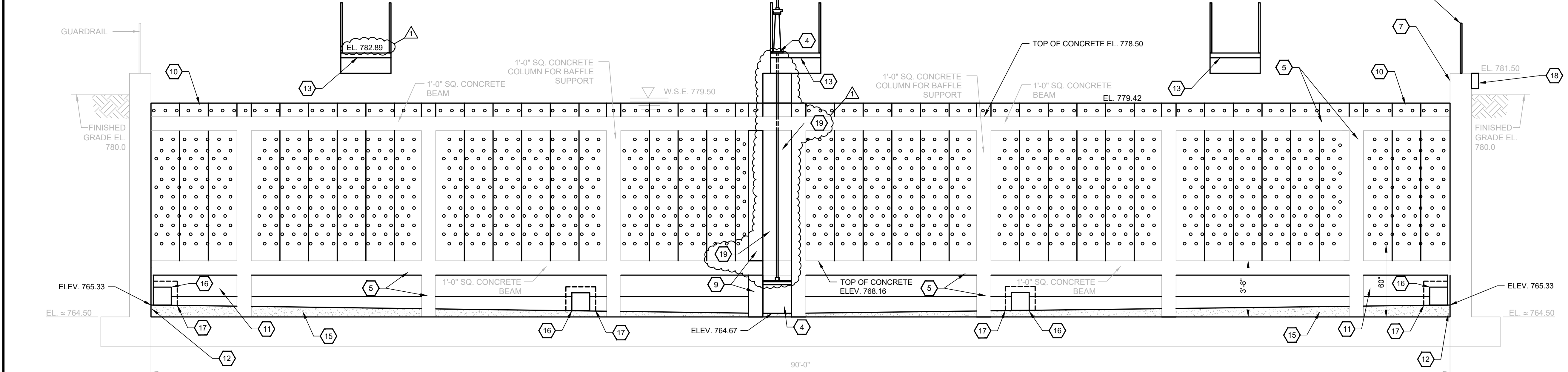
M-01-502



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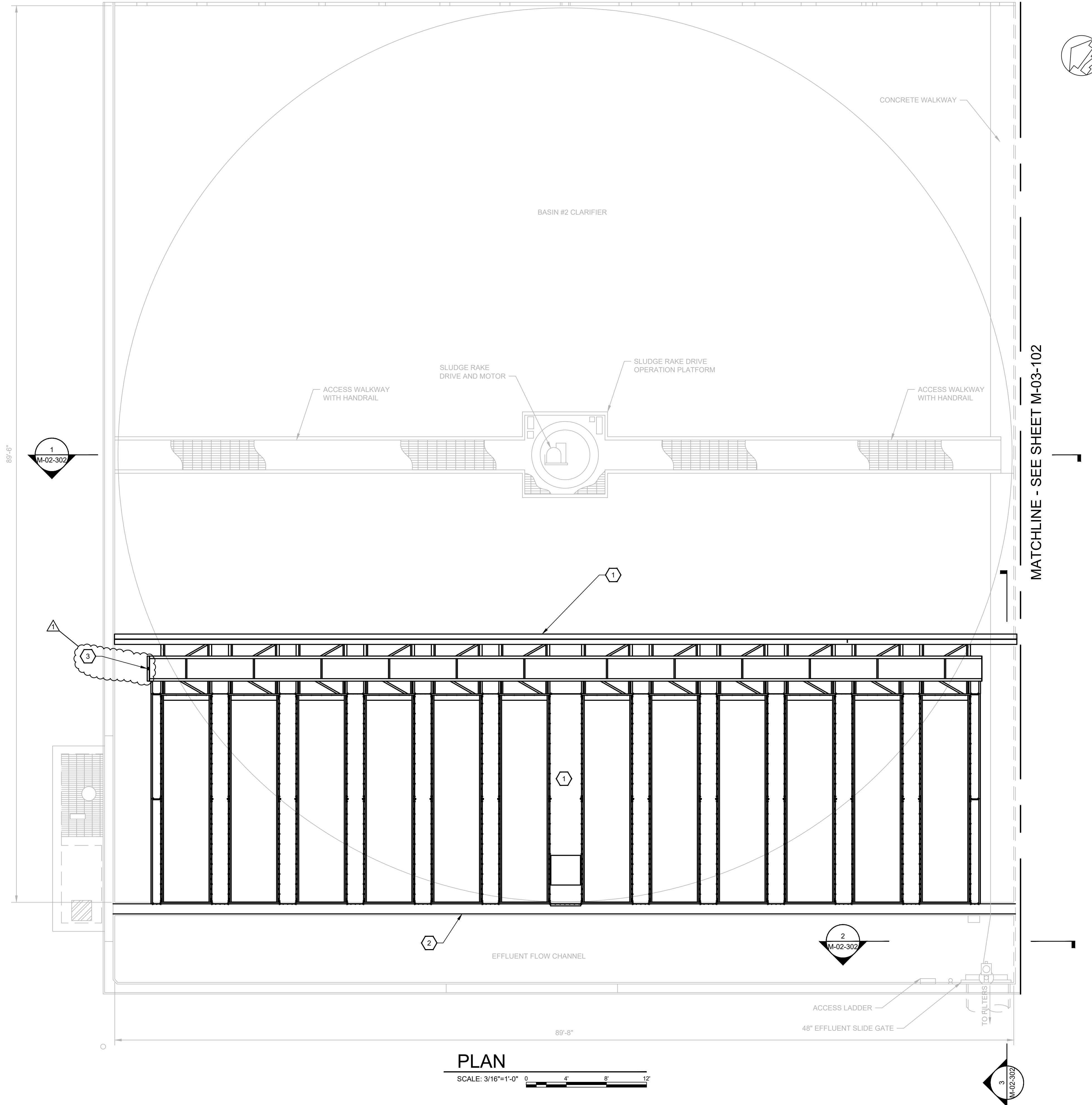


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3 SECTION
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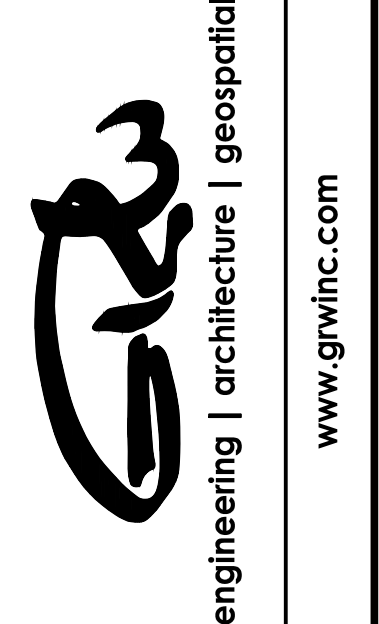
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 PRINTED: 12/29/2020 @ 7:30AM
 PLOTTED BY: rthacker



PLAN
SCALE: 3/16"=1'-0"

- SHEET KEYNOTES:**
1. INSTALL NEW STAINLESS STEEL PLATE SETTLER SYSTEM WITH SUPPORT TRUSS.
 2. INSTALL NEW SECTION OF CAST IN PLACE CONCRETE WALL (12" WIDE X 7" HIGH) BY DOWELING INTO TOP OF EXISTING CAST IN PLACE CONCRETE WALL.
 3. INSTALL REMOVABLE S.S. HAND-PULL GATE AT END OF TROUGH.

GRW PROJECT NO. 4789
CLIENT PROJECT NO. 184-4006

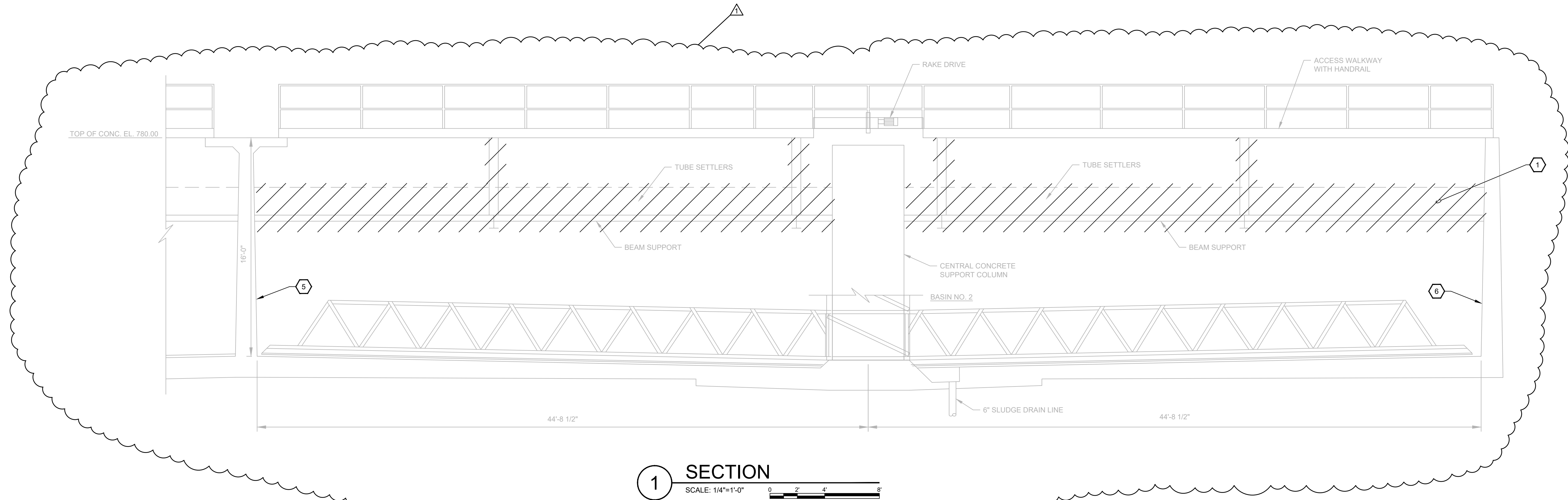


**BASIN NO. 2 PLAN
NEW EQUIPMENT
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT**

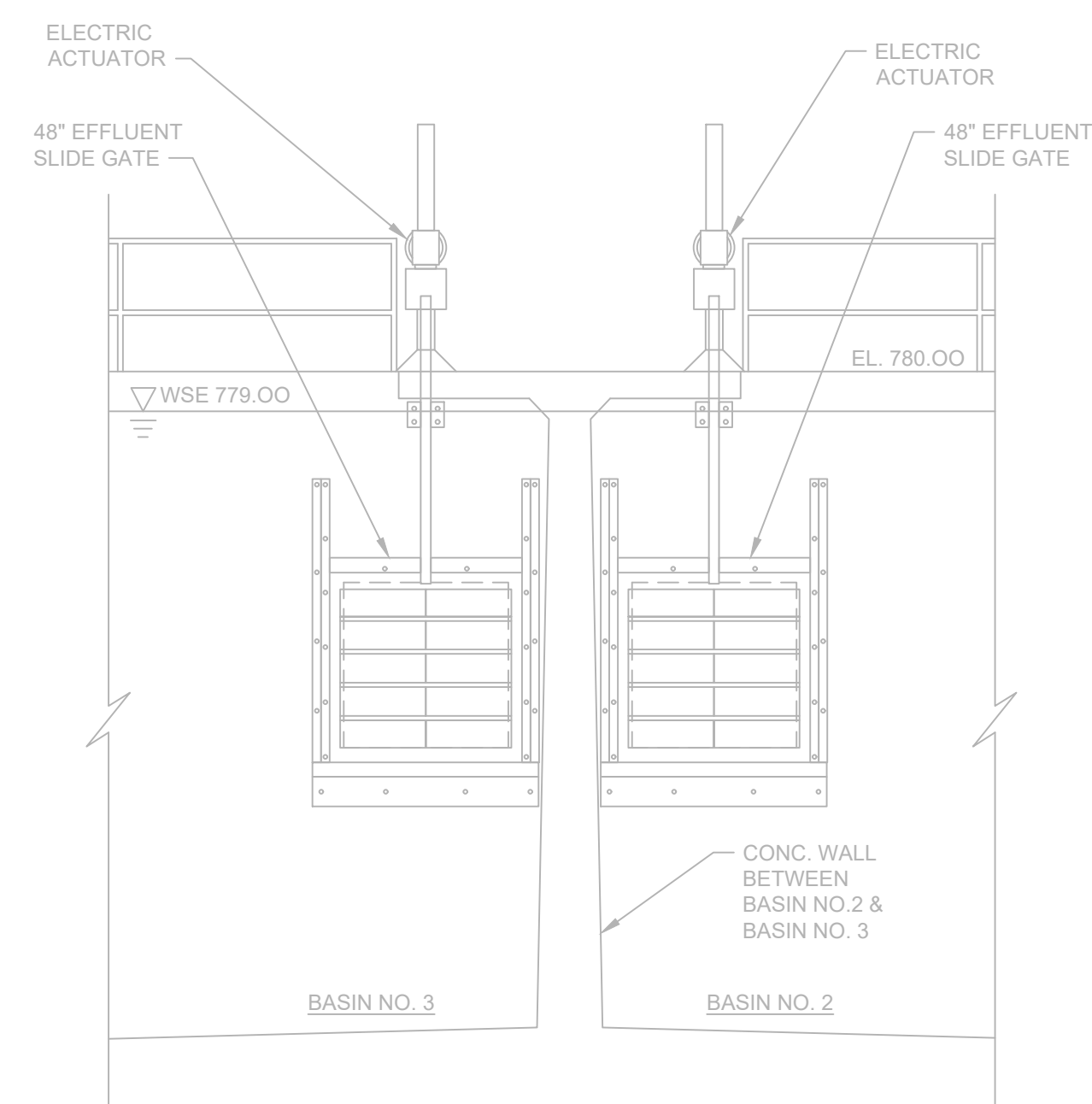
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DATE	12/29/20
BY	TLS
DRAWN	RLT
REVIEWED	TLS
APPROVED	JLH

DATE: DECEMBER, 2020
SCALE: 3/16" = 1'
SHEET NO.

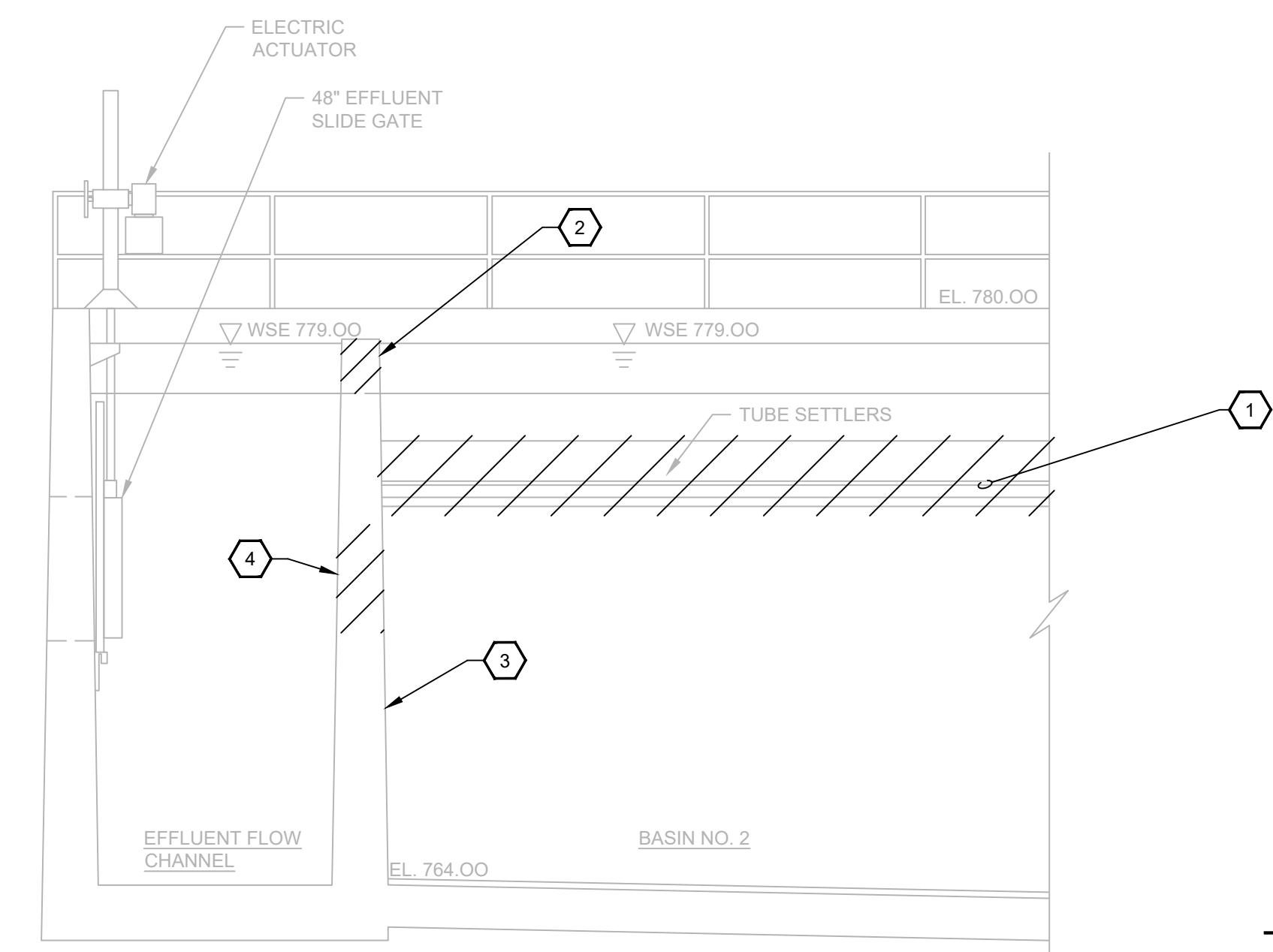
M-02-102



1 SECTION
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 0 2 4 8'



2 SECTION
 SCALE: 1/4"=1'-0"
 0 2 4 8'

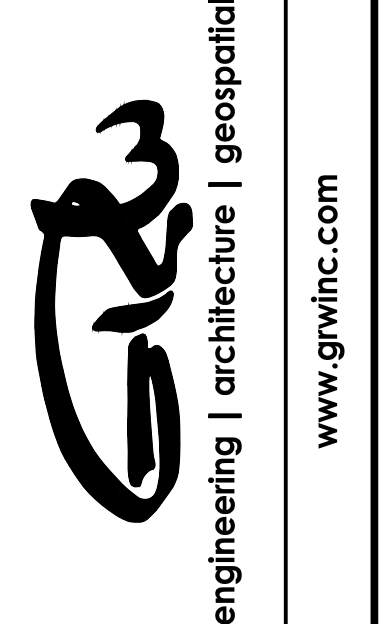


3 SECTION
 SCALE: 1/4"=1'-0"
 0 2 4 8'

SHEET KEYNOTES:

1. DEMO EXISTING TUBE SETTLERS AND TROUGHS.
2. DEMO ONE COURSE OF CONCRETE BLOCK (12" WIDE X 7" HIGH) FROM TOP OF WALL.
3. EXISTING CAST IN PLACE CONCRETE WALL. WALL HAS CENTERED TAPER WITH 18 1/2" WIDE BASE AND 12" WIDE TOP.
4. CONTRACTOR TO CORE DRILL FOR 36" PIPE PENETRATION WITH LINK-SEAL AROUND 36" PIPE. COORDINATE CORE DRILL LOCATION WITH PLATE SETTLER SHOP DRAWING.
5. WALL HAS CENTERED TAPER WITH 18 1/2" WIDE BASE AND 12" WIDE TOP.
6. WALL HAS OFFSET TAPER WITH 18 1/2" WIDE BASE AND 12" WIDE TOP.

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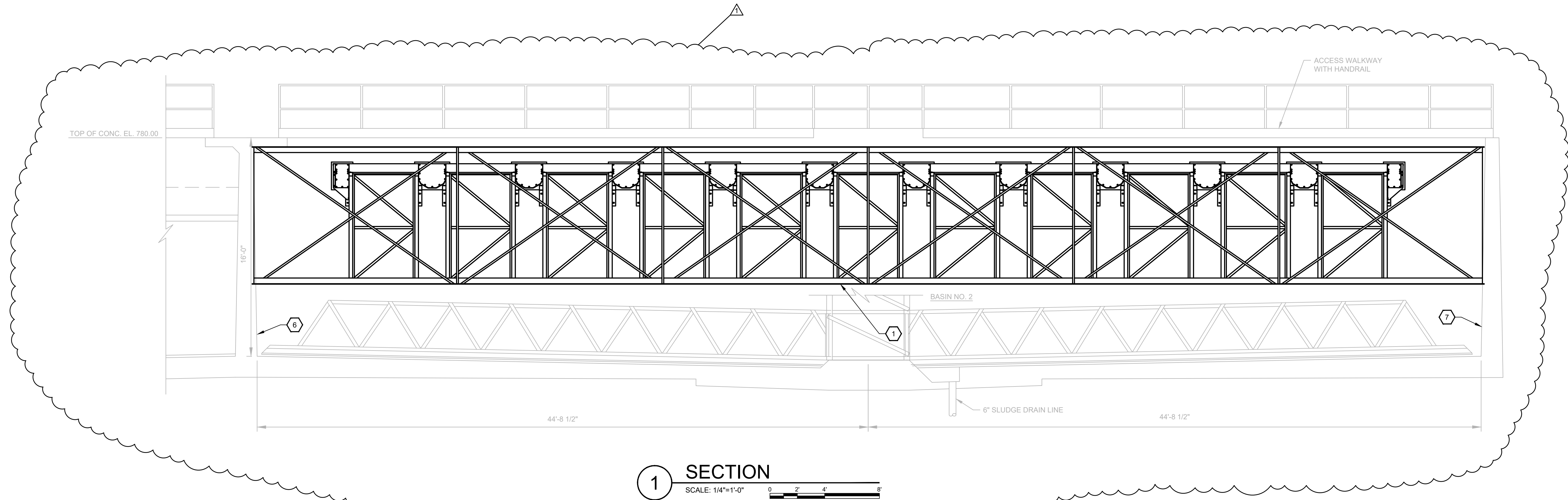
**BASIN NO. 2 SECTIONS
 DEMOLITION**
 FT THOMAS WATER TREATMENT PLANT
 BASIN IMPROVEMENTS - PHASE 2
 NORTHERN KENTUCKY WATER DISTRICT

DESIGNED	TLS
BY	TLN
DATE	12/28/20
DRAWN	TLN
REVIEWED	TLN
APPROVED	JLH

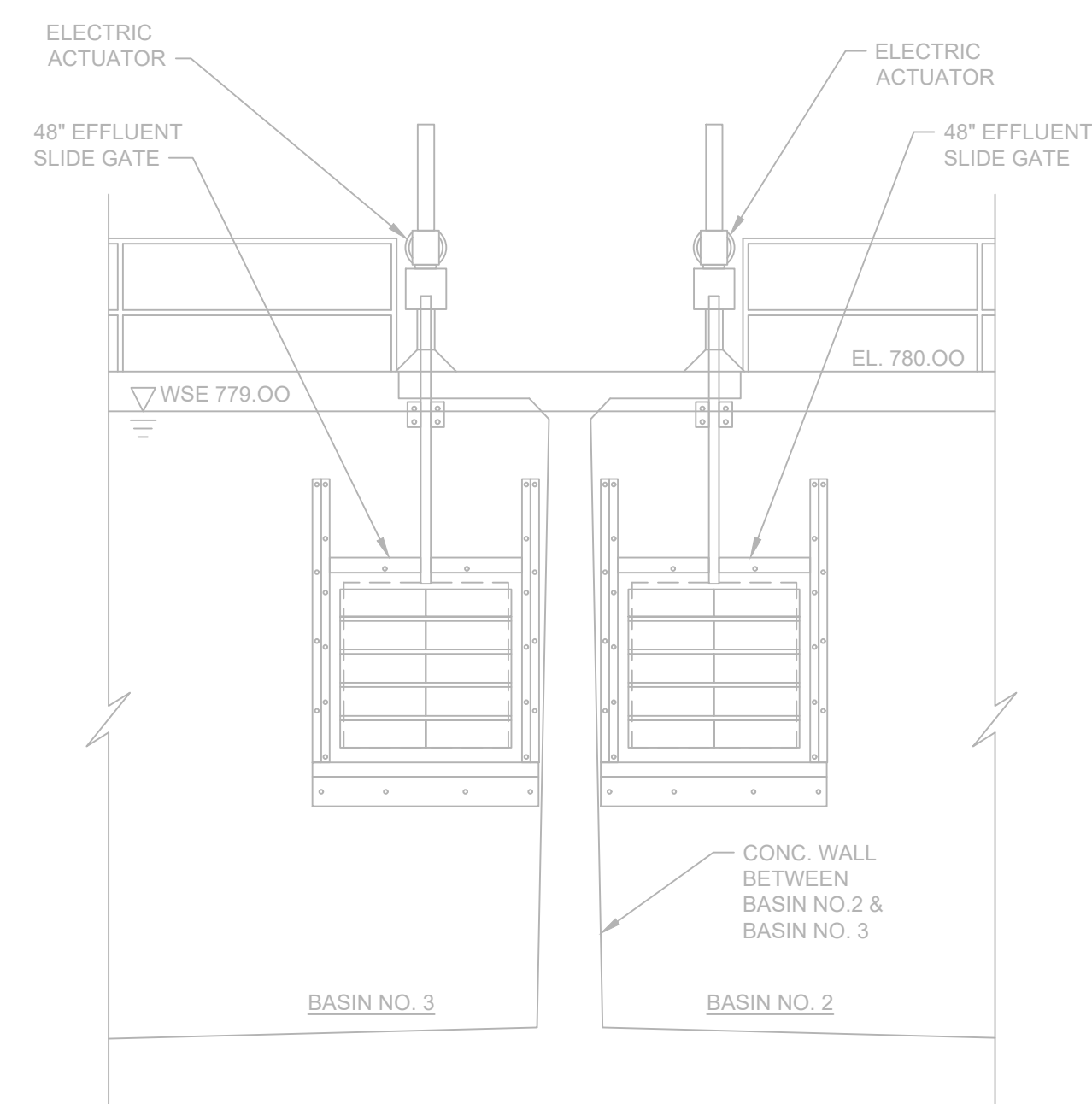
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 DATE: 12/28/20
 DRAWN: TLN
 REVIEWED: TLN
 APPROVED: JLH
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DATE: DECEMBER, 2020
 SCALE: 1/4" = 1'

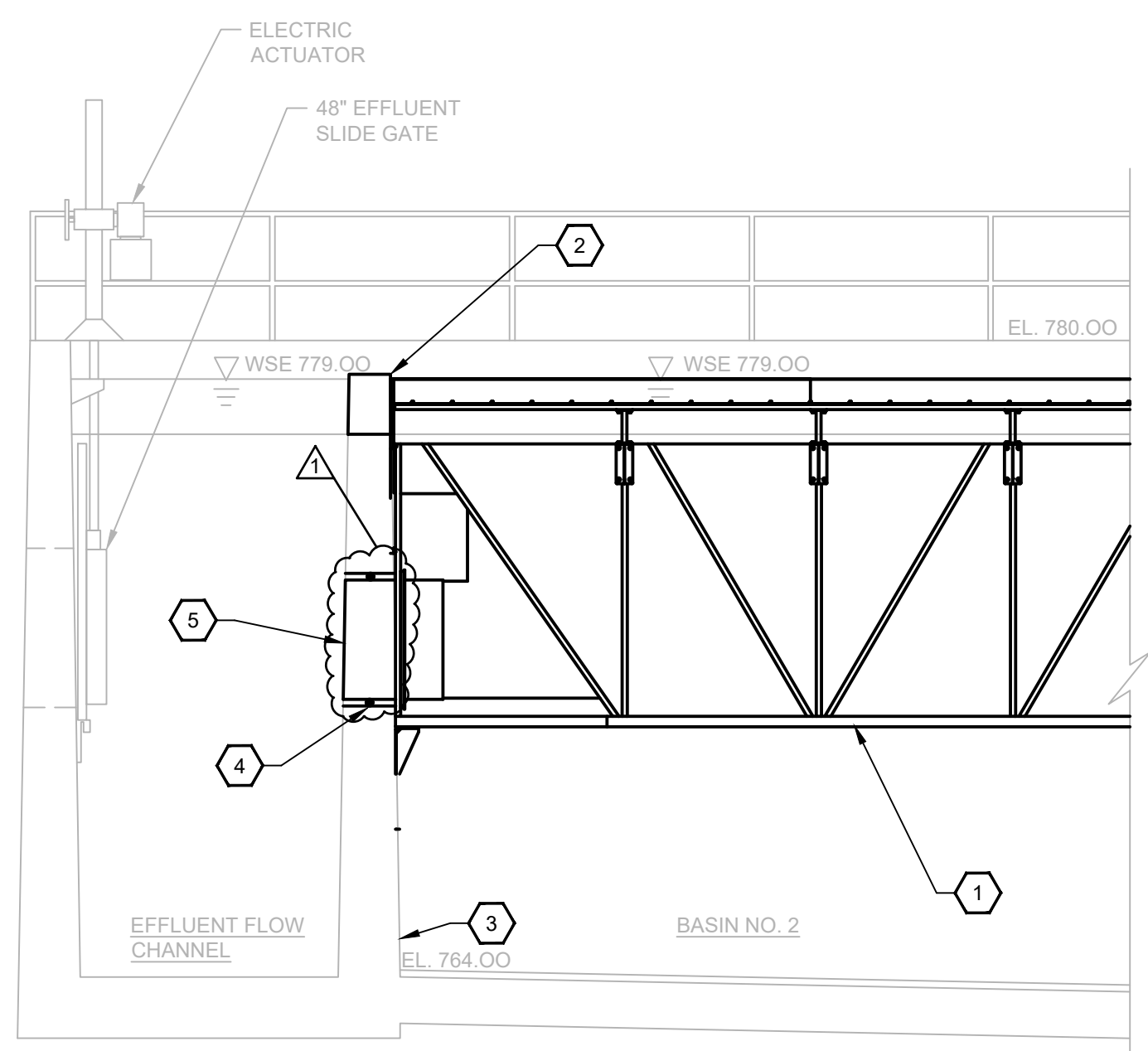
SHEET NO. M-02-301



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0 2 4 8'



2 SECTION
SCALE: 1/4"=1'-0"
0 2 4 8'

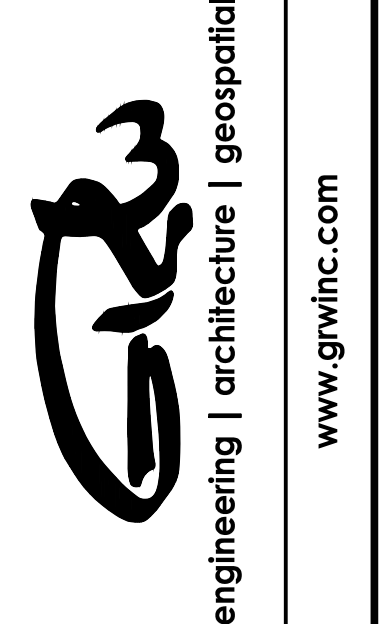


3 SECTION
SCALE: 1/4"=1'-0"
0 2 4 8'

SHEET KEYNOTES:

1. INSTALL NEW STAINLESS STEEL PLATE SETTLER SYSTEM WITH SUPPORT TRUSS. TOP OF PLATE SETTLERS TO SLANT TOWARDS EFFLUENT END OF BASIN. PLATE SETTLERS AND PLATE SETTLER WEIRS TO BE SET TO MAINTAIN A 779.00 WSE (1 FOOT OF FREE BOARD).
2. INSTALL NEW SECTION OF CAST IN PLACE CONCRETE WALL (12" WIDE X 7' HIGH) DOWELED INTO TOP OF EXISTING CAST IN PLACE CONCRETE WALL. NEW TOP OF WALL ELEVATION TO BE SAME AS PREVIOUS TOP OF WALL ELEVATION.
3. EXISTING CAST IN PLACE CONCRETE WALL. WALL HAS CENTERED TAPER WITH 18 1/2" WIDE BASE AND 12" WIDE TOP.
4. CONTRACTOR TO CORE DRILL WALL FOR 36" PIPE PENETRATION AND LINK-SEAL AROUND 36" PIPE. COORDINATE CORE DRILL LOCATION WITH PLATE SETTLER SHOP DRAWING.
5. INSTALL NEW 36" DI WALL PIPE WITH COLLAR. PIPE TO BE 3 FEET LONG WITH 1 FOOT EXTENDING INTO BASIN WITH COLLAR UP AGAINST WALL ON INSIDE OF BASIN.
6. WALL HAS CENTERED TAPER WITH 18 1/2" WIDE BASE AND 12" WIDE TOP.
7. WALL HAS OFFSET TAPER WITH 18 1/2" WIDE BASE AND 12" WIDE TOP.

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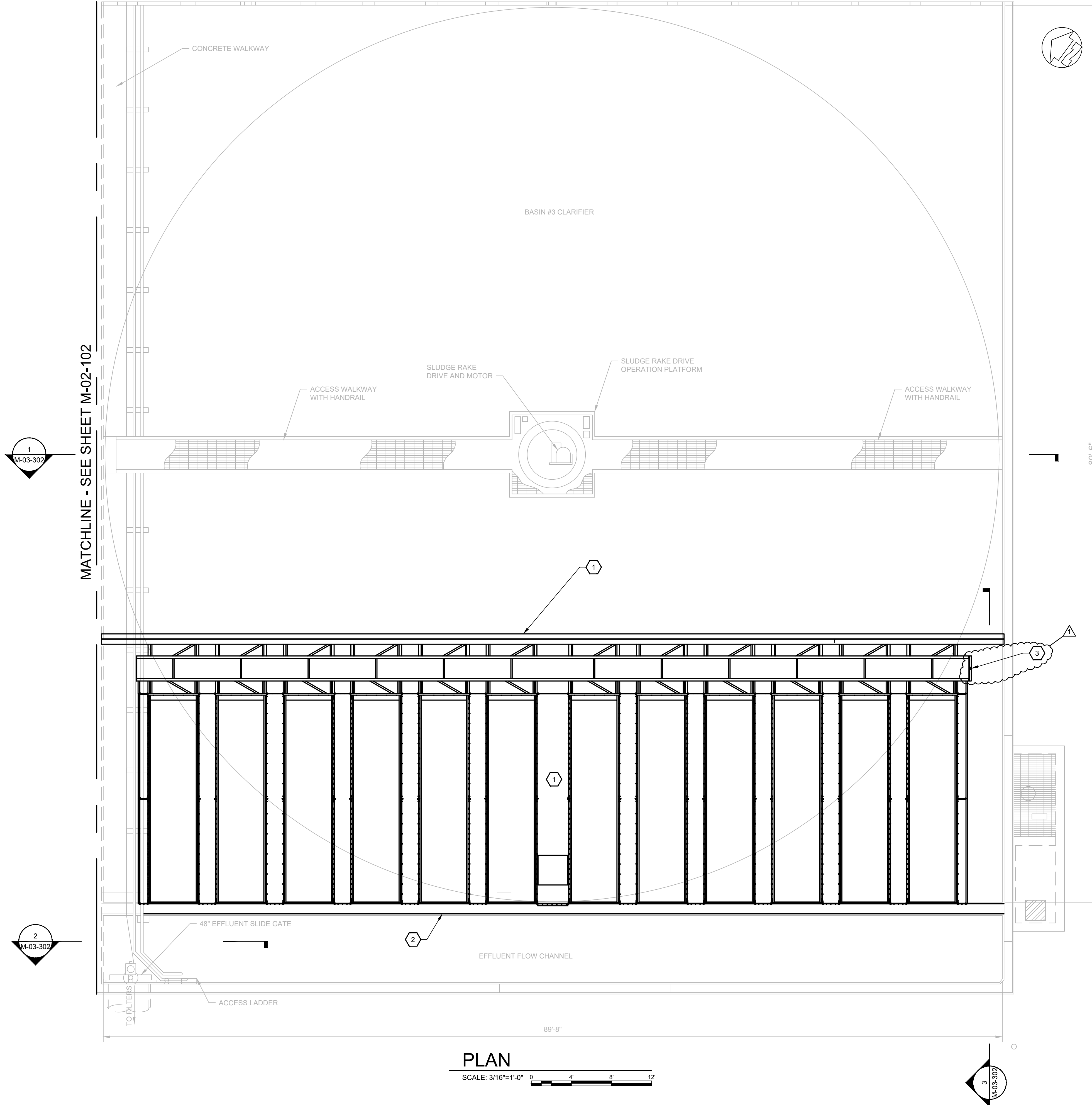


**BASIN NO. 2 SECTIONS
NEW EQUIPMENT
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT**

DESIGNED		BY		DATE	
TLS	TLS	TLS	TLS	12/28/20	12/28/20
DRAWN		REVIEWED		APPROVED	
RLT	RLT	TLS	TLS	JLH	JLH
NO. 1 ADDENDUM NO. 2					
SCALE CHECK: THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED					

DATE: DECEMBER, 2020
SCALE: 1/4" = 1'

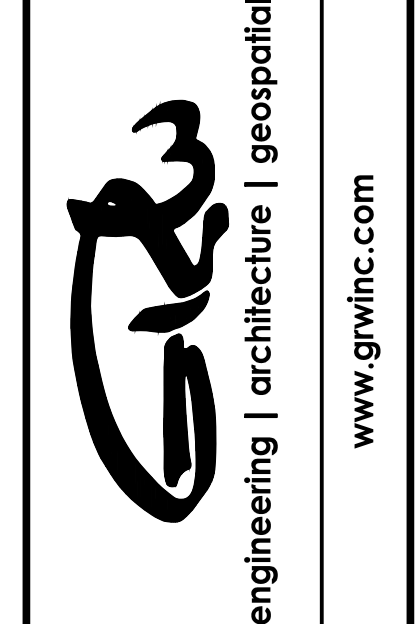
SHEET NO. M-02-302



PLAN
 SCALE: 3/16"=1'-0" 0 4 8 12'

- SHEET KEYNOTES:**
1. INSTALL NEW STAINLESS STEEL PLATE SETTLER SYSTEM WITH SUPPORT TRUSS.
 2. INSTALL NEW SECTION OF CAST IN PLACE CONCRETE WALL (12" WIDE X 7' HIGH) BY DOWELING INTO TOP OF EXISTING CAST IN PLACE CONCRETE WALL.
 3. INSTALL REMOVABLE S.S. HAND-PULL GATE AT END OF TROUGH.

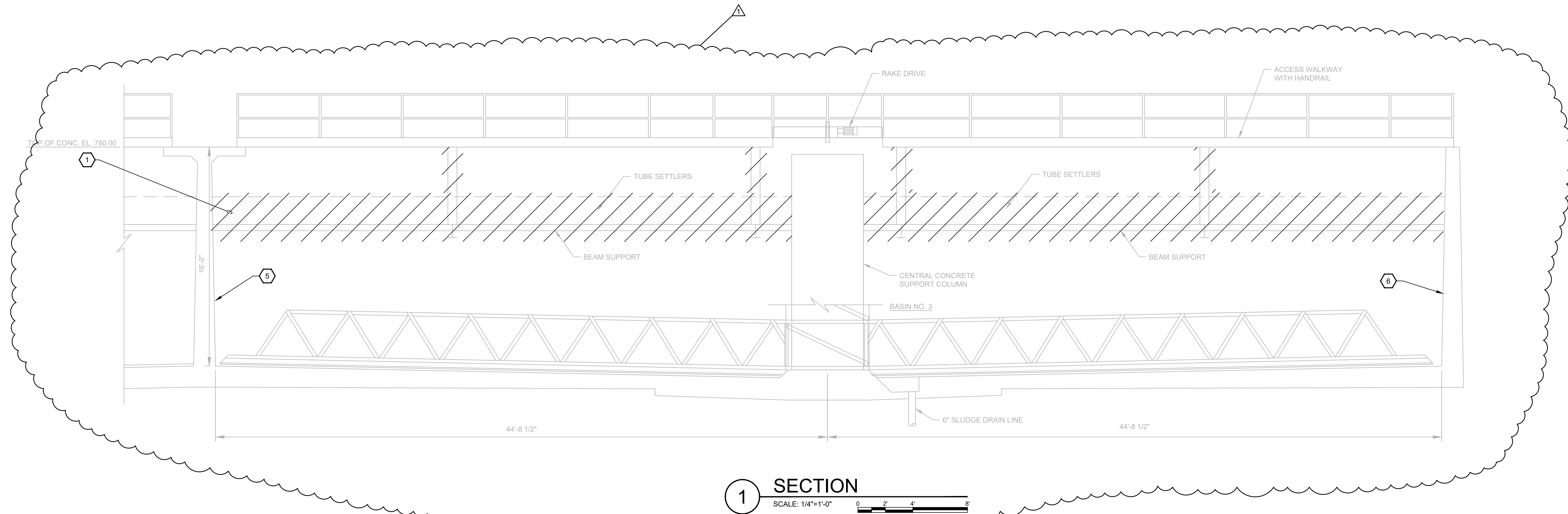
GRW PROJECT NO. 4789
 CLIENT PROJECT NO. 184-4006



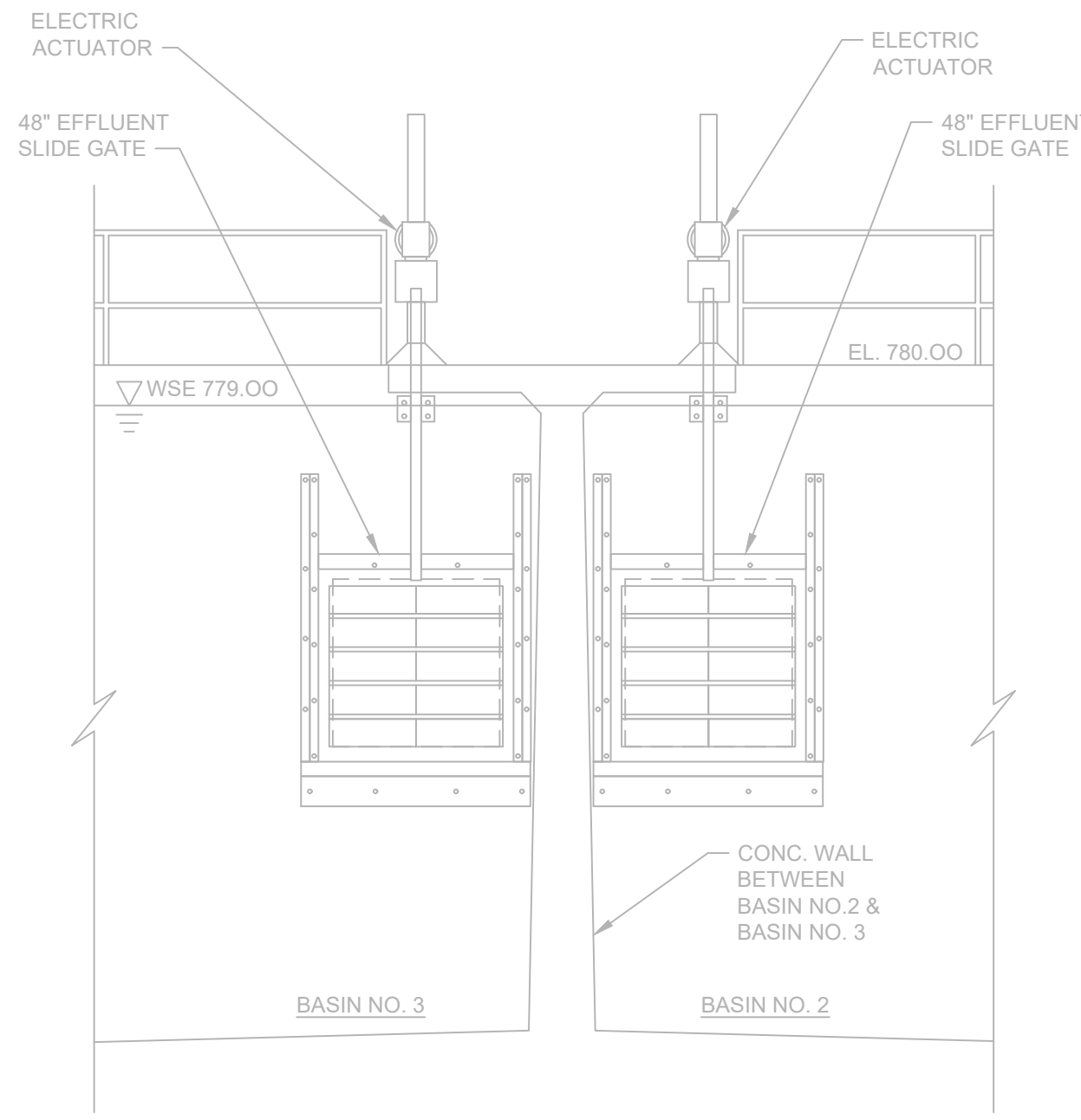
BASIN NO. 3 PLAN
NEW EQUIPMENT
 FT THOMAS WATER TREATMENT PLANT
 BASIN IMPROVEMENTS - PHASE 2
 NORTHERN KENTUCKY WATER DISTRICT

NO.	REVISIONS	DATE	BY	DESIGNED	APPROVED
1	ADDENDUM NO. 2	12/29/20	TLS	TLS	JLH

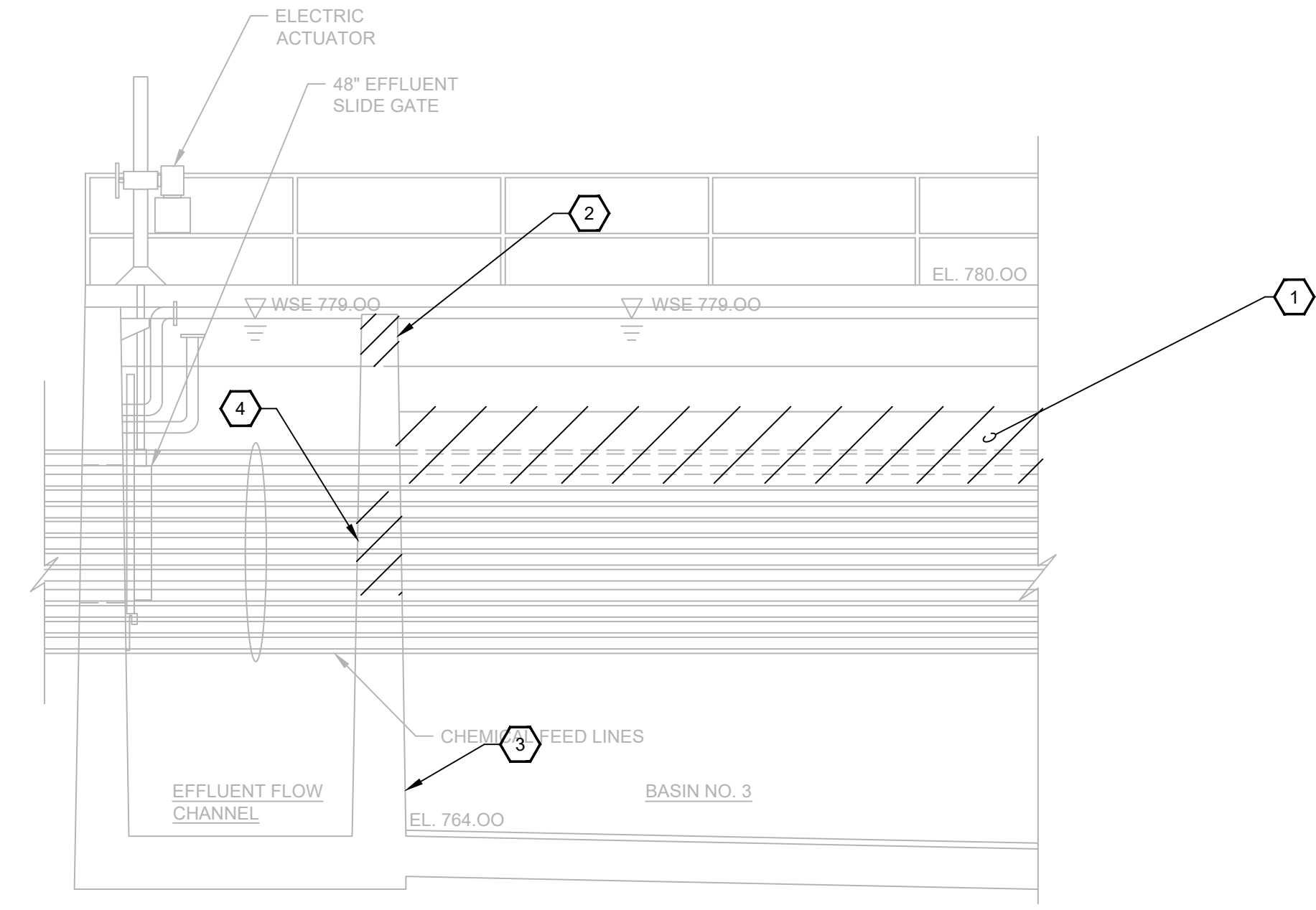
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 SHEET NO. **M-03-102**



1 SECTION
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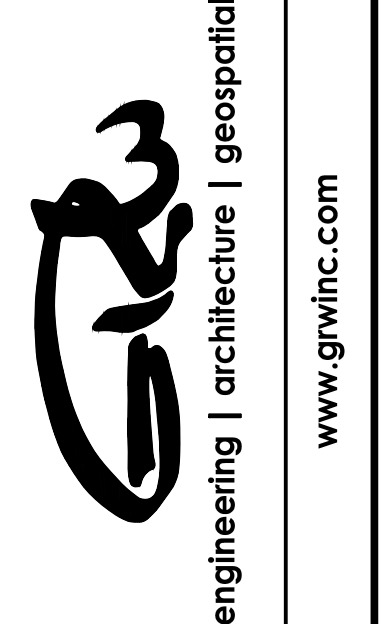
2 SECTION
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0 2' 4' 8'



3 SECTION
SCALE: 1/4"=1'-0"
0 2' 4' 8'

- SHEET KEYNOTES:**
1. DEMO EXISTING TUBE SETTLERS AND TROUGHS.
 2. DEMO ONE COURSE OF CONCRETE BLOCK (12" WIDE X 7" HIGH) FROM TOP OF WALL.
 3. EXISTING CAST IN PLACE CONCRETE WALL. WALL HAS CENTERED TAPER OF 18 1/2" WIDE AT BASE AND 12" WIDE AT TOP.
 4. CONTRACTOR TO CORE DRILL FOR 36" DI PIPE PENETRATION WITH LINK-SEAL AROUND 36" DI PIPE. COORDINATE CORE DRILL LOCATION WITH PLATE SETTLER SHOP DRAWING.
 5. WALL HAS CENTERED TAPER OF 18 1/2" WIDE BASE AND 12" WIDE TOP.
 6. WALL HAS OFFSET TAPER OF 18 1/2" WIDE BASE AND 12" WIDE TOP.

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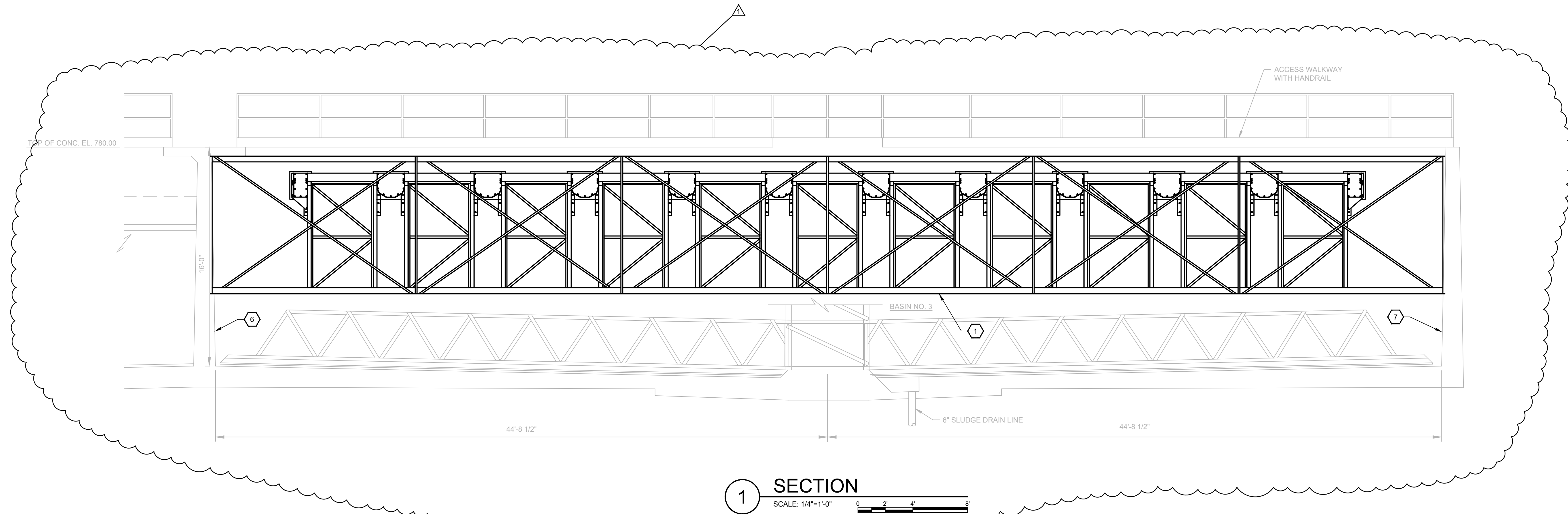
**BASIN NO. 3 SECTIONS
DEMOLITION**
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

DESIGNED	TLS	BY	TLS
DRAWN	RLT	DATE	12/29/20
REVIEWED	TLS	DESCRIPTION	APPENDIX NO. 2
APPROVED	JLH	NO.	

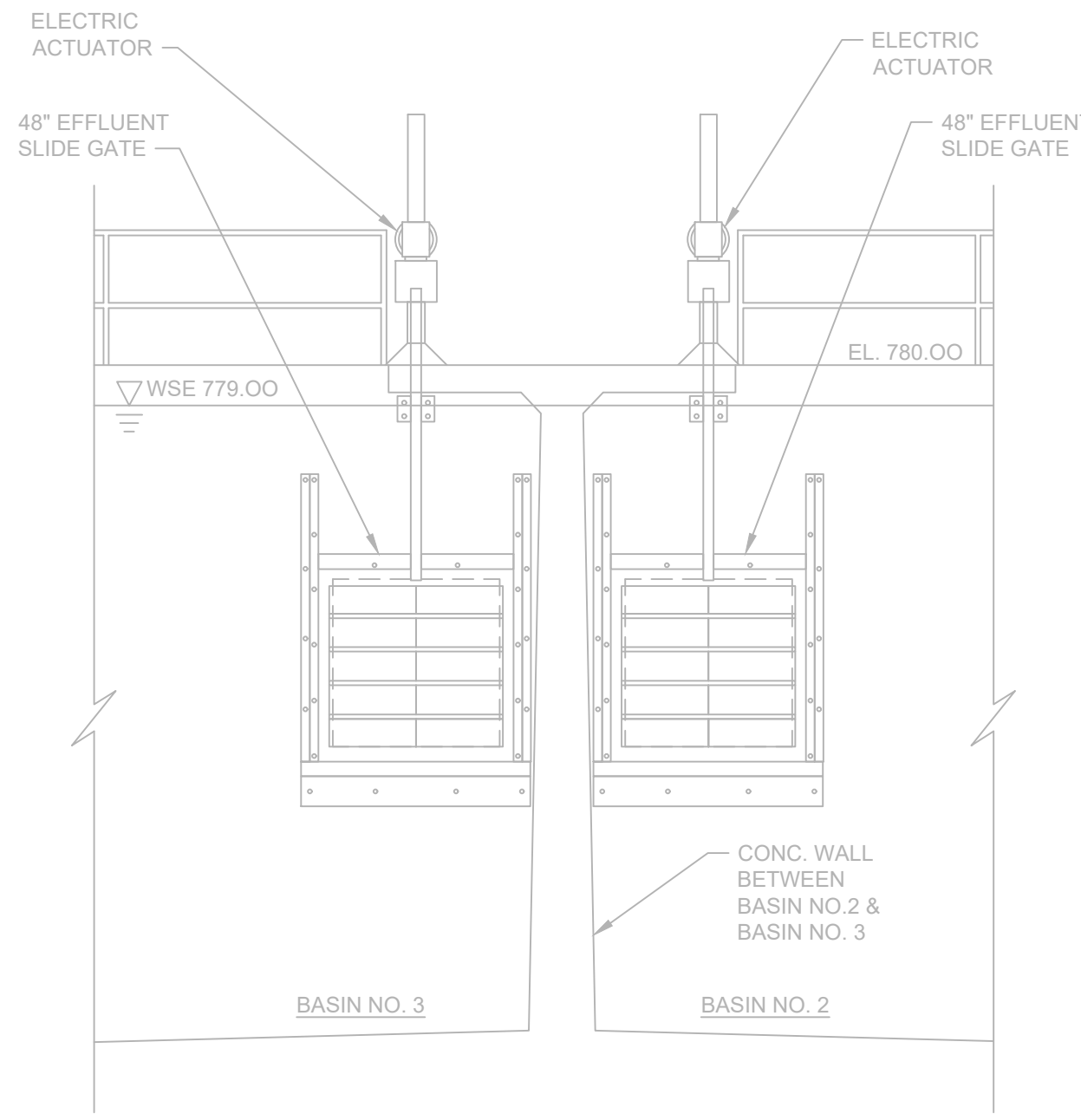
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DATE: DECEMBER, 2020
SCALE: 1/4" = 1'

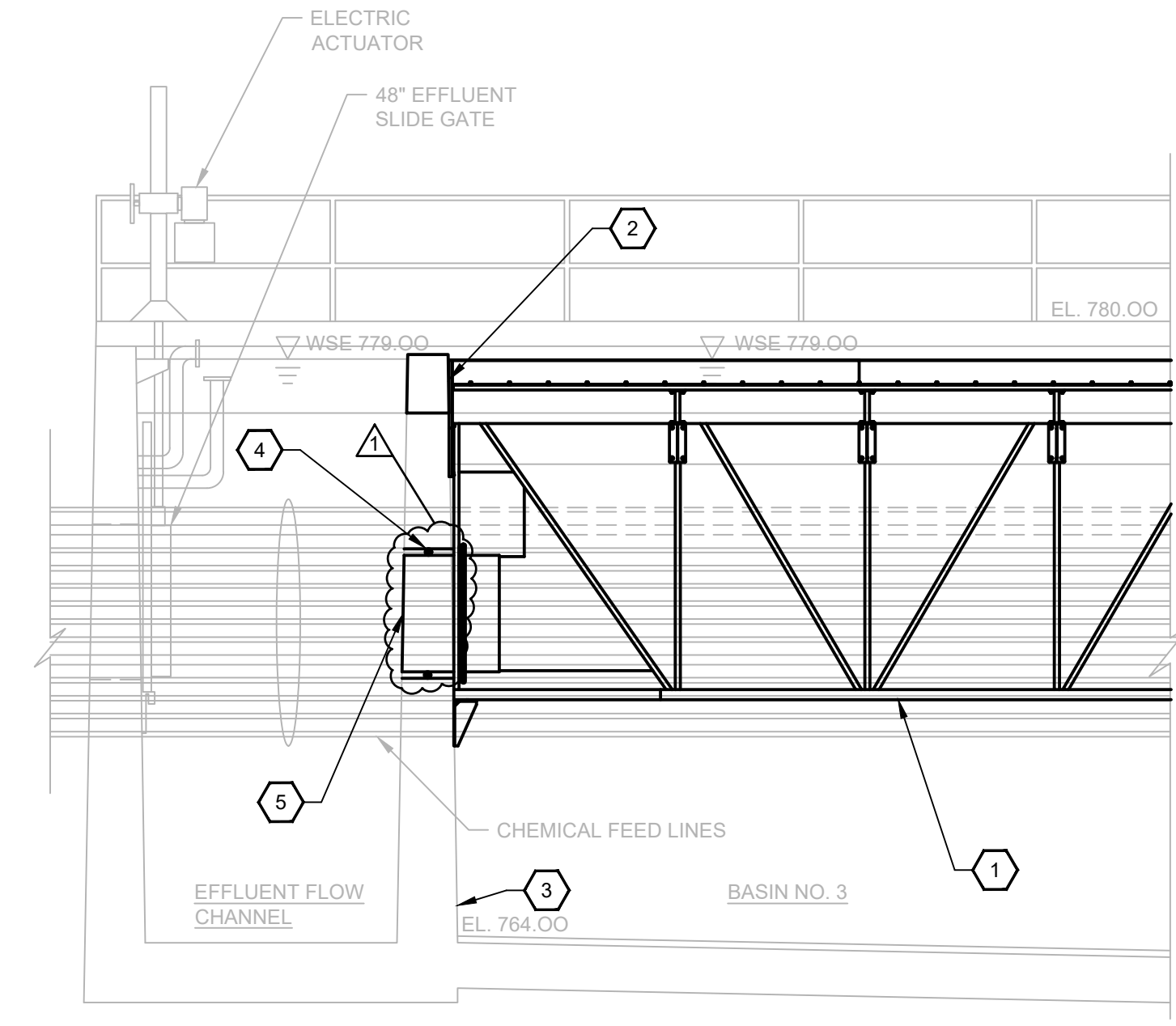
SHEET NO. M-03-301



1 SECTION
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0 2 4 8



2 SECTION
SCALE: 1/4"=1'-0"
0 2 4 8



3 SECTION
SCALE: 1/4"=1'-0"
0 2 4 8

SHEET KEYNOTES:

1. INSTALL NEW STAINLESS STEEL PLATE SETTLER SYSTEM WITH SUPPORT TRUSS. TOP OF PLATE SETTLERS TO SLANT TOWARDS EFFLUENT END OF BASIN. PLATE SETTLERS AND PLATE SETTLER WEIRS TO BE SET TO MAINTAIN A 779.00 WSE (1 FOOT OF FREE BOARD).
2. INSTALL NEW SECTION OF CAST IN PLACE CONCRETE WALL (12" WIDE X 7" HIGH) DOWELED INTO TOP OF EXISTING CAST IN PLACE CONCRETE WALL. NEW TOP OF WALL ELEVATION TO BE SAME AS PREVIOUS TOP OF WALL ELEVATION.
3. EXISTING CAST IN PLACE CONCRETE WALL. WALL HAS CENTERED TAPER OF 18 1/2" WIDE BASE AND 12" WIDE TOP.
4. CONTRACTOR TO CORE DRILL WALL FOR 36" PIPE PENETRATION AND LINK-SEAL AROUND 36" PIPE. COORDINATE CORE DRILL LOCATION WITH PLATE SETTLER SHOP DRAWING.
5. INSTALL NEW 36" DI WALL PIPE WITH COLLAR. PIPE TO BE 3 FEET LONG WITH 1 FOOT EXTENDING INTO BASIN WITH COLLAR UP AGAINST WALL ON INSIDE OF BASIN.
6. WALL HAS CENTERED TAPER OF 18 1/2" WIDE BASE AND 12" WIDE TOP.
7. WALL HAS OFFSET TAPER OF 18 1/2" WIDE BASE AND 12" WIDE TOP.

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**BASIN NO. 3 SECTIONS
NEW EQUIPMENT
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT**

NO.	REVISIONS DESCRIPTION	DATE	BY	DESIGNED	DRAWN	REVIEWED	APPROVED
				TLS	TLJ	TLJ	JLH
1	ADDENDUM NO. 2	12/28/20	TLJ				

SCALE CHECK: _____ THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

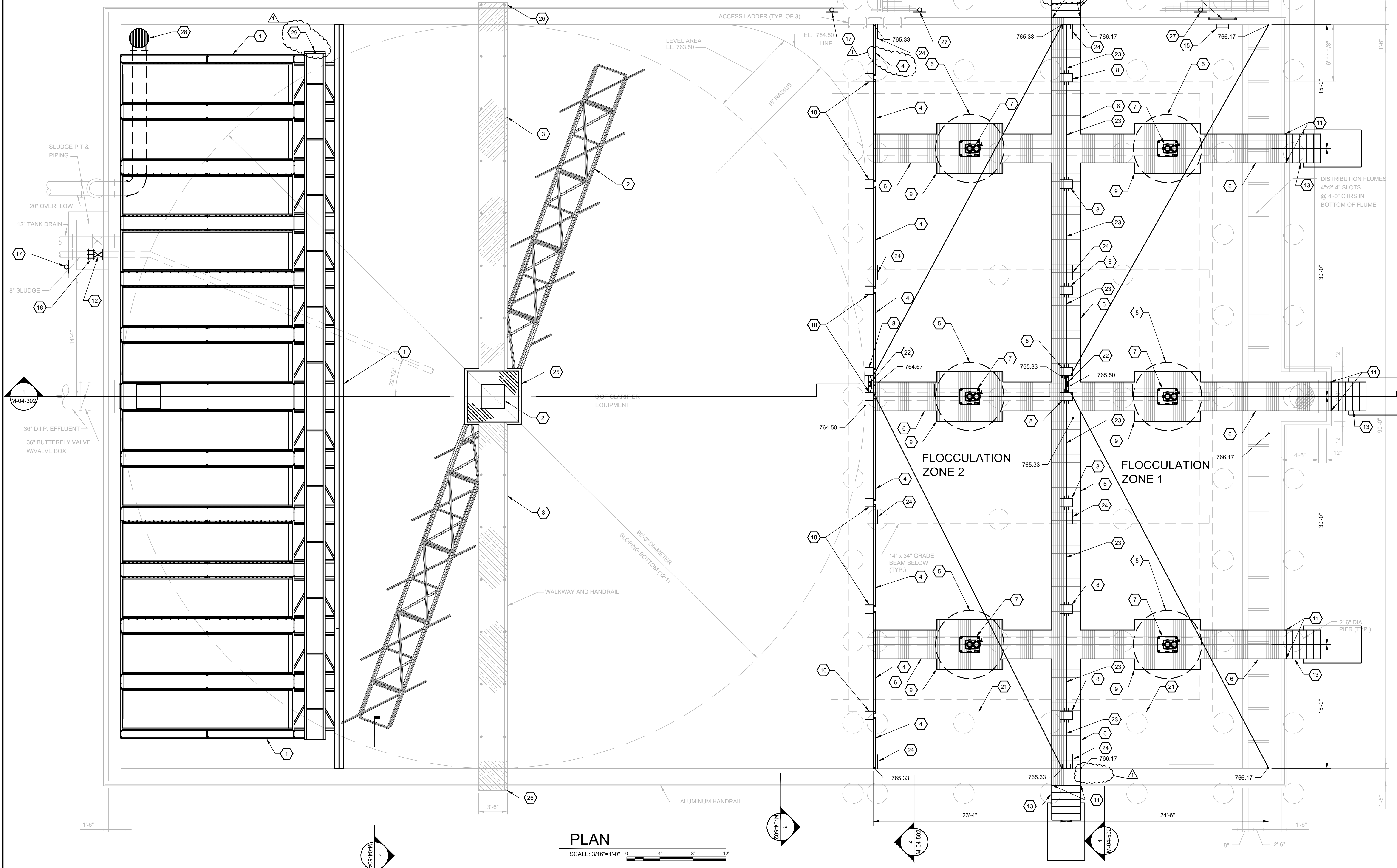
DATE: DECEMBER, 2020
SCALE: 1/4" = 1'
SHEET NO. M-03-302

SHEET KEYNOTES:

1. INSTALL NEW STAINLESS STEEL PLATE SETTLER SYSTEM WITH SUPPORT TRUSS.
2. INSTALL NEW CLARIFIER EQUIPMENT INCLUDING DRIVE, PLATFORM, CENTER COLUMN AND SLUDGE RAKE.
3. REMOVE, REFURBISH AND REINSTALL EXISTING CLARIFIER BRIDGE BEAMS (PAINTED STEEL).
4. INSTALL NEW FRP BAFFLES. ATTACH VERTICALLY TO UPSTREAM FACE OF REFURBISHED CONCRETE COLUMNS AND CROSS MEMBERS. INSTALL FRP BAFFLE ANCHORS TO AVOID CONCRETE REINFORCING STEEL.
5. INSTALL NEW FLOCCULATOR.
6. INSTALL NEW 42" WIDE GRATED WALKWAY W/ALUMINUM HANDRAILS, TOE PLATE, AND GRATING.
7. INSTALL NEW FLOCCULATOR DRIVE SYSTEM.
8. INSTALL NEW CONCRETE COLUMNS.
9. INSTALL NEW 6' x 8' PLATFORM AROUND FLOCCULATOR W/ALUMINUM HANDRAILS, TOE PLATE, AND GRATING.
10. REFURBISH AND REUSE EXISTING CONCRETE COLUMNS AND CROSS MEMBERS.
11. CAP ENDS OF EXISTING CUT HANDRAILS (42" WIDE).
12. INSTALL NEW 8" SLUDGE VALVE (PLUG VALVE) AND ELECTRIC ACTUATOR. ALSO SEE SHT. M-04-504.

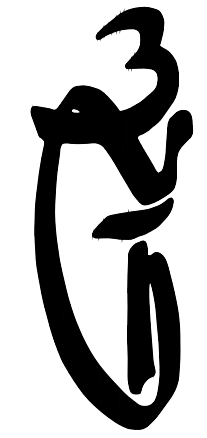
13. INSTALL NEW ALUMINUM STEPS. SEE STRUCTURAL SHEETS.
14. FILL HOLES IN WALL LEFT BY HORIZONTAL FLOCCULATOR DRIVE SHAFTS WITH CONCRETE.
15. INSTALL NEW FRP ACCESS LADDER. (LOCATION TO BE FIELD VERIFIED WITH NKWD STAFF PRIOR TO INSTALLATION) (SEE DETAIL ON SHT. M-04-302)
16. INSTALL NEW 42" WIDE ALUMINUM SWING GATE IN EXISTING HANDRAIL CENTERED ON ACCESS LADDER. LOCATION TO BE FIELD VERIFIED WITH NKWD STAFF PRIOR TO INSTALLATION.
17. INSTALL NEW DAVIT CRANE WALL MOUNTED BASE. (LOCATION TO BE FIELD VERIFIED WITH NKWD STAFF PRIOR TO INSTALLATION. REMOVE AND REPLACE SOIL AS NEEDED.)
18. INSTALL NEW 8" FLANGED COUPLING ADAPTER.
19. INSTALL NEW ALUMINUM HANDRAIL AND TOE PLATE.
20. NOT USED.
21. NOT USED.
22. 24" x 24" SLIDE GATE WITH SELF CONTAINED FRAME AND ELECTRIC ACTUATOR.
23. INSTALL NEW FRP BAFFLES USING SLIDE GUIDE ANGLES ATTACHED TO INSIDE FACE OF CONCRETE COLUMNS WITH 1 S.S. EPOXY ANCHOR EVERY 18". FRP PANELS ARE ORIENTED HORIZONTALLY AND SLIDE INTO SLIDE GUIDE ANGLES. INSTALL FRP BAFFLE ANCHORS TO AVOID CONCRETE REINFORCING STEEL.

24. 20" x 20" FRP DEFLECTOR BAFFLE MOUNTED WITH FRP OR S.S. ANGLES OR BEAMS AND LOCATED DIRECTLY IN FRONT OF AND 12" FROM 15" x 15" CUT OUT IN LARGE FRP BAFFLE WALL. USE EPOXY ANCHORS WITH S.S. BOLTS TO ANCHOR ANGLES BEAMS INTO ORIGINAL CONCRETE BASIN CONCRETE FLOOR (NOT NEW GROUT).
25. NEW ALUMINUM HANDRAIL WITH ALUMINUM TOE PLATE ON NEW PLATFORM TO MATCH EXISTING.
26. REMOVE, REFURBISH AND REINSTALL EXISTING STAIR STRINGERS (PAINTED STEEL).
27. INSTALL NEW DAVIT CRANE WALL MOUNTED BASE. (LOCATION TO BE FIELD VERIFIED WITH NKWD STAFF PRIOR TO INSTALLATION). CUT AND REMOVE SECTION OF EXISTING GRATING TO ALLOW INSTALLATION AND USE OF DAVIT CRANE BASE MOUNT (FILE SHARP EDGES OF CUTS).
28. 20" DI OVERFLOW PIPE RELOCATION TO BE INCLUDED IN PLATE SETTLER DESIGN AND PROVIDED BY PLATE SETTLER MANUFACTURER. MAINTAIN SAME OVERFLOW ELEVATION AS EXISTING OVERFLOW (780.50) REUSE EXISTING COVER GRATING IF POSSIBLE OR REPLACE WITH SIMILAR COVER GRATING.
29. INSTALL REMOVABLE S.S. HAND-PULL GATE AT END OF TROUGH.



PLAN
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 PLOTTED BY: rthacker

GRW PROJECT NO. 4789
 CLIENT PROJECT NO. 184-4006

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BASIN NO. 4 PLAN
NEW EQUIPMENT
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

NO.	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED
1	12/29/20	ADDENDUM NO. 2	TLS	TLS	RLT	JLH

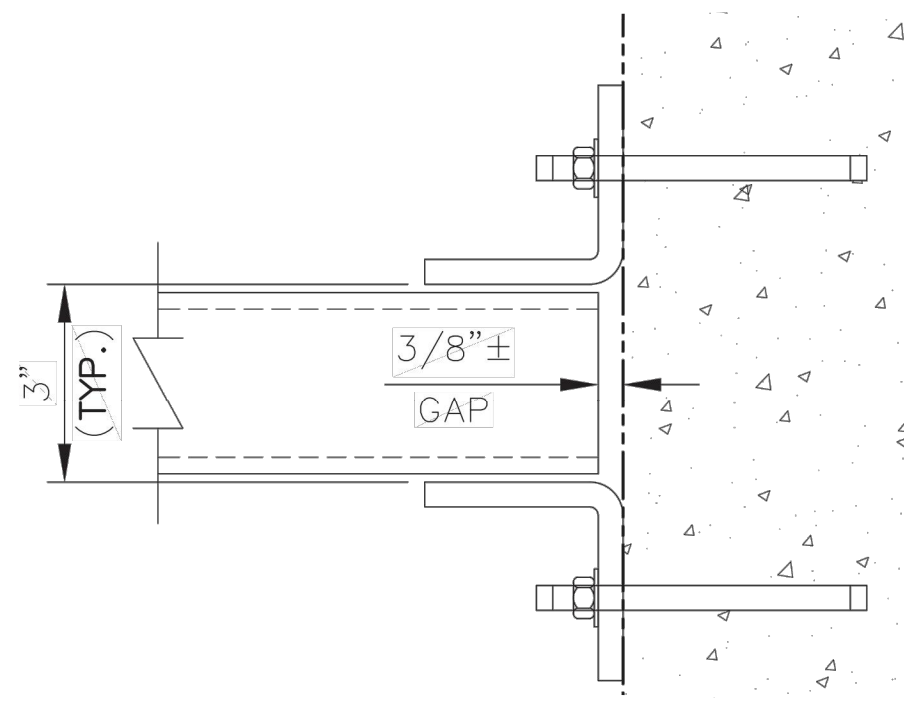
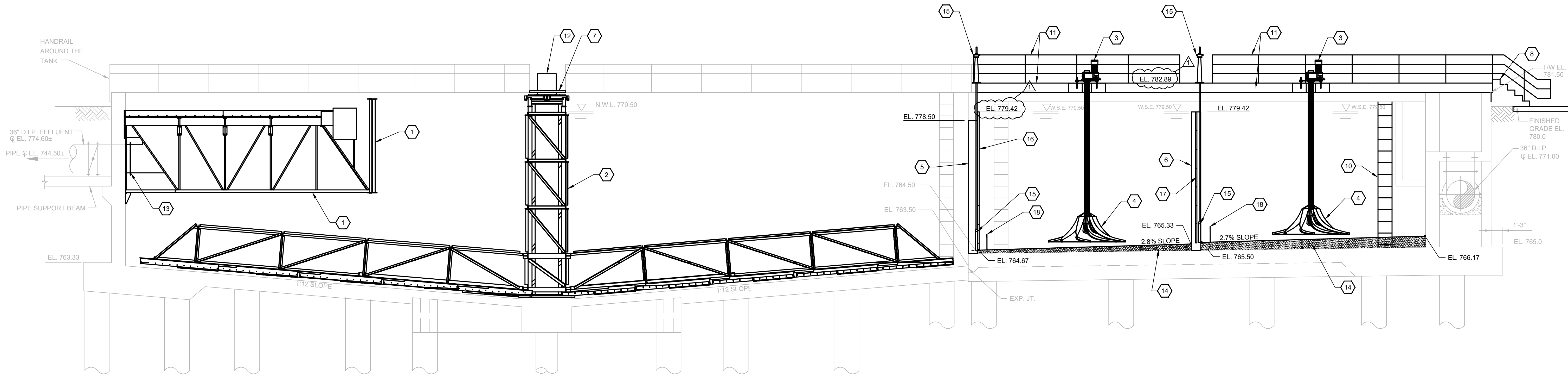
REVISIONS
 DATE: DECEMBER, 2020
 SCALE: 3/16" = 1'
 SHEET NO. M-04-102

BID SET

PLOTTED BY: rthacker

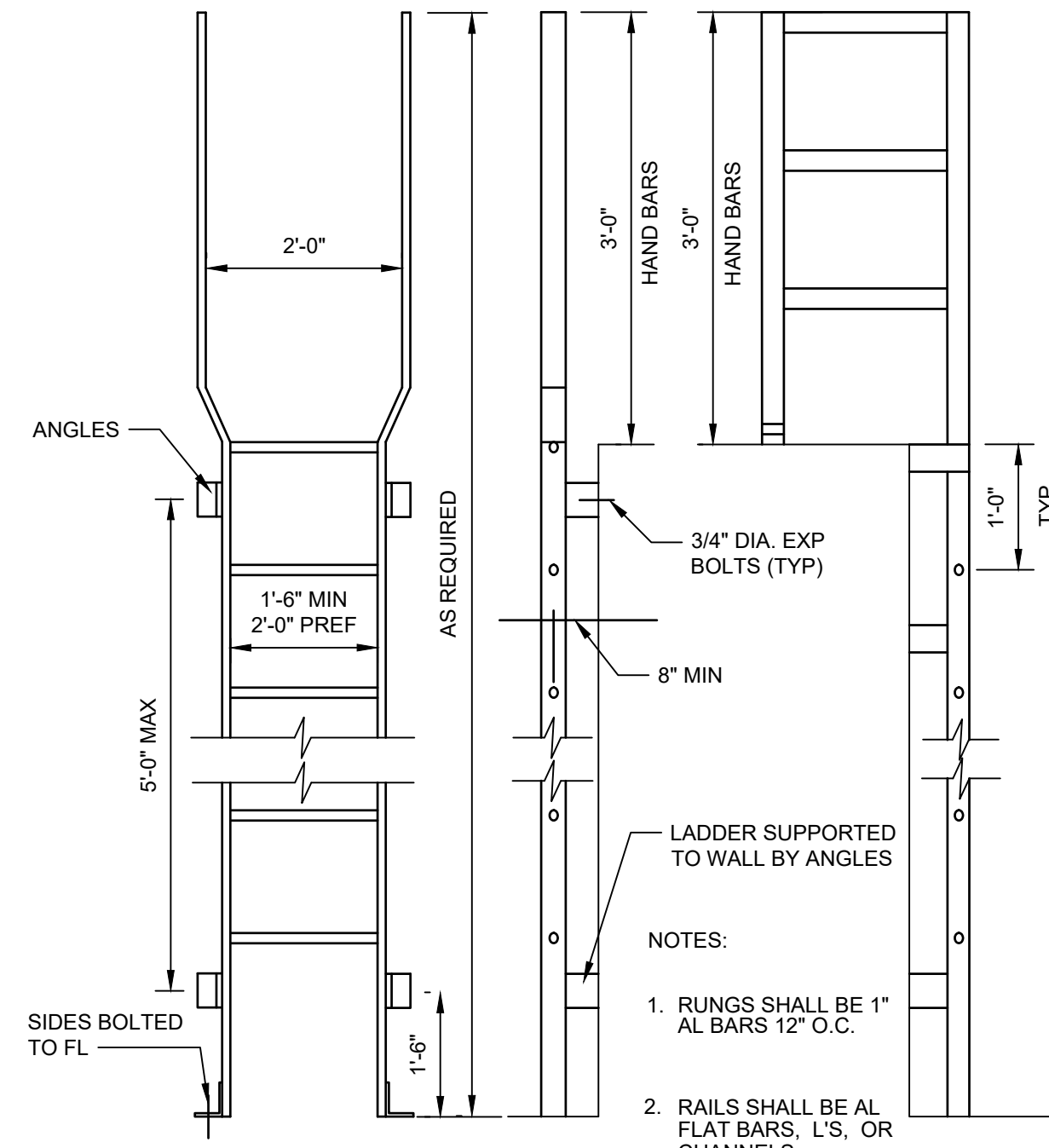
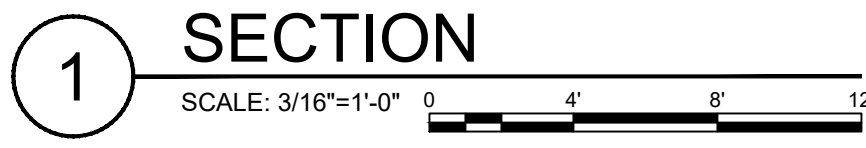
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SLIDE GUIDE ANGLES DETAIL

NOT TO SCALE



FIBERGLASS ACCESS LADDER DETAIL

NOT TO SCALE

SHEET KEYNOTES:

- INSTALL NEW STAINLESS STEEL PLATE SETTLER SYSTEM W/SUPPORT TRUSS, PLATE SETTLERS AND PLATE SETTLER WEIRS TO BE SET TO MAINTAIN A 779.50 WATER SURFACE ELEVATION (2 FEET OF FREE BOARD).
- INSTALL NEW CLARIFIER MECHANISM INCLUDING CENTER COLUMN AND RAKE.
- INSTALL NEW FLOCCULATOR DRIVE SYSTEM.
- INSTALL NEW FLOCCULATOR WITH 5" CLEARANCE FROM FLOOR.
- REFURBISH AND REUSE EXISTING CONCRETE COLUMNS AND CONCRETE CROSS MEMBERS.
- INSTALL NEW CONCRETE COLUMNS.
- REFURBISH AND REUSE EXISTING CLARIFIER BRIDGE BEAMS (PAINTED STEEL).
- INSTALL NEW ALUMINUM STEPS. SEE STRUCTURAL SHEETS.
- NOT USED.
- INSTALL NEW FRP ACCESS LADDER. (LOCATION TO BE FIELD VERIFIED WITH NKWD STAFF PRIOR TO INSTALLATION) (SEE DETAIL THIS SHEET)
- INSTALL NEW 42" WIDE GRATED WALKWAY WITH ALUMINUM HANDRAILS, TOE PLATE AND GRATING. SEE STRUCTURAL SHEETS.
- INSTALL NEW CLARIFIER DRIVE AND PLATFORM.
- CONNECT DISCHARGE FROM PLATE SETTLERS TO NEW 1' STUB OF 36" DI PIPE EXTENDING FROM WALL. NEW 1' LONG 36" DI PIPE STUB TO BE FL X PE AND SECURED TO WALL WITH EX. BOLTS (STUDS) AND NEW NUTS.
- INSTALL 6000 PSI GROUT.
- 24" x 24" SLIDE GATE WITH ELECTRIC ACTUATOR, SELF CONTAINED FRAME, AND ACTUATOR PEDESTAL.
- INSTALL NEW FRP BAFFLES ON UPSTREAM FACE OF COLUMNS AND CROSS BEAMS.
- INSTALL NEW FRP BAFFLES ON INSIDE FACE OF COLUMNS USING SLIDE GUIDE ANGLES. SEE DETAIL THIS SHEET.
- 20" x 20" FRP DEFLECTOR BAFFLE MOUNTED WITH FRP OR STAINLESS STEEL ANGLES OR BEAMS AND LOCATED 12" FROM 15" X 15" CUT OUT IN LARGE FRP BAFFLE WALL. USE EPOXY ANCHORS WITH S.S. BOLTS TO ANCHOR ANGLES/BEAMS INTO ORIGINAL BASIN CONCRETE FLOOR (NOT NEW GROUT).

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BASIN NO. 4 SECTION
NEW EQUIPMENT
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

DESIGNED	TLS	DRAWN	RLT	REVIEWED	TLS	APPROVED	JLH
NO.	1	DATE	12/29/20	DATE		DATE	
DESCRIPTION	ADDENDUM NO. 2						

SCALE CHECK: _____ THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

DATE: DECEMBER, 2020
 SCALE: 3/16" = 1'
 SHEET NO.

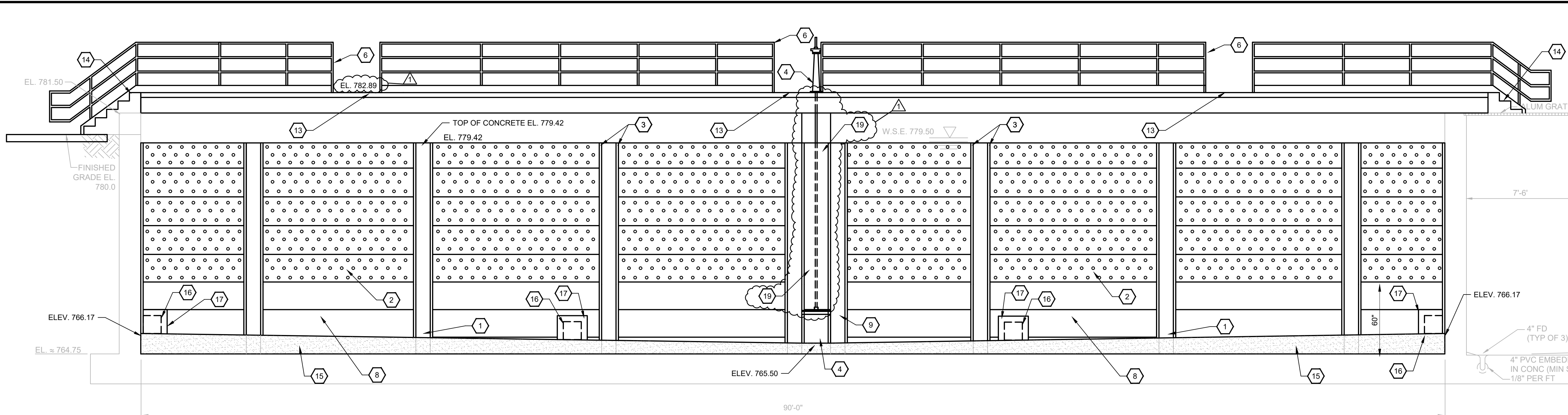
M-04-302

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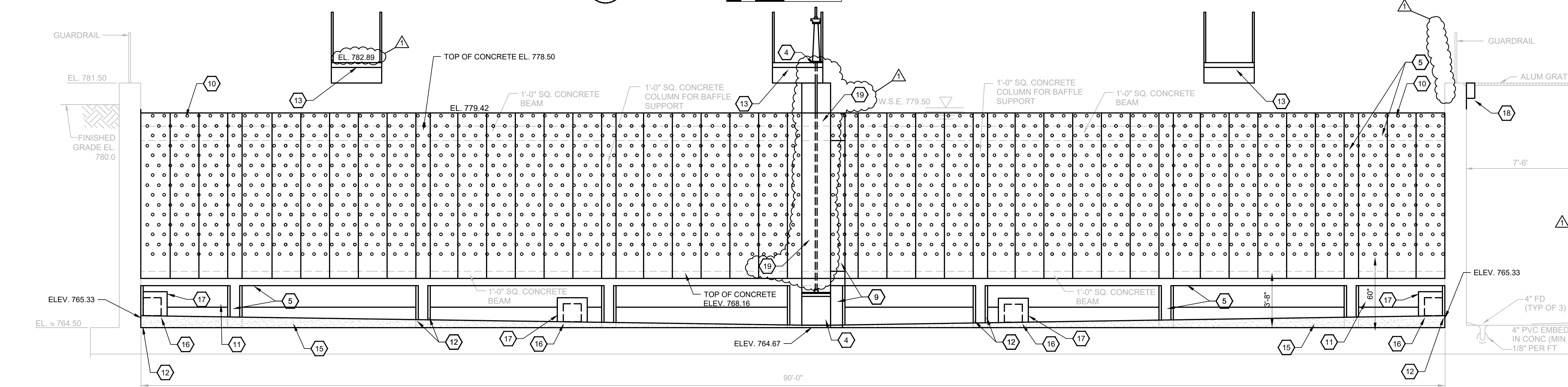
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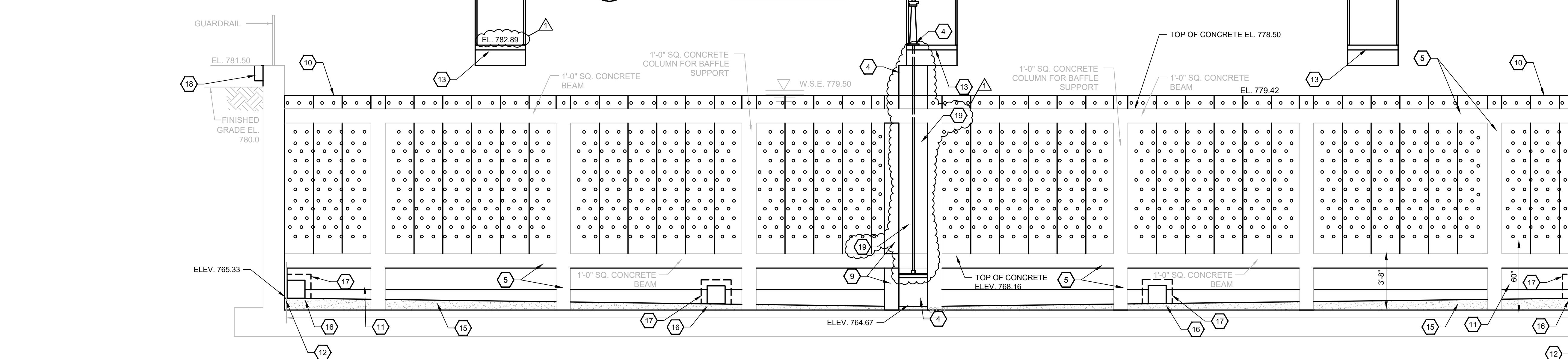
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1 SECTION
SCALE: 1/4"=1'-0"
0 2' 4' 8'



2 SECTION
SCALE: 1/4"=1'-0"
0 2' 4' 8'



3 SECTION
SCALE: 1/4"=1'-0"
0 2' 4' 8'

SHEET KEYNOTES:

1. NEW CAST IN PLACE CONCRETE COLUMNS FOR FRP BAFFLE WALL.
2. NEW HORIZONTAL PERFORATED FRP BAFFLES (EACH 2' HIGH) WITH 2-1/2" DIAMETER HOLES WITH TOTAL HOLE AREA EQUAL TO 2.5% OF CROSS SECTIONAL AREA OF FLOW (36 SQ. FT.). PERFORATED BAFFLES BEGIN AT 5' ABOVE BASIN FLOOR AND END AT 1" BELOW THE BASIN WATER SURFACE ELEVATION.
3. NEW FRP BAFFLE SLIDE GUIDE ANGLES BOLTED TO CENTER OF CONCRETE COLUMN WITH 1 S.S. EPOXY ANCHOR EVERY 18 INCHES. FRP PANELS SLIDE INTO SLIDE GUIDE ANGLES AND ARE THEN BOLTED TO SLIDE GUIDE ANGLES.
4. 24" x 24" SLIDE GATE WITH ELECTRIC ACTUATOR, SELF CONTAINED FRAME, AND ACTUATOR PEDESTAL.
5. REHAB/REUSE EXISTING CONCRETE COLUMNS AND CONCRETE CROSS MEMBERS.
6. NEW ALUMINUM HANDRAIL WITH ALUMINUM TOE PLATE.
7. NOT USED.
8. NEW HORIZONTAL SOLID FRP BAFFLES (EACH 2' HIGH) TO A HEIGHT OF 6' ABOVE BASIN FLOOR.
9. NEW CAST IN PLACE CONCRETE COLUMN FOR NEW 24" X 24" SLIDE GATE.
10. NEW VERTICAL FRP BAFFLES (EACH 2' WIDE) WITH 2 1/2" DIAMETER HOLES IN TOP PORTION OF BAFFLES WITH TOTAL HOLE AREA EQUAL TO 2.5% OF CROSS SECTIONAL AREA OF FLOW (36 SQ. FT.). VERTICAL PANELS ARE 17 FEET TALL. THE TOP 9 FEET OF THE PANELS ARE PERFORATED. PERFORATIONS IN PANELS BEGIN AT A HEIGHT OF 5 FEET ABOVE THE BASIN FLOOR. THE LOWER PORTION OF THE VERTICAL PANELS ARE SOLID. THE LOWER END OF THE VERTICAL PANELS ARE LOCATED AT MID-POINT OF EXISTING LOWER CONCRETE BEAM (3.17 FEET ABOVE BASIN FLOOR). ATTACH VERTICAL FRP PANELS DIRECTLY TO CONCRETE CROSS MEMBERS WITH STAINLESS STEEL EPOXY ANCHORS PER MANUFACTURER'S INSTRUCTIONS. MINIMUM 6 ANCHORS PER PANEL. TOP OF VERTICAL PANELS TO BE 1" BELOW BASIN WATER SURFACE ELEVATION.
11. NEW HORIZONTAL SOLID FRP BAFFLES FROM BASIN FLOOR TO BOTTOM OF EXISTING LOWER CONCRETE BEAM (2.67 FEET ABOVE BASIN FLOOR). ATTACH FRP PANELS TO FRP ANGLES WITH STAINLESS STEEL BOLTS PER MANUFACTURER INSTRUCTIONS. MINIMUM 6 BOLTS PER PANEL.
12. FRP ANGLES ATTACHED TO CONCRETE SIDEWALLS AND CONCRETE COLUMNS USING STAINLESS STEEL EPOXY ANCHORS PER MANUFACTURER INSTRUCTIONS.
13. INSTALL NEW 42" WIDE GRATED WALKWAY WITH ALUMINUM HANDRAILS, TOE PLATE, AND GRATING.
14. INSTALL NEW ALUMINUM STEPS. SEE STRUCTURAL SHEETS.
15. INSTALL 6000 PSI GROUT.
16. 15" X 15" BAFFLE CUT OUT WITH FRP OR STAINLESS STEEL ANGLE OR BEAM REINFORCING.
17. 20" X 20" FRP DEFLECTOR BAFFLE MOUNTED WITH FRP OR STAINLESS STEEL ANGLES OR BEAMS (USE EPOXY ANCHORS WITH S.S. BOLTS TO ANCHOR ANGLES/BEAMS INTO ORIGINAL BASIN CONCRETE FLOOR (NOT NEW GROUT)).
18. INSTALL NEW DAVIT CRANE WALL MOUNTED BASE.
19. SLIDE GATE FRAME SHALL HAVE SOLID S.S. PLATE BEHIND LIVE STEM ON UPSTREAM SIDE OF SLIDE GATE WHICH IS WELDED OR BOLTED TO FRAME.

GENERAL NOTES

1. CONTRACTOR TO FIELD MEASURE EXISTING CONCRETE COLUMNS AND CROSS MEMBERS TO BE REFURBISHED AND COORDINATE WITH FRP BAFFLE AND SLIDE GATE SHOP DRAWINGS.
2. FRP BAFFLES TO BE FLUSH WITH BOTTOM OF BASIN. NO GAPS BETWEEN FRP BAFFLES. TOP OF FRP BAFFLES TO BE 1" BELOW NORMAL WATER SERVICE ELEVATION.

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**BASIN NO. 4 SECTION
NEW EQUIPMENT
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT**

NO.	DATE	BY	DESIGNED	DRAWN	REVIEWED	APPROVED
1	12/29/20	TLS	TLS	RLT	TLS	JLH
ADDENDUM NO. 2						

DATE: DECEMBER, 2020
SCALE: AS SHOWN
SHEET NO.

M-04-502

BID SET

PLOTTED BY: rthacker

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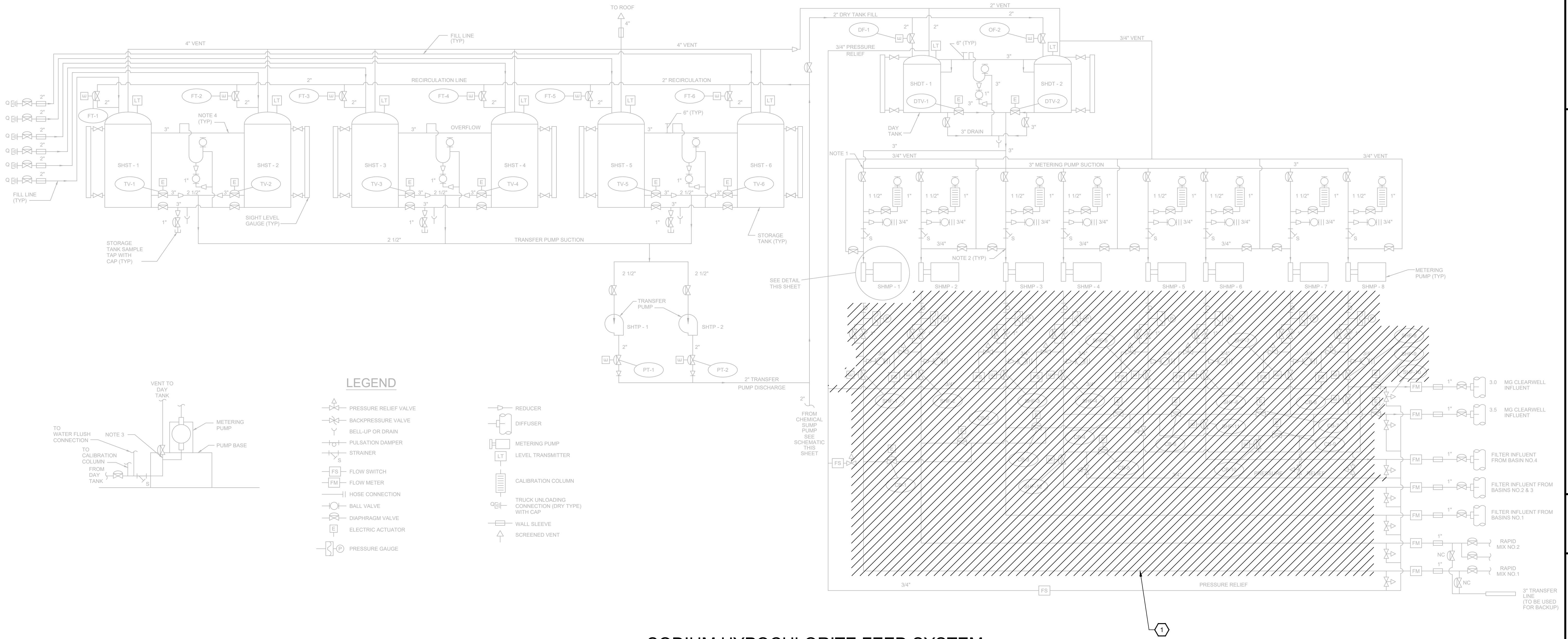
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SHEET KEYNOTES:

- 1. DEMO EXISTING SODIUM HYPOCHLORITE PIPING, VALVES, ELECTRIC ACTUATORS, PRESSURE GAUGES, AND PULSATION DAMPERS FROM PERISTALTIC PUMP DISCHARGE TO (PRESSURE RELIEF VALVES), INCLUDING ELECTRICAL CONDUIT WIRING AND BOXES. DO NOT DEMO (PRESSURE RELIEF VALVES)

GENERAL NOTE:

- 1. ONLY ONE SODIUM HYPOCHLORITE FEED PUMP DISCHARGE PIPE MAY BE OUT OF SERVICE AT A TIME
- 2. REUSE EXISTING OVERHEAD PIPE RACK AND SECURE NEW PIPING AND TUBING TO EXISTING PIPE RACK.



SODIUM HYPOCHLORITE FEED SYSTEM
NOT TO SCALE

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CLIENT PROJECT NO. 184-4006

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**SODIUM HYPOCHLORITE CHEMICAL FEED
DEMOLITION**
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

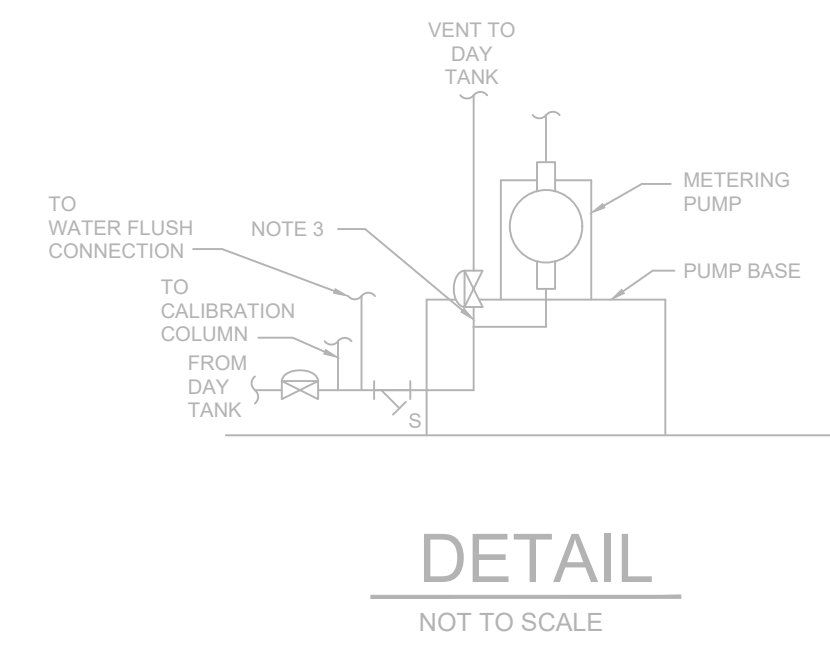
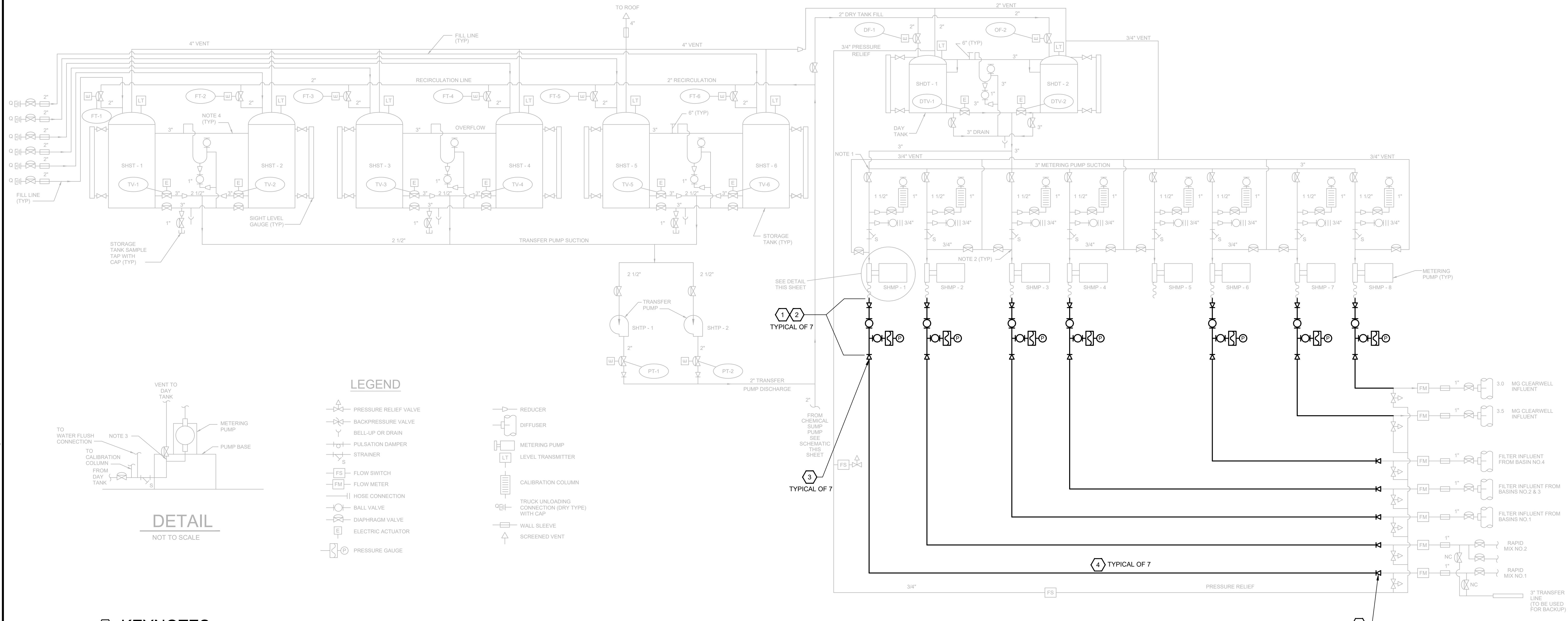
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		12/29/20	TLS		TLS		

REVISIONS
NO. 1
DESCRIPTION
ADDENDUM NO. 2

DATE: DECEMBER, 2020
SCALE: NTS
SHEET NO.

M-05-601

BID SET



- LEGEND**
- PRESSURE RELIEF VALVE
 - BACKPRESSURE VALVE
 - BELL-UP OR DRAIN
 - PULSATION DAMPER
 - STRAINER
 - FS FLOW SWITCH
 - FM FLOW METER
 - HOSE CONNECTION
 - BALL VALVE
 - DIAPHRAGM VALVE
 - E ELECTRIC ACTUATOR
 - PRESSURE GAUGE
 - REDUCER
 - DIFFUSER
 - METERING PUMP
 - LT LEVEL TRANSMITTER
 - CALIBRATION COLUMN
 - TRUCK UNLOADING CONNECTION (DRY TYPE) WITH CAP
 - WALL SLEEVE
 - SCREENED VENT

- NEW LEGEND**
- VENTED BALL VALVE
 - EX. PERISTALTIC PUMP TUBING (MARPRENE)
 - HOSE BARB
 - PRESSURE GAUGE WITH DIAPHRAGM SEAL

KEYNOTES:

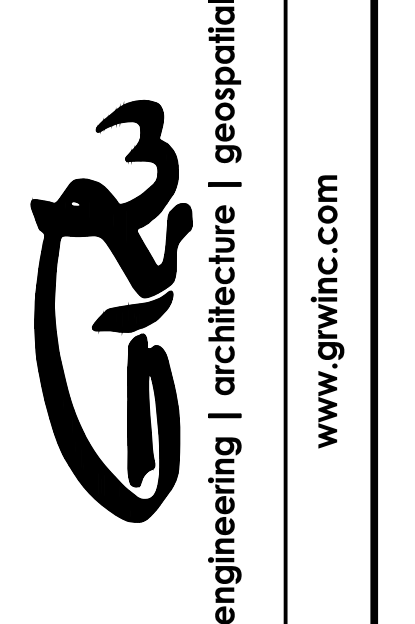
- INSTALL 2' OF VERTICAL 1 1/2" PVC (SCH. 80) PIPING (STARTING AT 6" ABOVE PUMP PEDESTAL) WITH 1 1/2" VENTED BALL VALVES AND PRESSURE GAUGE WITH DIAPHRAGM SEAL. TRANSITION FROM EXISTING PERISTALTIC PUMP TUBING TO NEW 1 1/2" PVC (SCH. 80) PIPING WITH A HOSE BARB.
- LEAVE A 2" VERTICAL GAP BETWEEN EXISTING PERISTALTIC PUMP DISCHARGE AND BOTTOM OF NEW VERTICAL 1 1/2" PVC PIPING.
- TRANSITION FROM 1 1/2" PVC (SCH. 80) PIPING TO 3/8" FLEXIBLE PVC TUBING WITH A HOSE BARB. LEAVE A 6" GAP BETWEEN END OF PVC CARRIER PIPING AND 2" PVC CASING PIPE.
- INSTALL TWO 3/8" FLEXIBLE PVC TUBES INSIDE 2" PVC (SCH. 80) CASING PIPE. ONE TUBE IS ACTIVE AND THE OTHER TUBE IS A SPARE. INSTALL CASING PIPE AND TUBING ON EXISTING PIPE RACK. FILL SPACE BETWEEN OUTSIDE OF 3/8" FLEXIBLE PVC TUBING AND INSIDE OF 2" PVC CASING PIPE WITH SODIUM HYPOCHLORITE RESISTANT CAULK (AT ENDS OF 2" PVC CASING PIPE).

GENERAL NOTE:

- ONLY ONE SODIUM HYPOCHLORITE FEED PUMP DISCHARGE PIPE MAY BE OUT OF SERVICE AT A TIME
- REUSE EXISTING OVERHEAD PIPE RACK AND SECURE NEW PIPING AND TUBING TO EXISTING PIPE RACK

SODIUM HYPOCHLORITE FEED SYSTEM
NOT TO SCALE

GRW PROJECT NO. 4789
CLIENT PROJECT NO. 184-4006



**SODIUM HYPOCHLORITE CHEMICAL FEED
NEW EQUIPMENT**
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

NO.	REVISIONS	DATE	DESIGNED	BY	DRAWN	REVIEWED	APPROVED
1	ADDENDUM NO. 2	12/29/24	TLS	TLS	RLT	TLS	JLH

SCALE CHECK: _____ THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

DATE: DECEMBER, 2020
SCALE: NTS
SHEET NO.

M-05-602

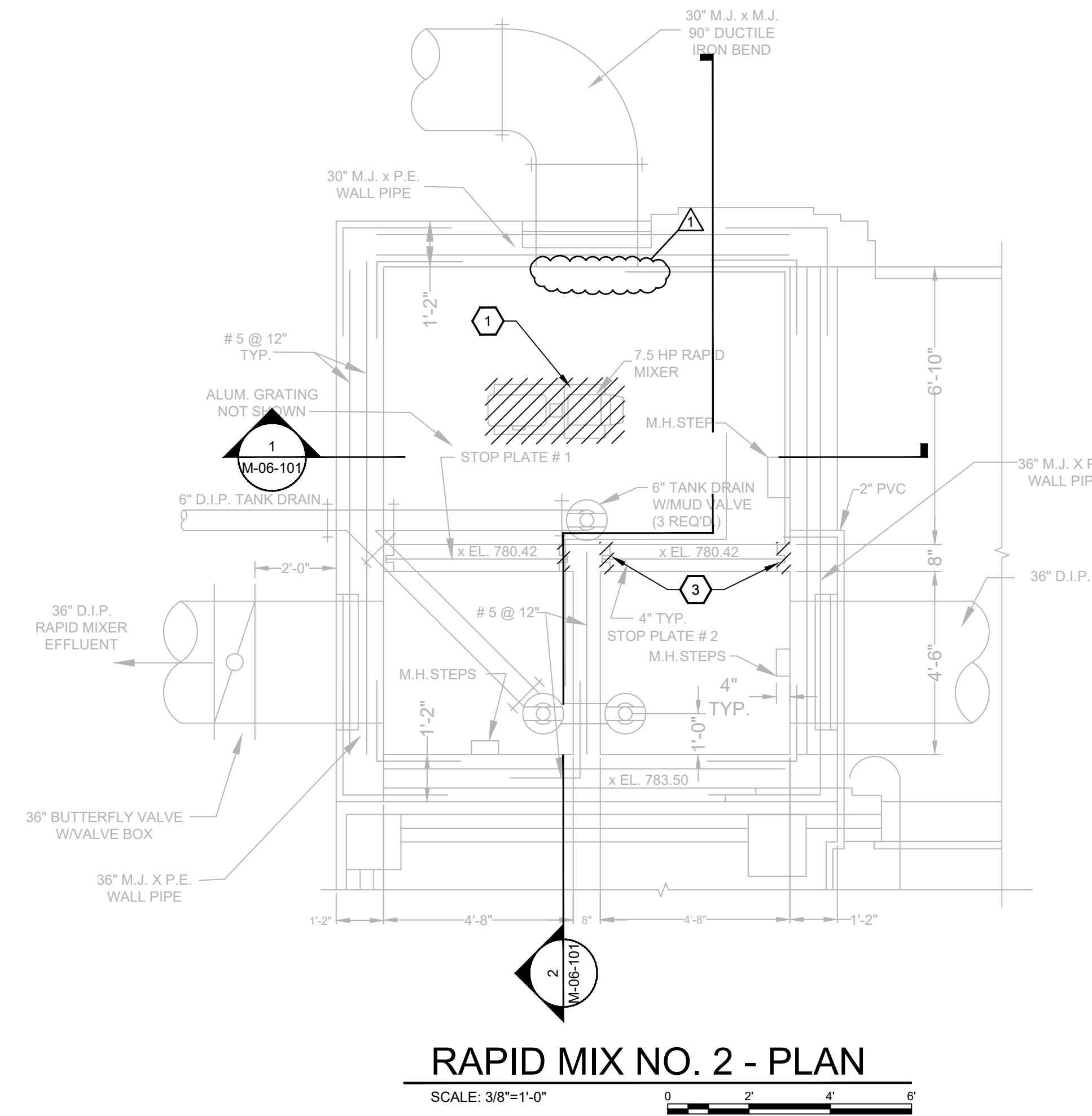
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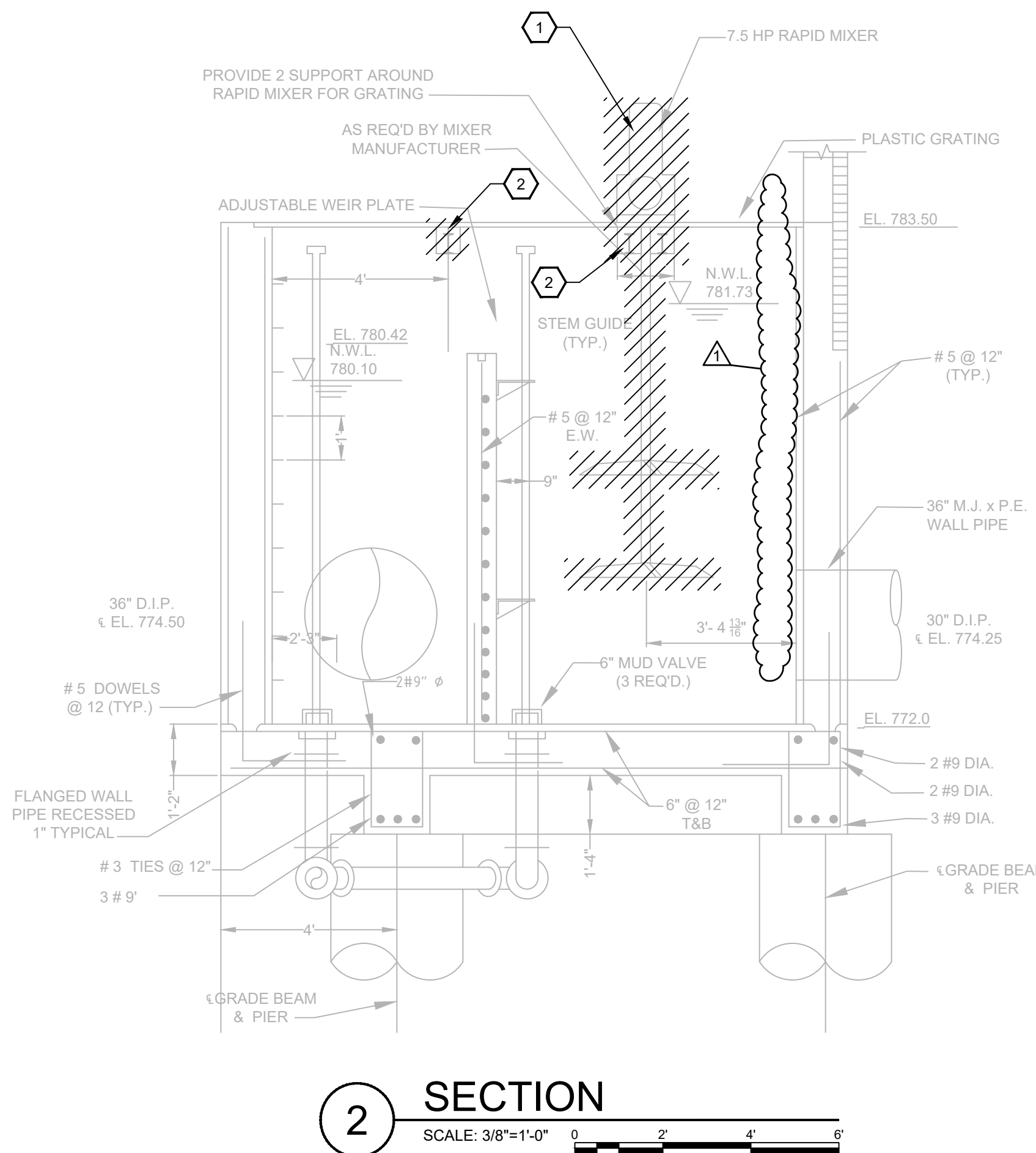
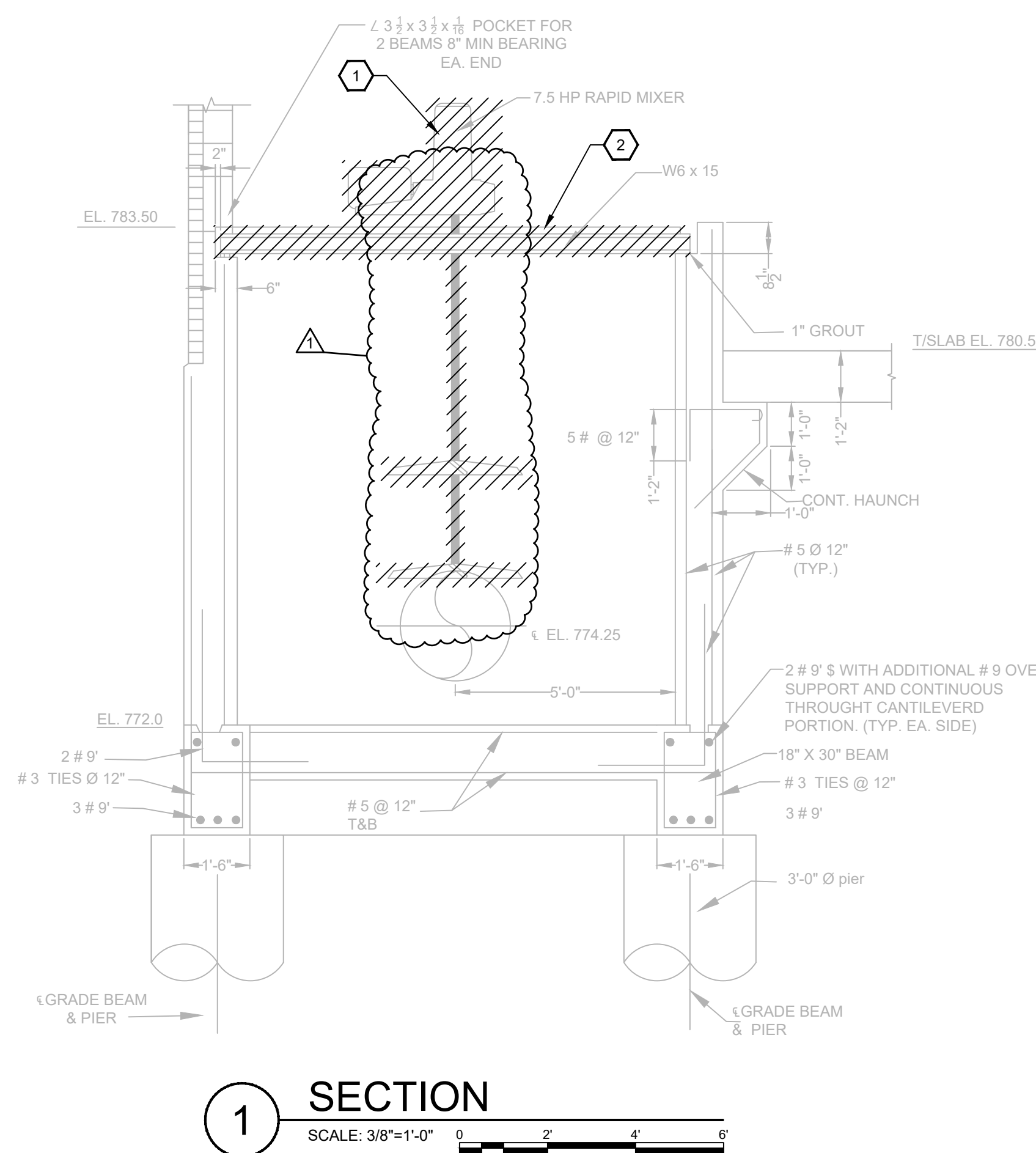
SHEET KEYNOTES:

1. DEMO EXISTING RAPID MIXER EQUIPMENT.
2. DEMO EXISTING PLASTIC COVER PLATE SUPPORT BEAMS.
3. DEMO EXISTING STOP GATE ANTI-FRICTION GUIDES (ENTIRE HEIGHT OF STOP GATE WALL APPROX. 9 FEET).
4. DEMO EXISTING SUPPORT BEAM.



RAPID MIX NO. 2

NOT TO SCALE



RAPID MIX SUPPORT BEAM

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GRW PROJECT NO. 4789
CLIENT PROJECT NO. 184-4006

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RAPID MIX NO. 2 - PLAN & SECTIONS
DEMOLITION
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

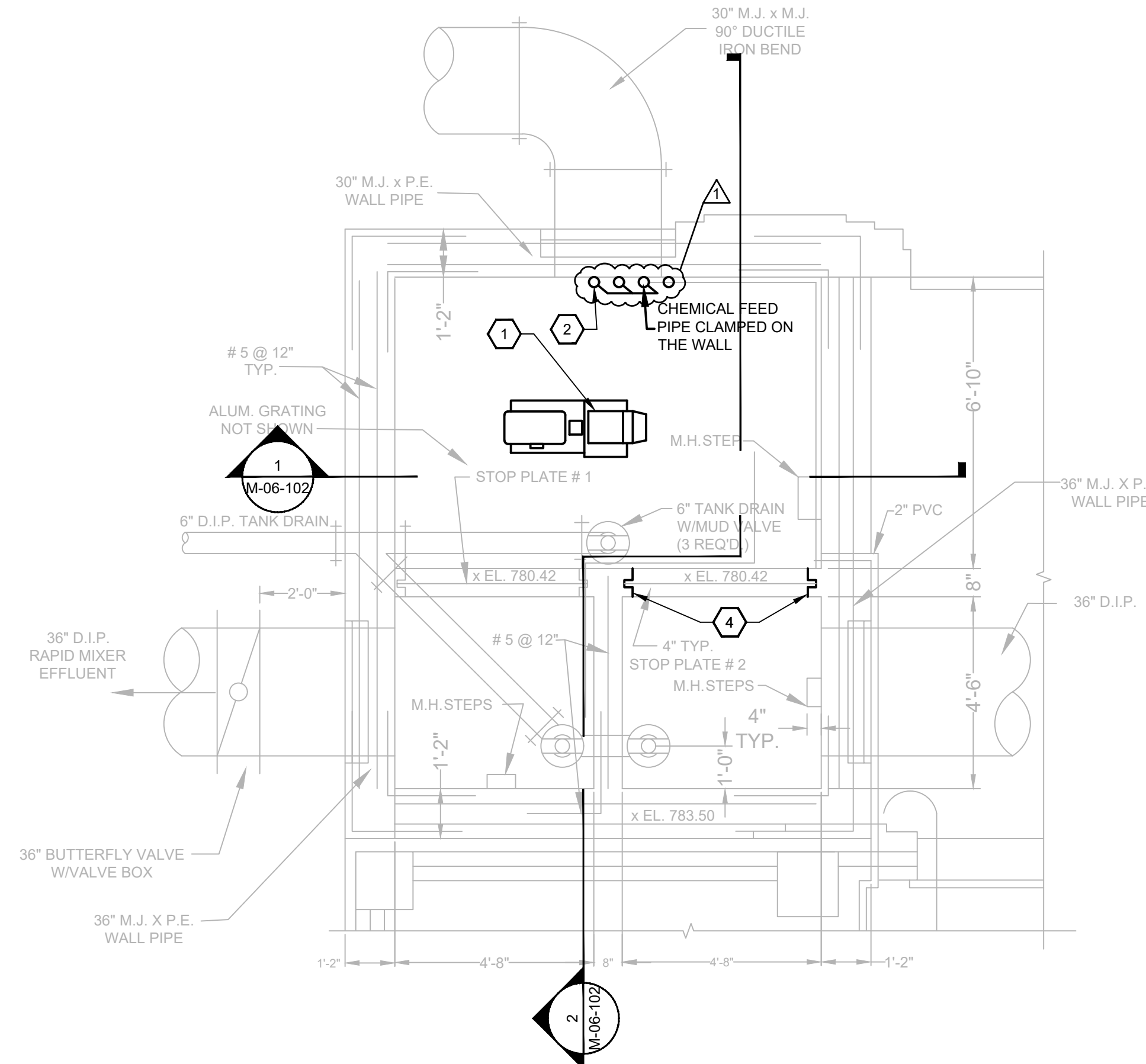
NO.	REVISIONS	DATE	BY	DESIGNED	DRAWN	REVIEWED	APPROVED
1	ADDENDUM NO. 2	12/29/20	TLS	TLS	RLT	TLS	JLH

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DATE: DECEMBER, 2020
SCALE: 3/8" = 1'

SHEET NO. M-06-101

BID SET



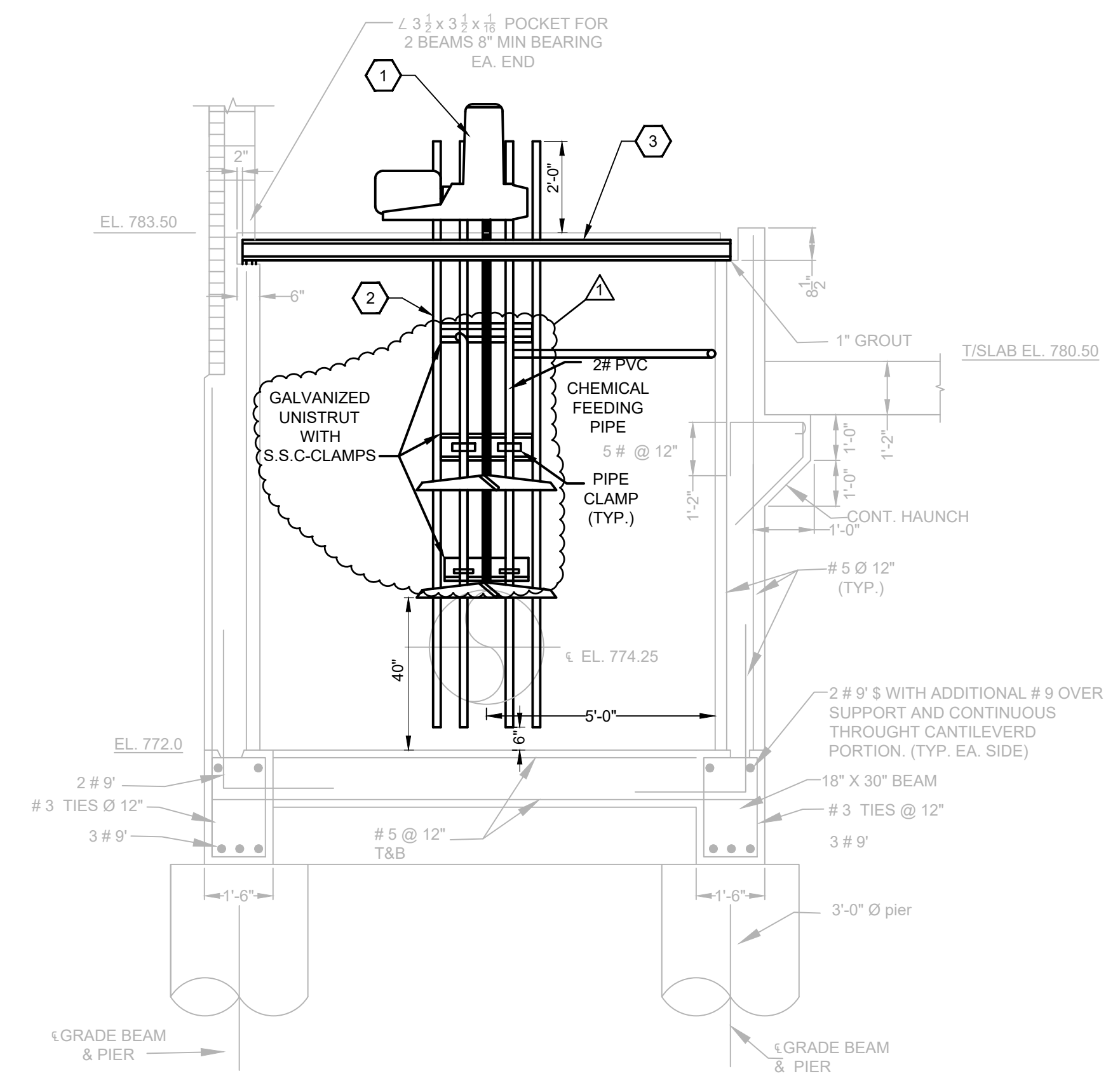
RAPID MIX NO. 2 - PLAN
SCALE: 3/8"=1'-0"

SHEET KEYNOTES:

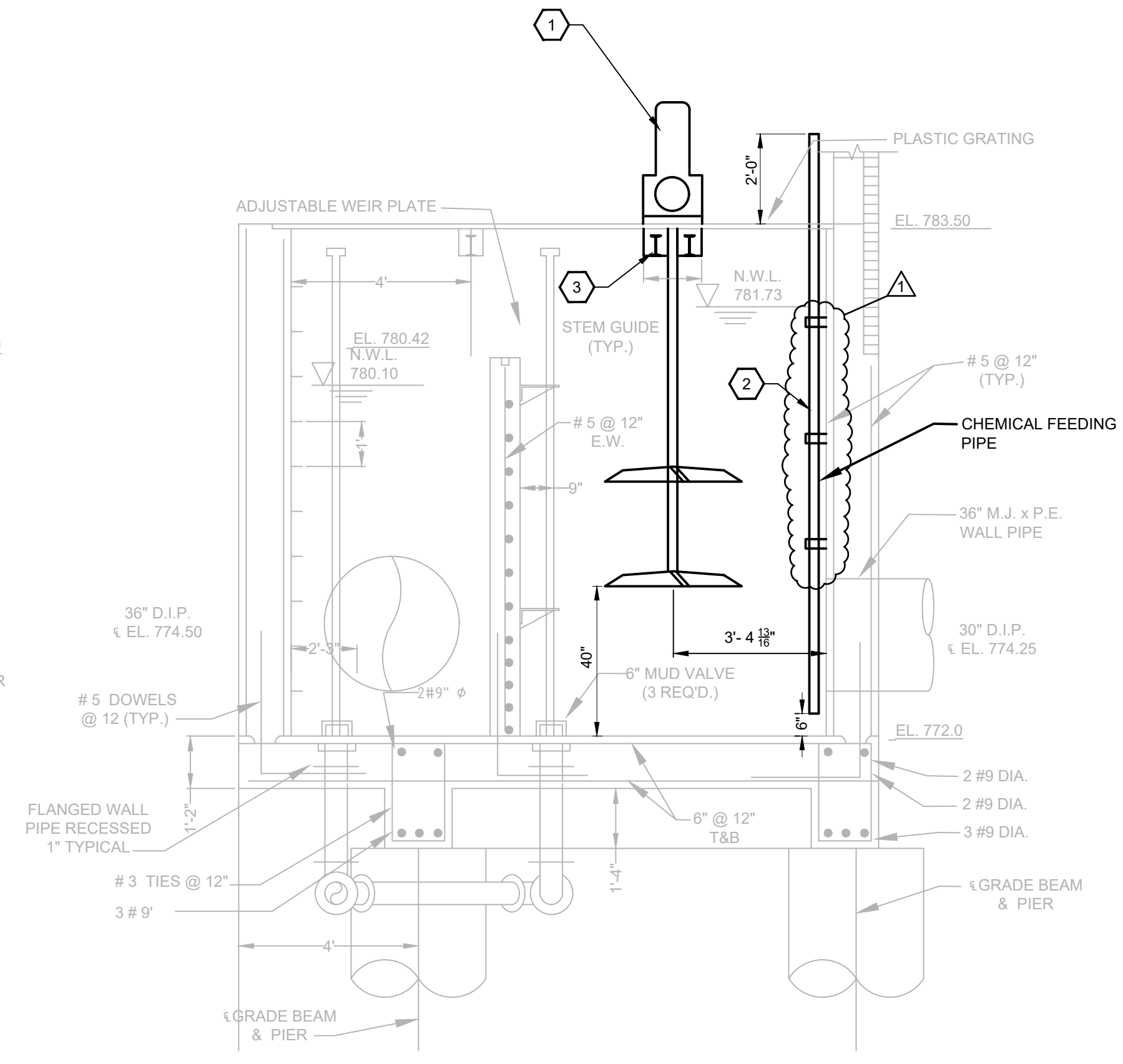
1. INSTALL NEW 7.5 HP RAPID MIXER EQUIPMENT
2. INSTALL NEW 2" SCHEDULE 80 PVC CHEMICAL FEED PIPES (4) SECURED TO WALL WITH GALVANIZED UNISTRUT WITH S.S. C-CLAMPS
3. INSTALL NEW SUPPORT BEAMS FOR MIXER AND PLASTIC COVER PLATES
4. INSTALL NEW STOP GATE UHMWP ANTI-FRICTION GUIDES (ENTIRE HEIGHT OF STOP GATE WALL APPROX. 9 FEET)

NOTES:

1. REUSE EXISTING PLASTIC COVER PLATES



1 SECTION
SCALE: 3/8"=1'-0"



2 SECTION
SCALE: 3/8"=1'-0"

GRW PROJECT NO. 4789
CLIENT PROJECT NO. 184-4006

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RAPID MIX NO. 2 - PLAN & SECTIONS
NEW EQUIPMENT
FT THOMAS WATER TREATMENT PLANT
Basin Improvements - Phase 2
NORTHERN KENTUCKY WATER DISTRICT

DESIGNED	TLS
BY	TLN
DATE	12/29/20
REVIEWED	TLN
APPROVED	JLH

REVISIONS

NO.	DESCRIPTION
1	APPENDIX NO. 2

SCALE CHECK: THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

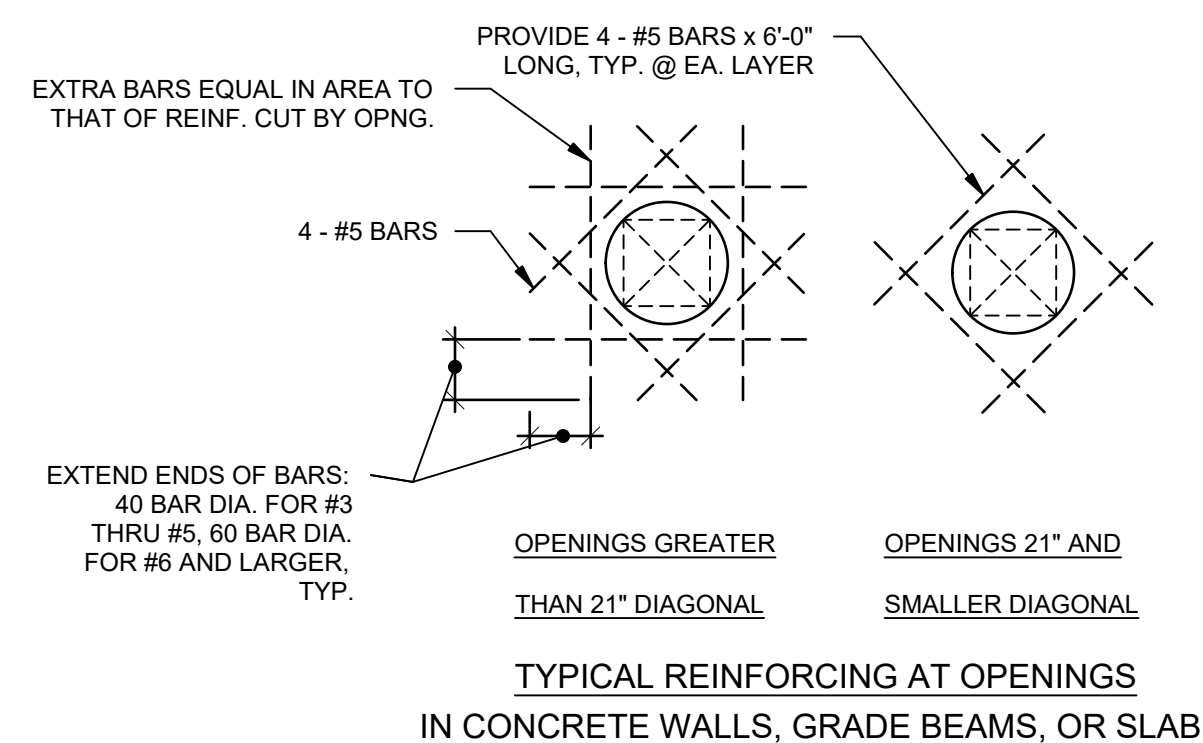
DATE: DECEMBER, 2020
SCALE: 3/8" = 1'
SHEET NO.

M-06-102

GENERAL STRUCTURAL NOTES

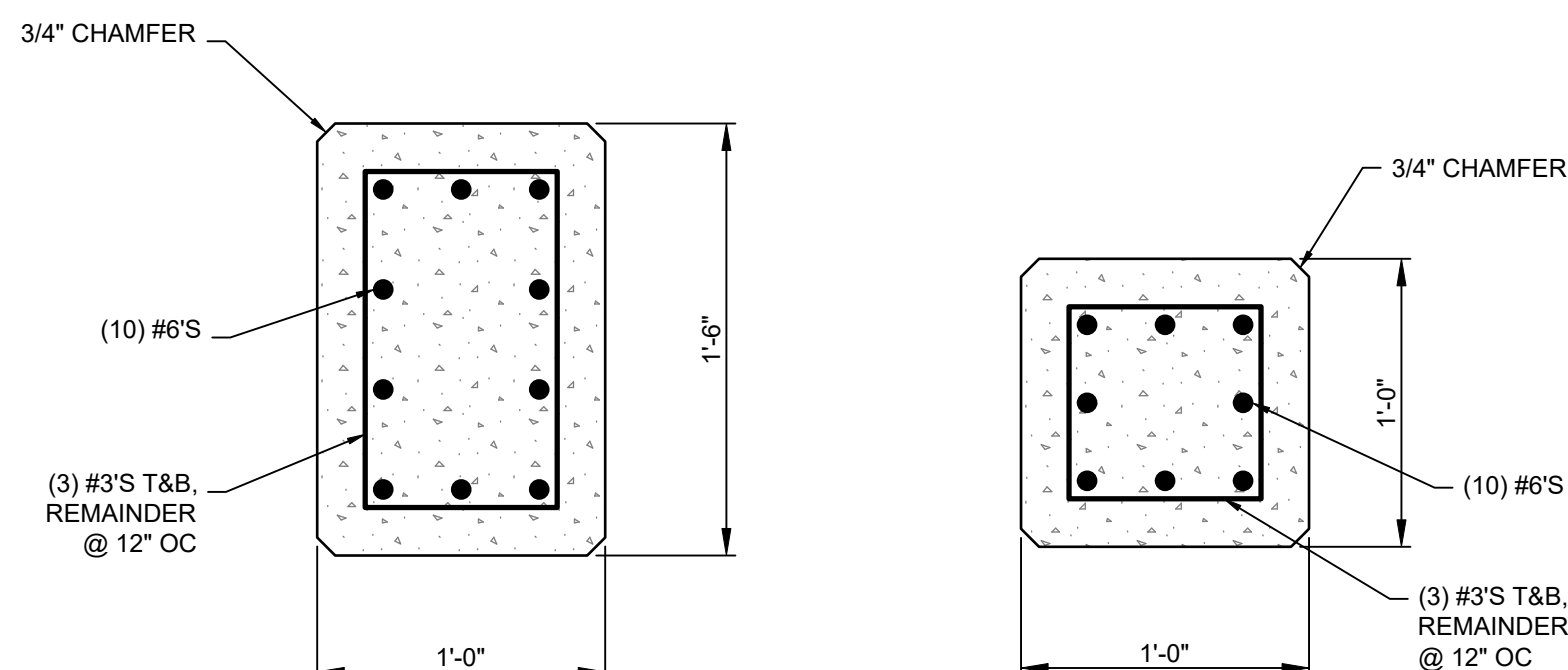
05.53 METAL GRATINGS CONT'D

2. THE TYPICAL DETAILS ON THE DRAWINGS CONTAIN ADDITIONAL GENERAL ALUMINUM GRATING CONSTRUCTION NOTES AND DETAILS.
- E. ALL EDGES OF ALUMINUM BAR GRATING SHALL BE Banded WITH AN EQUIVALENT DEPTH BEARING BAR.
- F. ALUMINUM BAR GRATING PIECES SHALL BE FABRICATED IN SHOP TO THE FULLEST EXTENT POSSIBLE.
- G. ALUMINUM BAR GRATING PIECES SHALL BE FABRICATED TO FIT TOGETHER PRECISELY WITH HAIRLINE JOINTS.
- H. BURS SHALL BE REMOVED AND SHARP EDGES SHALL BE EASED TO A RADIUS.
- I. CONNECTIONS THAT MAINTAIN THE STRUCTURAL CAPACITY OF THE JOINED PIECES SHALL BE USED.
- J. ALUMINUM BAR GRATING PIECES SHALL BE CLEARLY MARKED SO THEY CAN BE ACCURATELY ERECTED USING THE ERECTION DRAWINGS.
- K. WELDING MATERIALS AND METHODS SHALL BE USED THAT MINIMIZE DISTORTION AND DEVELOP THE STRENGTH AND CORROSION RESISTANCE OF THE BASE METAL.
- L. WELDS SHALL HAVE A QUALITY APPEARANCE WITHOUT EXCESSIVE OVERLAP OR UNDERCUT AND THE WELDING FLUX REMOVED.
- M. DIMENSIONS OF EXISTING STRUCTURE WHERE ALUMINUM BAR GRATING INTERFACES SHALL BE VERIFIED IN THE FIELD PRIOR TO FABRICATION.
- N. ALL SHOP AND FIELD WELDING SHALL BE DONE BY A CERTIFIED WELDER USING QUALIFIED WELDING PROCEDURES ACCORDING TO THE APPROPRIATE AWS CODE.
- O. ALUMINUM BAR GRATING SHALL HAVE A MILL FINISH.



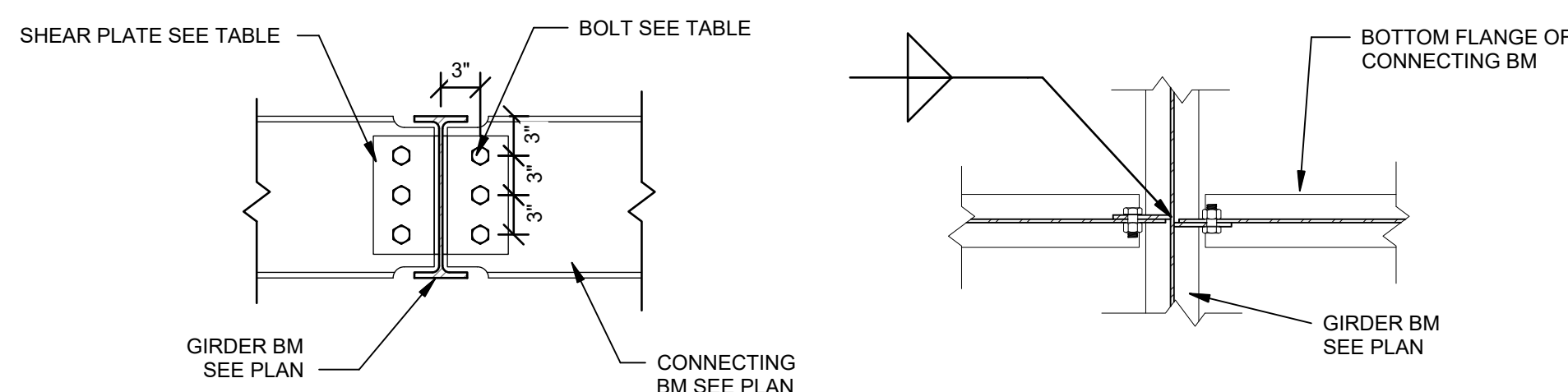
1 TYPICAL WALL OR FLOOR PENETRATION DETAIL

SCALE: 3/4"=1'-0"



2 COLUMN PIER REINFORCING

SCALE: 1 1/2"=1'-0"

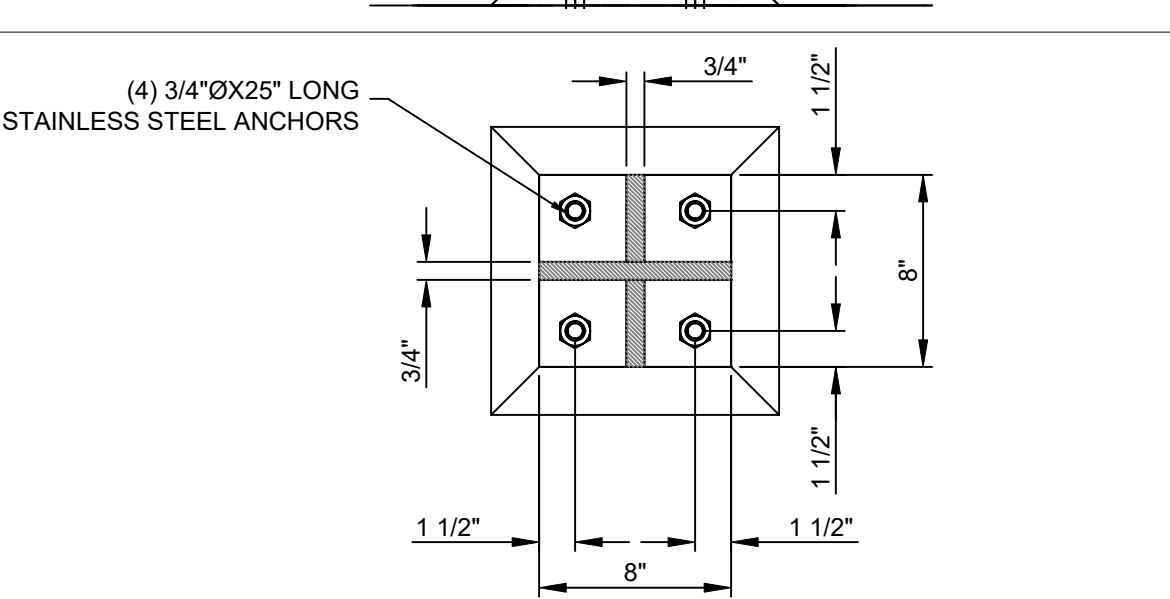
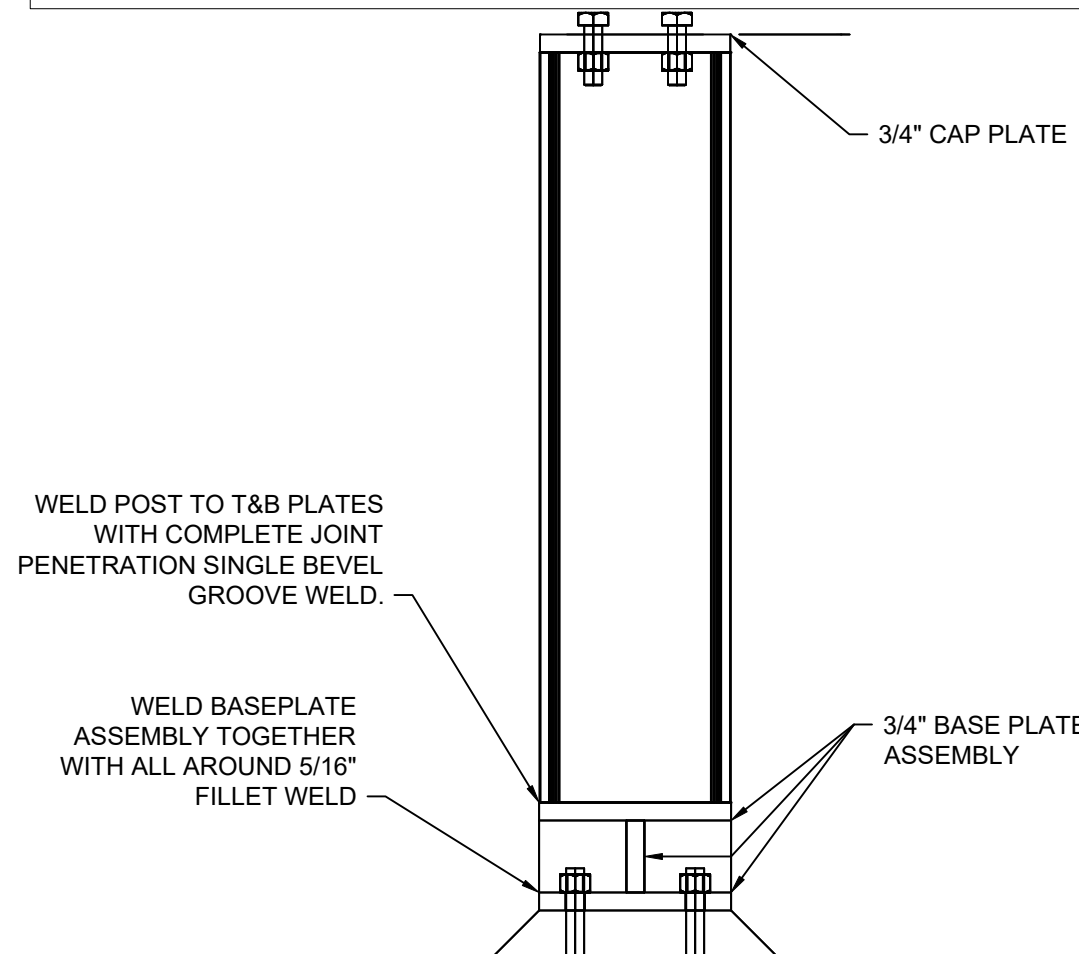
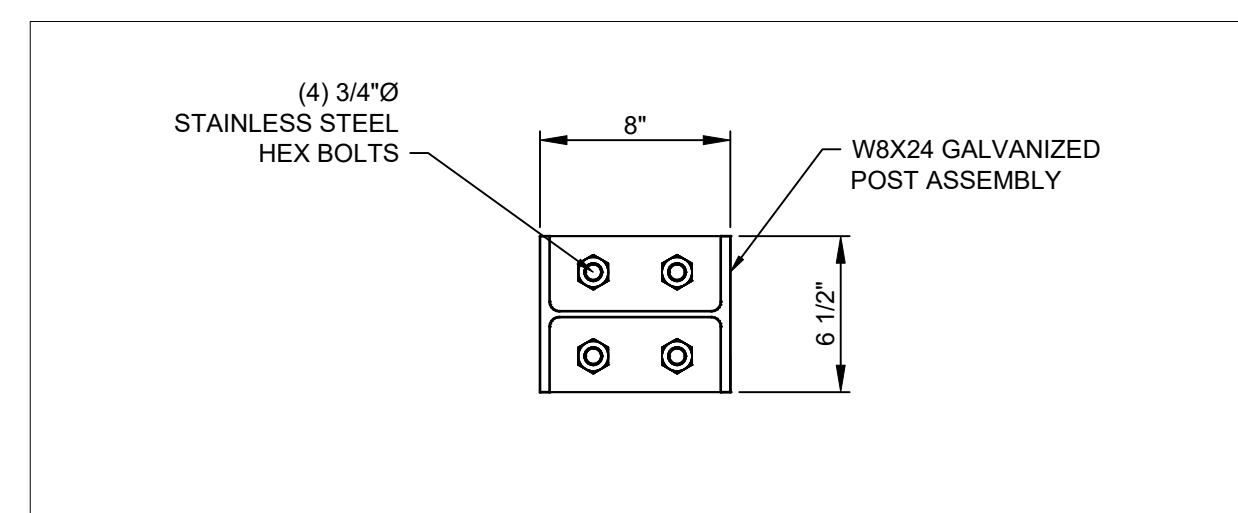


CONNECTION CAPACITY TABLE (LRFD LOADS)					
BM SIZE	NUMBER OF BOLTS @ 3" OC	3/4" Ø A325-N		7/8" Ø A325-N	
		PLATE LENGTH	CAPACITY (KIPS) SHEAR (AXIAL)	PLATE LENGTH	CAPACITY (KIPS) SHEAR (AXIAL)
W 30	8	23-1/2"	108.6 (25.5)	24"	159.4 (34.6)
W 27 W 24	7	20-1/2"	92.3 (21.7)	21"	135.5 (29.4)
W 21	6	17-1/2"	75.9 (17.8)	18"	111.4 (24.3)
W 18	5	14-1/2"	70.4 (16.5)	15"	96.9 (19.3)
W 16	4	11-1/2"	54.3 (12.7)	12"	74.6 (14.9)
W 14 W 12	3	8-1/2"	37.8 (8.9)	9"	55.5 (11.9)
W 10 W 8	2	5-1/2"	21.0 (4.9)	6"	24.6 (4.9)

- REFER TO GENERAL NOTES FOR MATERIAL PROPERTIES OF STEEL MEMBERS AND BOLTS
- AT 3/4" Ø BOLTS; PLATE THICKNESS = 5/16" W/ 1/4" FILLET WELD
- AT 7/8" Ø BOLTS; PLATE THICKNESS = 3/8" W/ 1/4" FILLET WELD
- MINIMUM VERTICAL EDGE DISTANCE 1-1/4" AND MINIMUM HORIZONTAL EDGE DISTANCE 1-1/2" FOR 3/4" BOLTS
- MINIMUM VERTICAL EDGE DISTANCE 1-1/2" AND MINIMUM HORIZONTAL EDGE DISTANCE 1-3/4" FOR 7/8" BOLTS
- CONNECTION DESIGNED FOR THE MAXIMUM RESULTANT SHEAR AND AXIAL FORCES SHOW IN TABLE
- LOADS ARE BASED ON AISC 360-10, LRFD DESIGN SPECIFICATION
- CONNECTION SATISFIES IBC SECTION 1615.3.2.2 FOR HIGH RISE BUILDINGS
- W8 CONNECTION SHALL HAVE SHEAR CONNECTION CENTERED ON BEAM

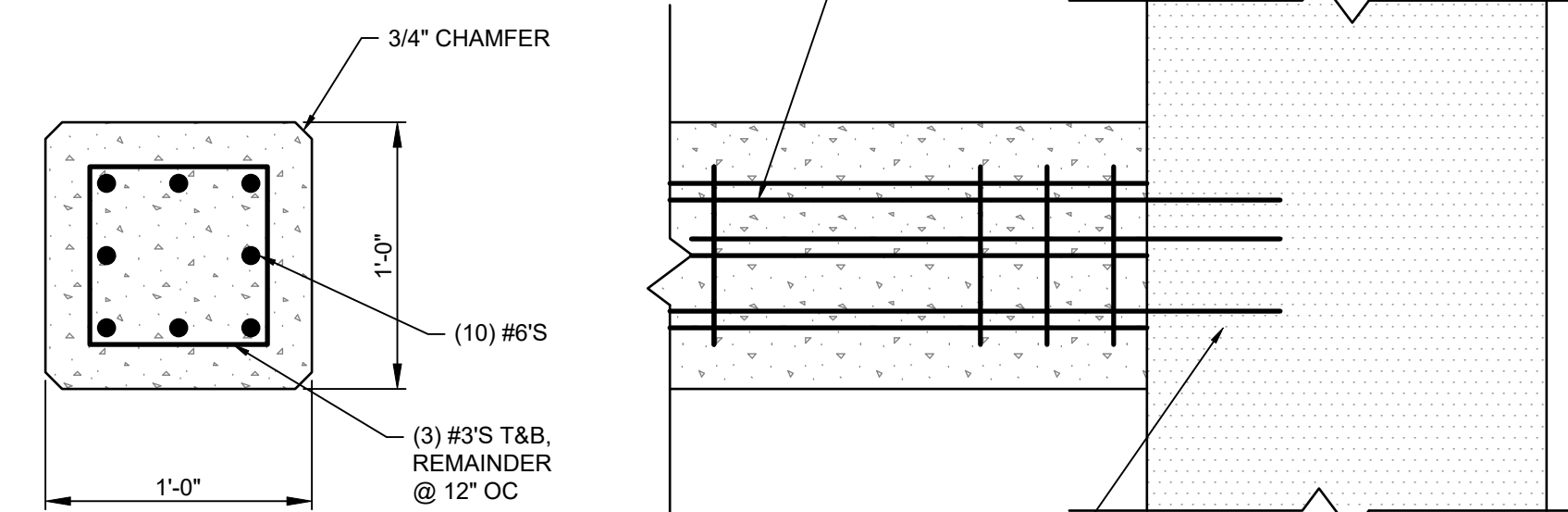
3 TYPICAL BEAM-BEAM BOLTED-WELDED SINGLEPLATE SHEAR CONNECTION

SCALE: 1"=1'-0"



4 TYPICAL BEAM SUPPORT POST DETAIL

SCALE: 1 1/2"=1'-0"



USE LAPPED DOWELS TO ATTACH HORIZONTAL BARS TO EXISTING COLUMN OR WALL 6" USING THE HILTI HY 200R ADHESIVE ANCHORING SYSTEM.

5 TYPICAL NEW BEAM DETAIL

SCALE: 1 1/2"=1'-0"

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GENERAL STRUCTURAL NOTES
AND TYPICAL DETAILS
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

REVISIONS	DATE	BY	DESCRIPTION
1	12/20/20	JRM	ADDED QUANTITY
2		JRM	
3		JRM	
4		JRM	
5		JRM	

SCALE CHECK: THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

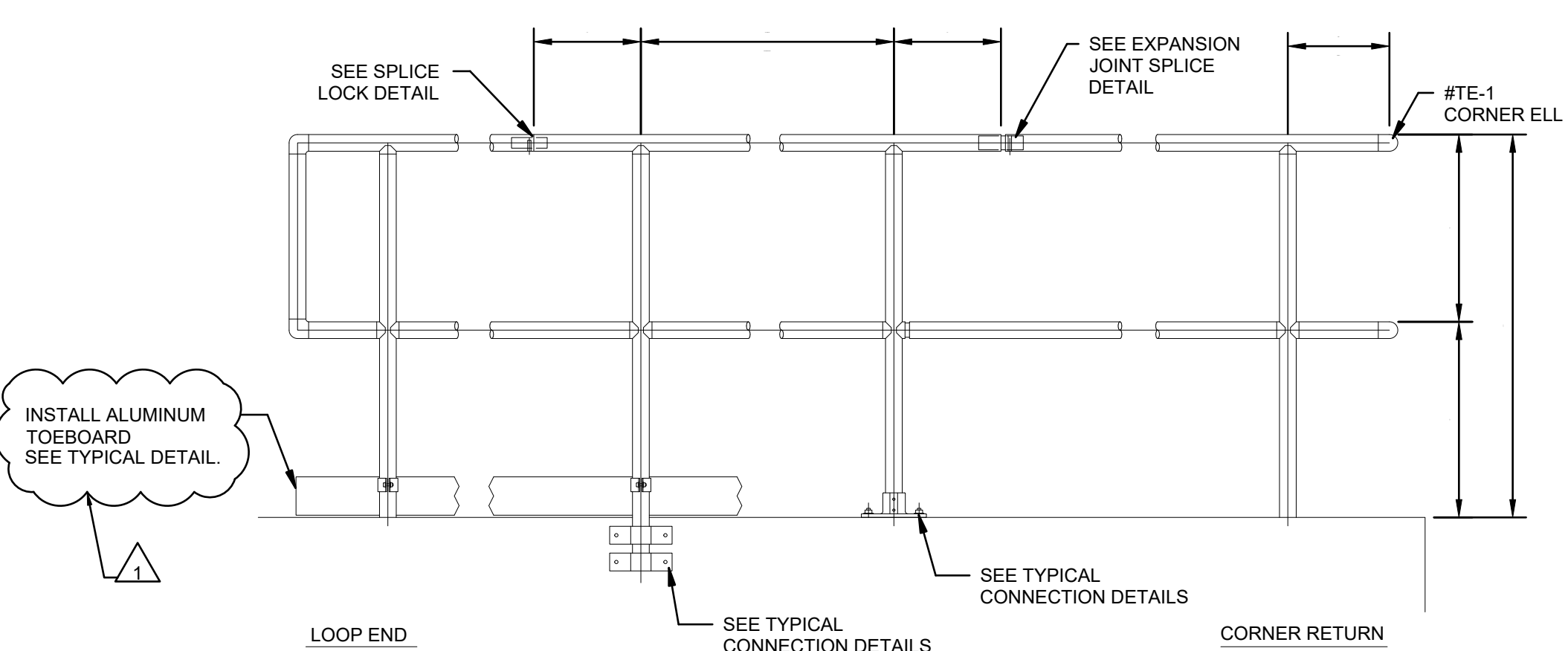
DATE: DECEMBER, 2020
SCALE: AS SHOWN
SHEET NO. S-00-002

OSHA GUARDRAIL

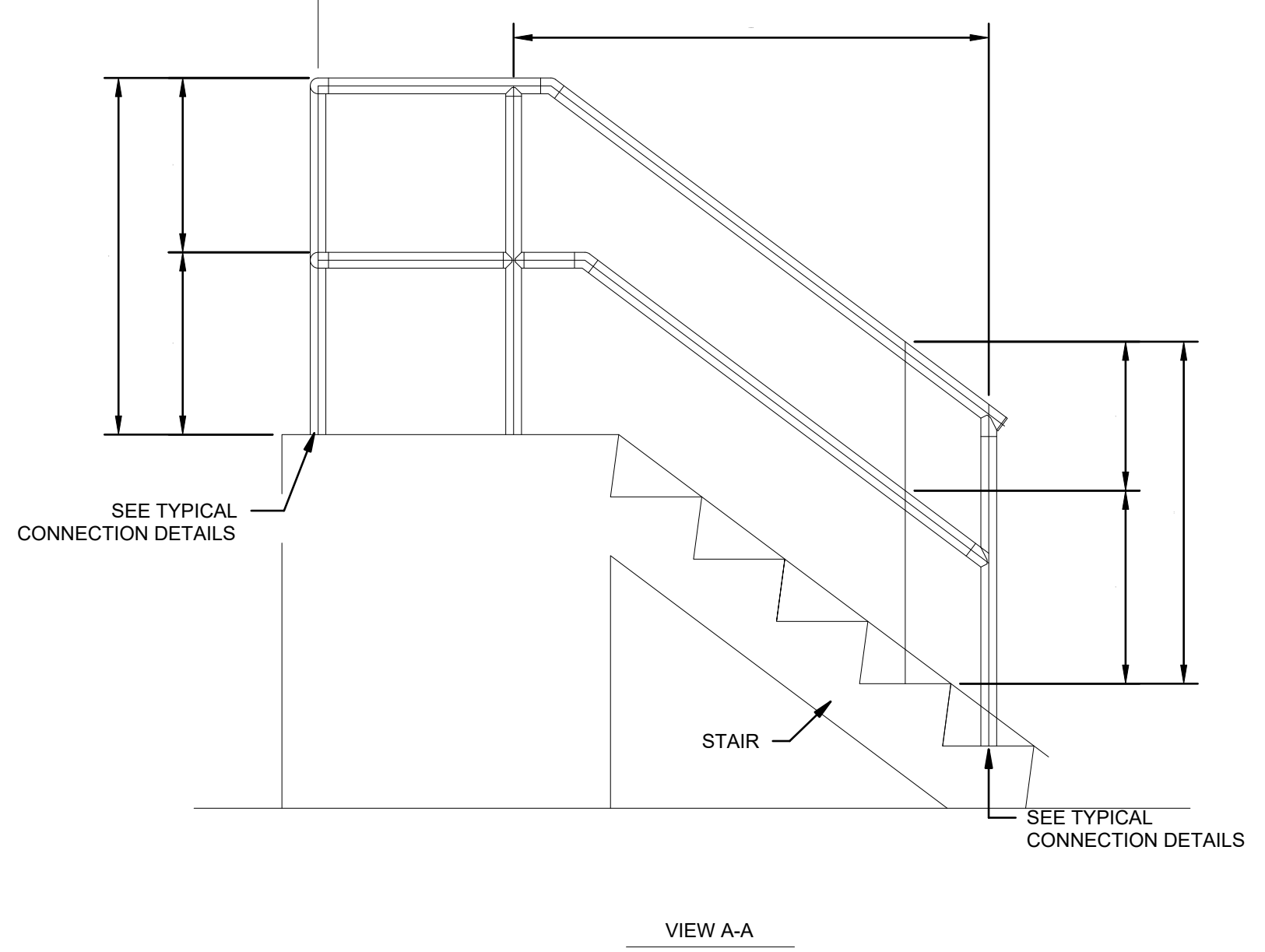
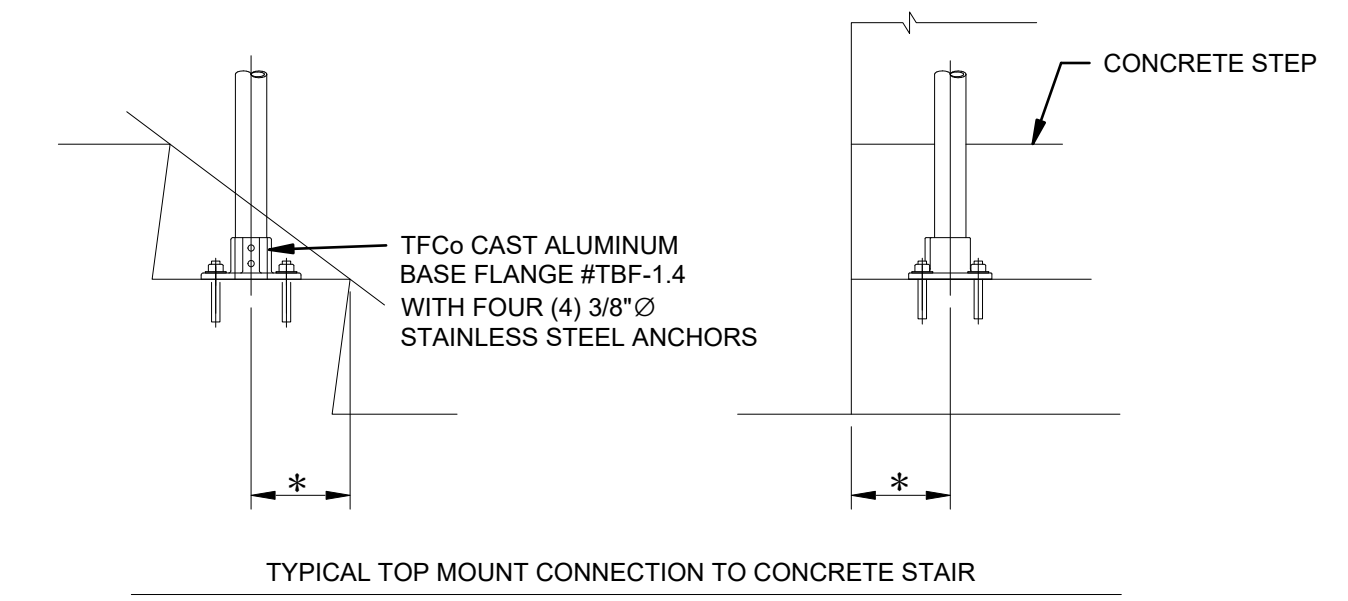
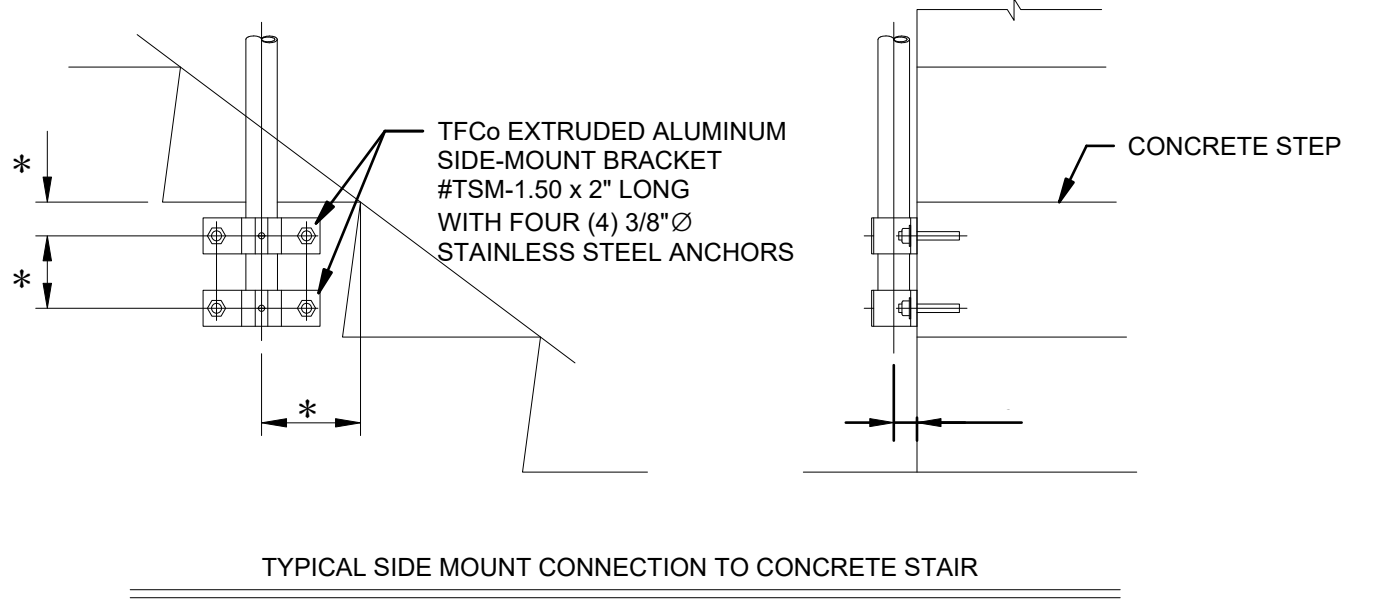
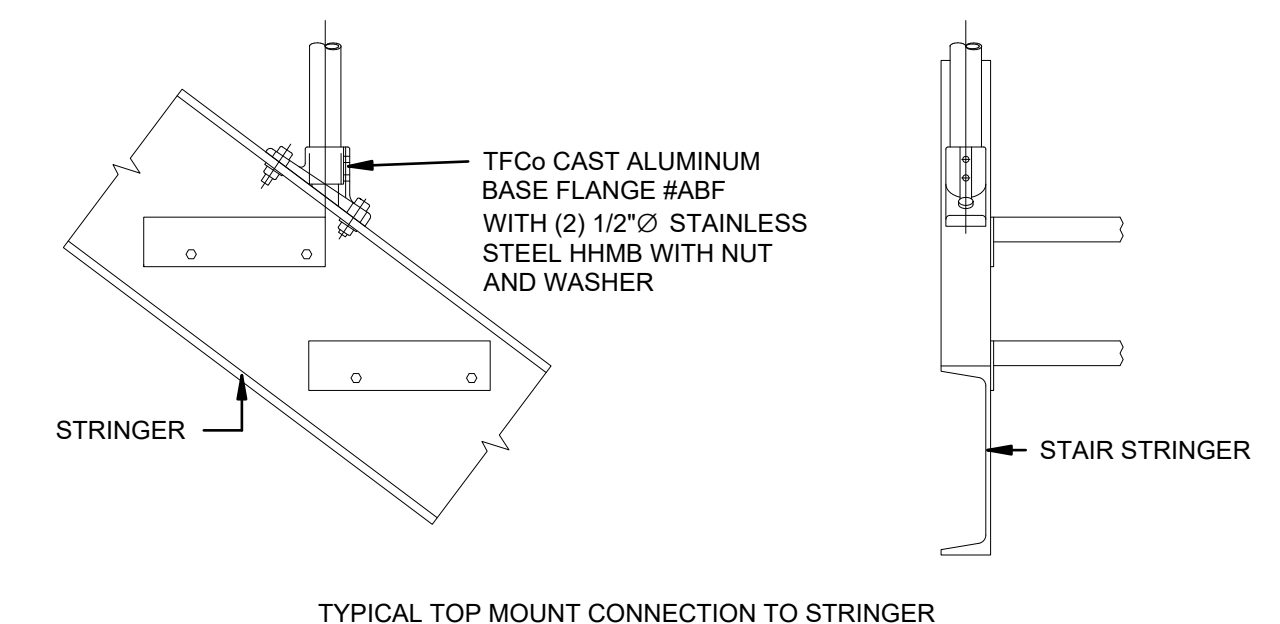
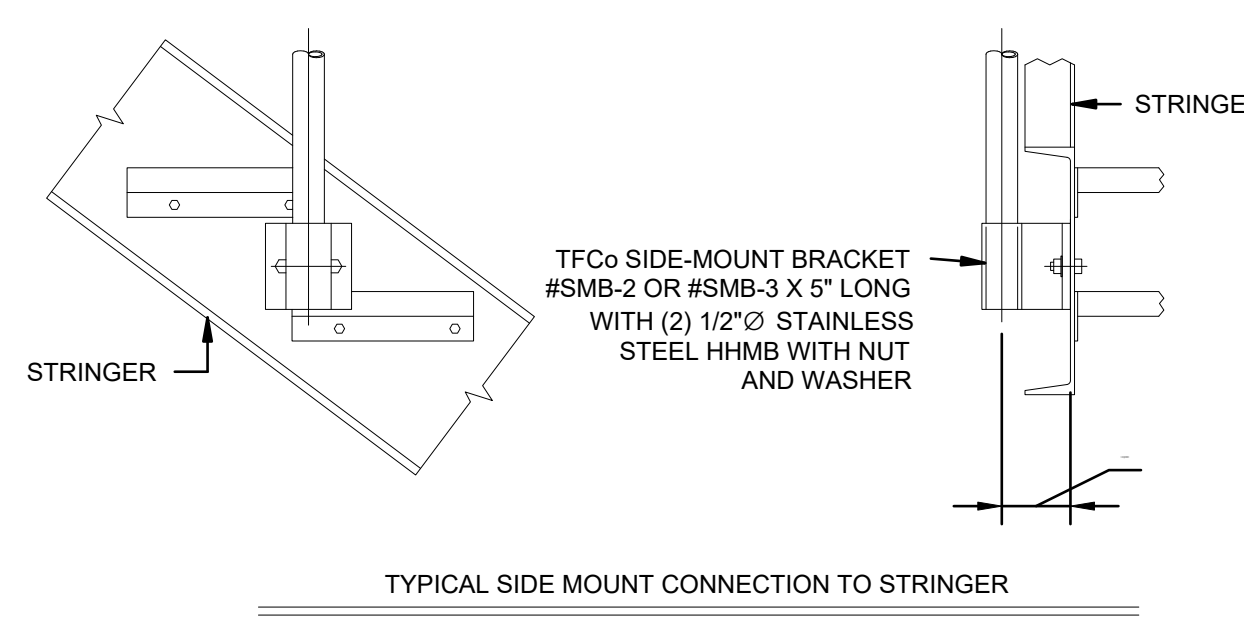
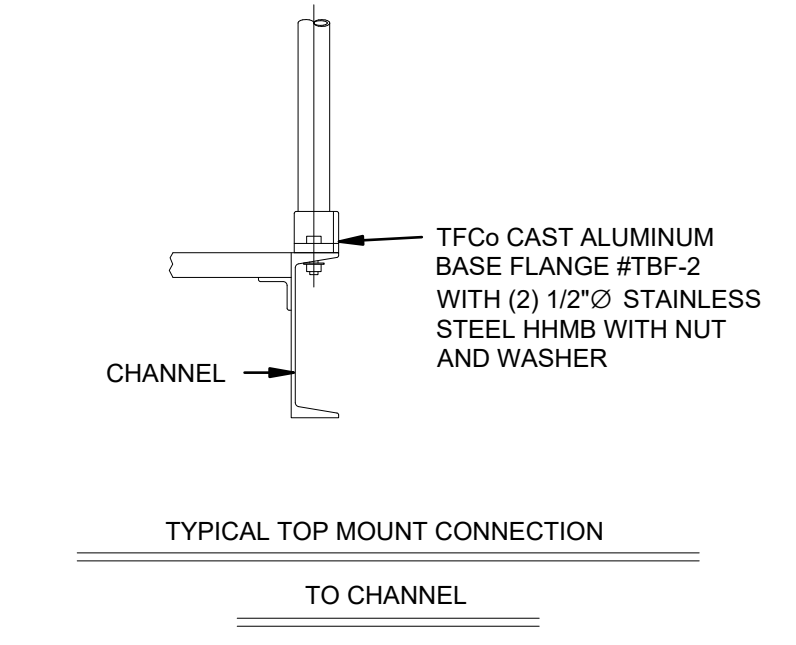
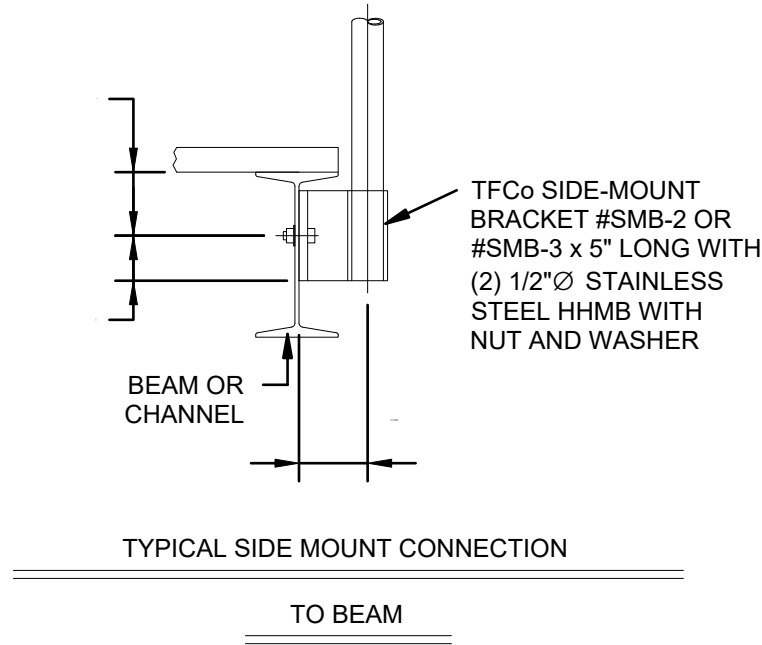
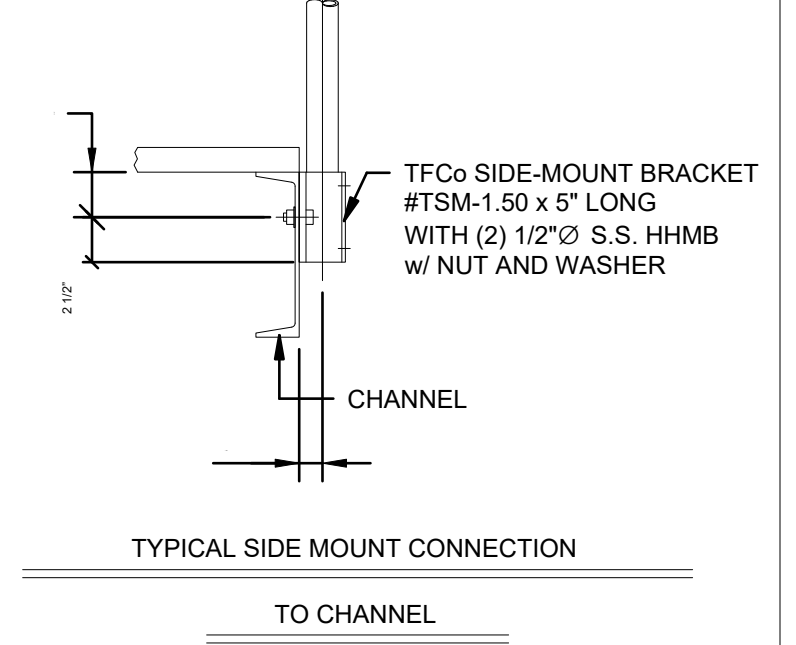
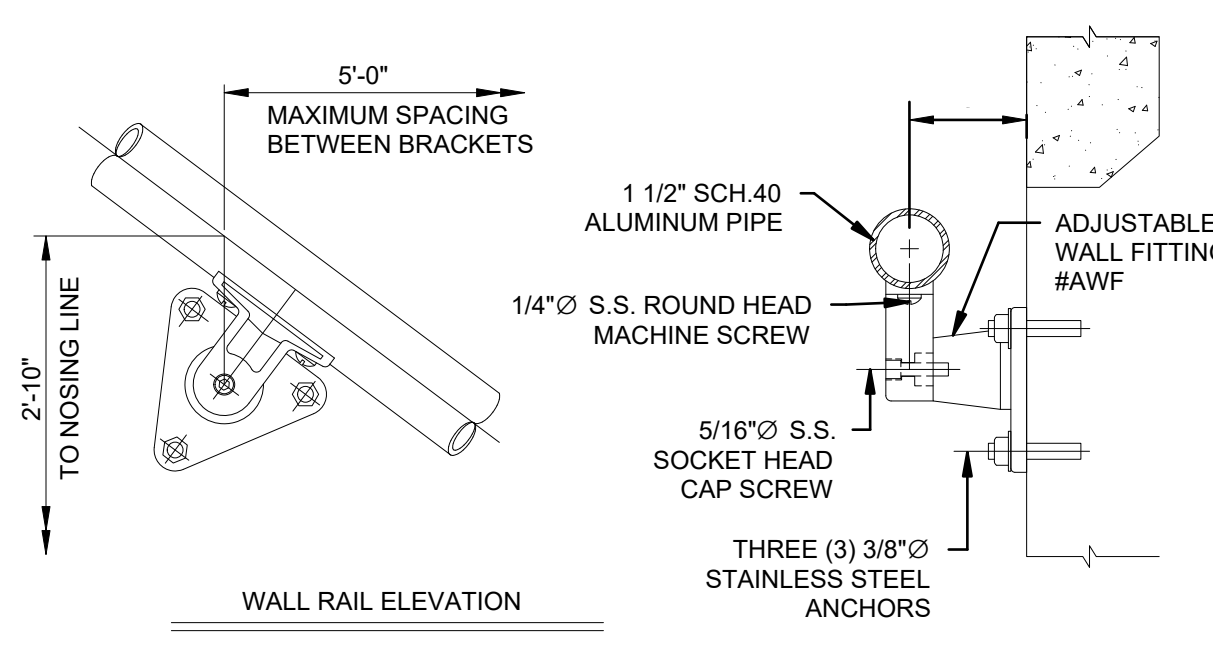
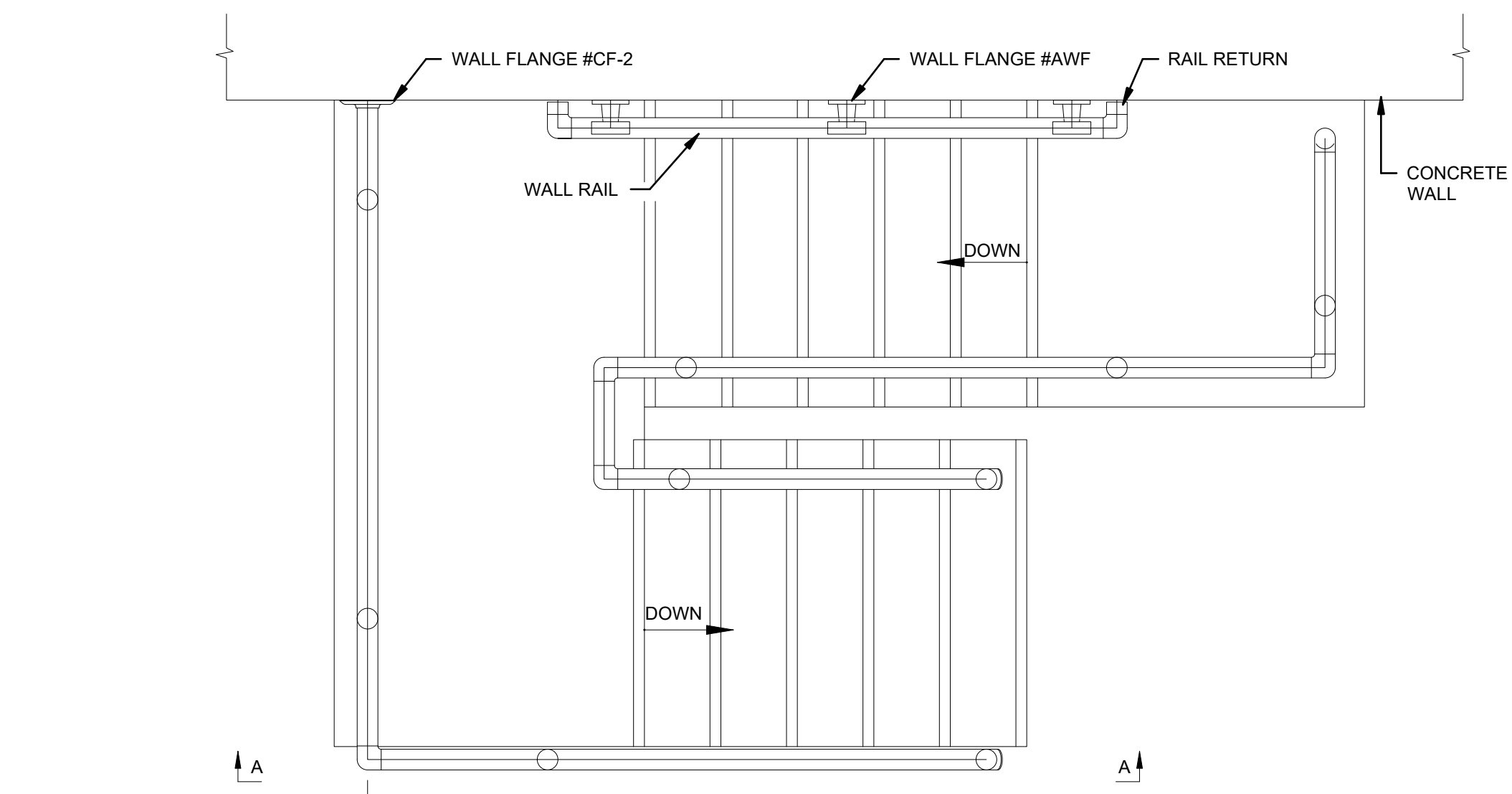
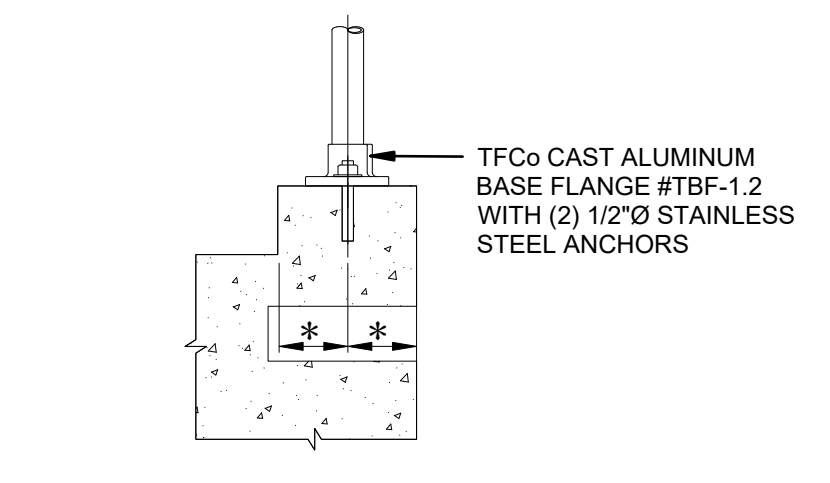
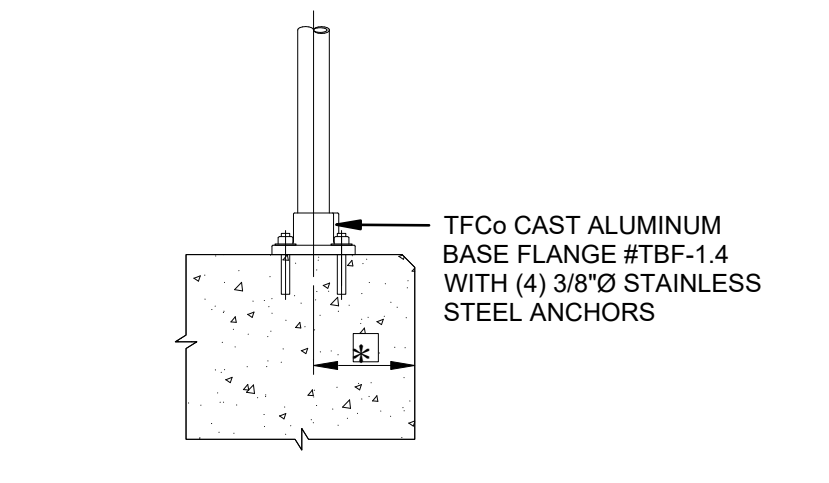
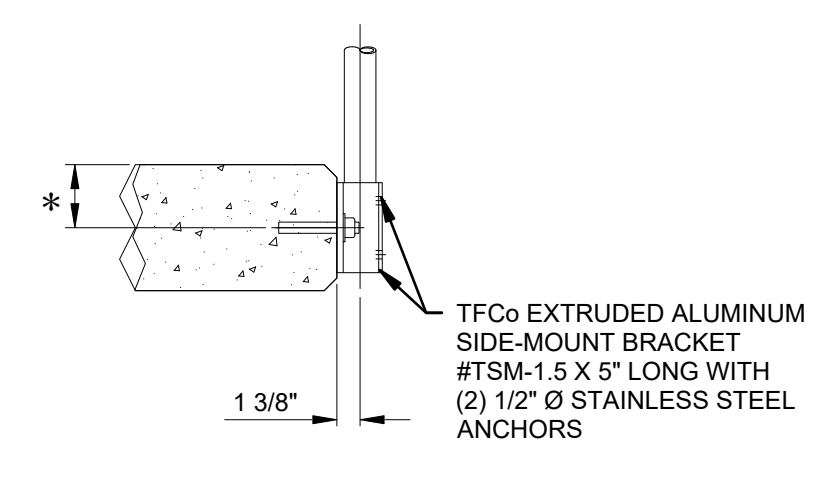
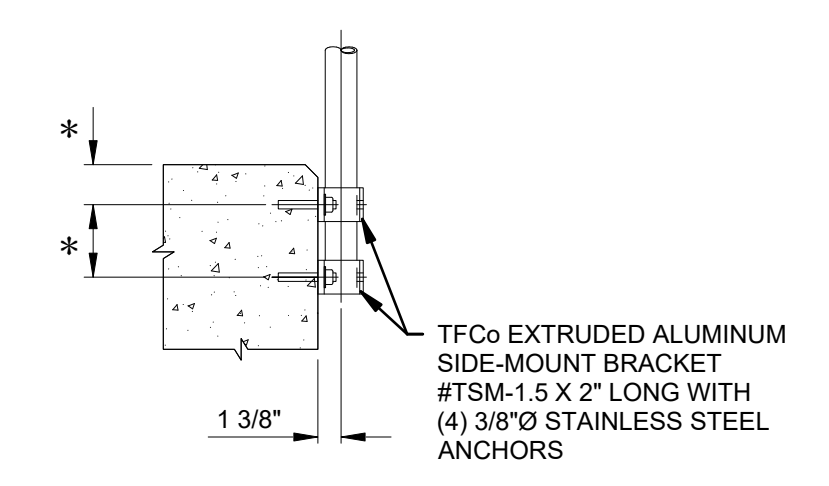
DESIGN REQUIREMENTS

- GUARDRAILS/HANDRAILS SHALL BE THE PRODUCT OF A COMPANY NORMALLY ENGAGED IN THE MANUFACTURE OF PIPE RAILING. RAILING SHALL BE SHOP ASSEMBLED IN LENGTHS NOT TO EXCEED 24 FEET FOR FIELD ERECTION.
- THE GUARDRAILS/HANDRAILS SHALL BE MADE OF PIPES JOINED TOGETHER WITH COMPONENT FITTINGS. SAMPLES OF ALL COMPONENTS, BASES, TOE PLATE AND PIPE SHALL BE SUBMITTED FOR APPROVAL AT THE REQUEST OF THE ENGINEER. COMPONENTS THAT ARE POP-RIVETED OR GLUED AT THE JOINTS WILL NOT BE ACCEPTABLE. ALL COMPONENTS MUST BE MECHANICALLY FASTENED WITH STAINLESS STEEL HARDWARE. HANDRAIL AND COMPONENTS SHALL BE TUFRAIL, AS MANUFACTURED BY THOMPSON FABRICATING, LLC (BIRMINGHAM, ALABAMA) OR AN APPROVED EQUAL.
- RAILING MATERIALS SHALL BE 1 1/2" SCHEDULE 40 ALUMINUM PIPE ALLOY 6105-T5, ASTM-B-429 OR ASTM-B-221. POST MATERIALS SHALL BE 1 1/2" SCHEDULE 40 ALUMINUM PIPE OF THE SAME ALLOY. POST SPACING SHALL BE A MAXIMUM OF 6'-0".
- GUARDRAILS/HANDRAILS AND GUARDRAIL/HANDRAIL ATTACHMENT COMPONENTS TO SUPPORT CONDITIONS SHALL BE DESIGNED BY THE MANUFACTURER TO WITHSTAND A 200 LB CONCENTRATED LOAD APPLIED IN ANY DIRECTION AND AT ANY POINT ON THE TOP-/MID-RAIL OR 50 LB PER LINEAR FOOT ALONG THE TOP-/MID-RAIL WHICH EVER LOAD AND LOAD LOCATION IS WORSE.
- THE MANUFACTURER SHALL SUBMIT CALCULATIONS FOR APPROVAL. TESTING OF BASE CASTINGS OR BASE EXTRUSIONS BY AN INDEPENDENT LAB OR MANUFACTURER'S LAB (IF MANUFACTURER'S LAB MEETS THE REQUIREMENTS OF THE ALUMINUM ASSOCIATION) WILL BE AN ACCEPTABLE SUBSTITUTE FOR CALCULATIONS. CALCULATIONS WILL BE REQUIRED FOR APPROVAL OF ALL OTHER DESIGN ASPECTS.
- POSTS SHALL NOT INTERRUPT THE CONTINUATION OF THE TOP RAIL AT ANY POINT ALONG THE RAILING, INCLUDING CORNERS AND END TERMINATIONS (OSHA 1910.23). THE TOP SURFACE OF THE TOP RAILING SHALL BE SMOOTH AND SHALL NOT BE INTERRUPTED BY PROJECTED FITTINGS.
- THE MID-RAIL AT A CORNER RETURN SHALL BE ABLE TO WITHSTAND A 200 LB LOAD WITHOUT LOOSENING. THE MANUFACTURER IS TO DETERMINE THIS DIMENSION FOR THEIR SYSTEM AND PROVIDE PHYSICAL LABORATORY TESTS TO CONFIRM COMPLIANCE.
- CONCRETE ANCHORS SHALL BE STAINLESS STEEL TYPE 303 OR 304 AND SHALL BE DESIGNED AND FURNISHED BY THE GUARDRAIL/HANDRAIL MANUFACTURER. THE ANCHOR DESIGN SHALL INCLUDE THE APPROPRIATE REDUCTION FACTORS FOR SPACING AND EDGE DISTANCES IN ACCORDANCE WITH THE ANCHOR MANUFACTURER'S PUBLISHED DATA. ANCHORS SHOWN IN THE TYPICAL DETAILS SHOWN ON THIS SHEET ARE FOR REFERENCE AND SHALL BE VERIFIED BY THE DESIGNER.
- TOE PLATE SHALL CONFORM TO OSHA STANDARDS. TOE PLATE SHALL BE A MINIMUM OF 4" HIGH AND SHALL BE AN EXTRUSION THAT ATTACHES TO THE POSTS WITH CLAMPS THAT WILL ALLOW FOR EXPANSION AND CONTRACTION BETWEEN POSTS. TOE PLATES SHALL BE SET 1/4" ABOVE THE WALKING SURFACE. TOE PLATES SHALL BE PROVIDED ON HANDRAILS AS REQUIRED BY OSHA AND/OR AS SHOWN ON DRAWINGS. TOE PLATES SHALL BE SHIPPED LOOSE IN STOCK LENGTHS FOR FIELD INSTALLATION.
- OPENINGS IN THE RAILING SHALL BE GUARDED BY A SELF-CLOSING GATE (OSHA 1910.23). SAFETY CHAINS SHALL NOT BE USED UNLESS SPECIFICALLY SHOWN ON THE DRAWINGS.
- FINISH SHALL BE ALUMINUM ASSOCIATION M10-C22-A41 (215-R1). THE PIPE SHALL BE PLASTIC-WRAPPED. THE PLASTIC WRAP IS TO BE REMOVED AFTER ERECTION.
- ALUMINUM SURFACES IN CONTACT WITH CONCRETE, GROUT OR DISSIMILAR METALS WILL BE PROTECTED WITH A COAT OF BITUMINOUS PAINT, MYLAR ISOLATORS OR OTHER APPROVED MATERIAL.

* CONCRETE ANCHOR DIAMETER, EDGE DISTANCES, EMBEDMENT, AS WELL AS POST SPACINGS, TO BE DETERMINED UPON ANCHOR SELECTION.



TYPICAL OSHA GUARDRAIL
GUARDRAILS SHALL BE TOP-MOUNTED OR SIDE-MOUNTED, AS SHOWN ON PLANS



GRW PROJECT NO. 4789

CLIENT PROJECT NO. 184-4006

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TYPICAL GUARD RAIL DETAILS

FT THOMAS WATER TREATMENT PLANT BASIN IMPROVEMENTS - PHASE 2

NORTHERN KENTUCKY WATER DISTRICT

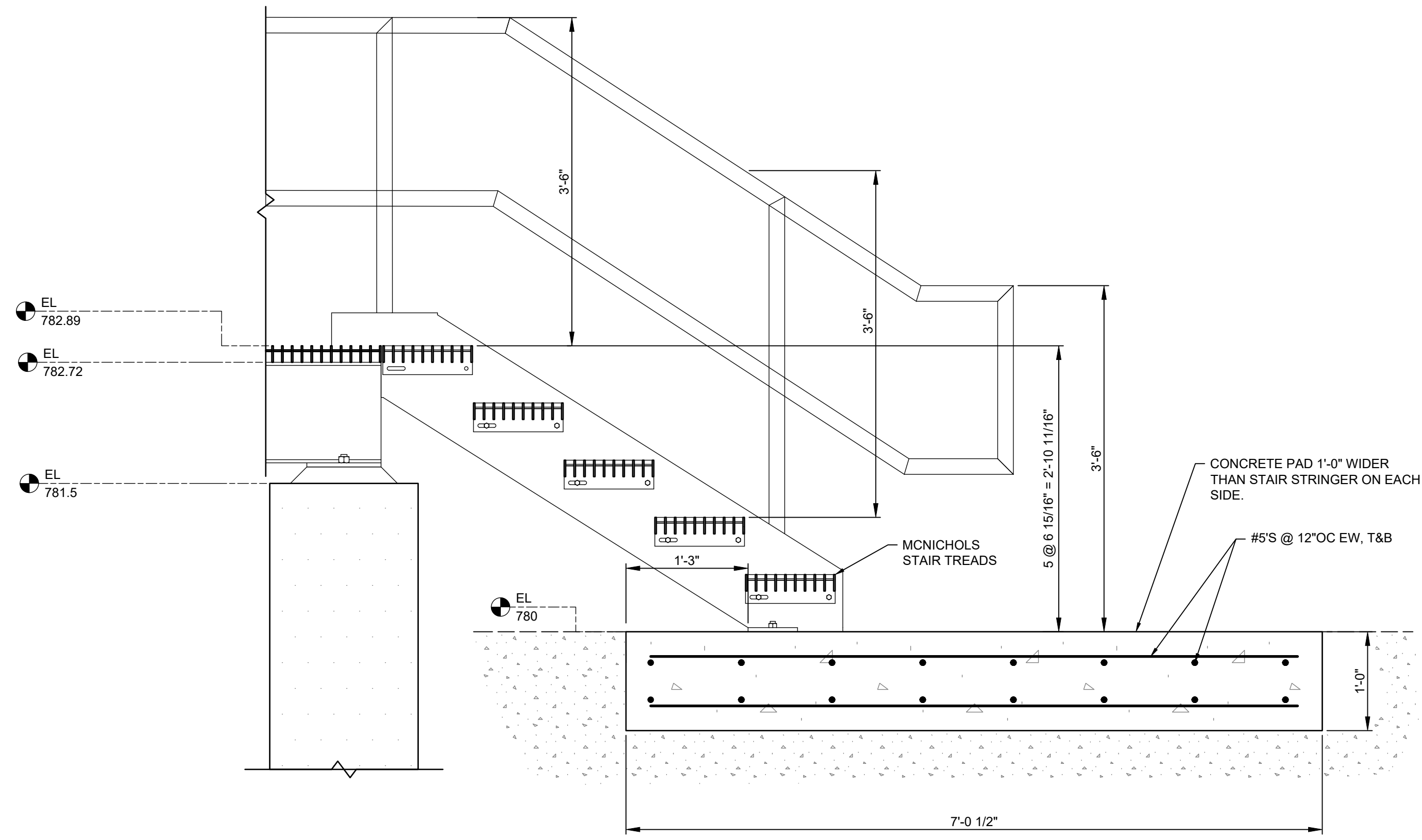
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1	12/29/20	ADDITIONAL #2	JRM	JRM			JRM	JRM

SCALE CHECK: THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

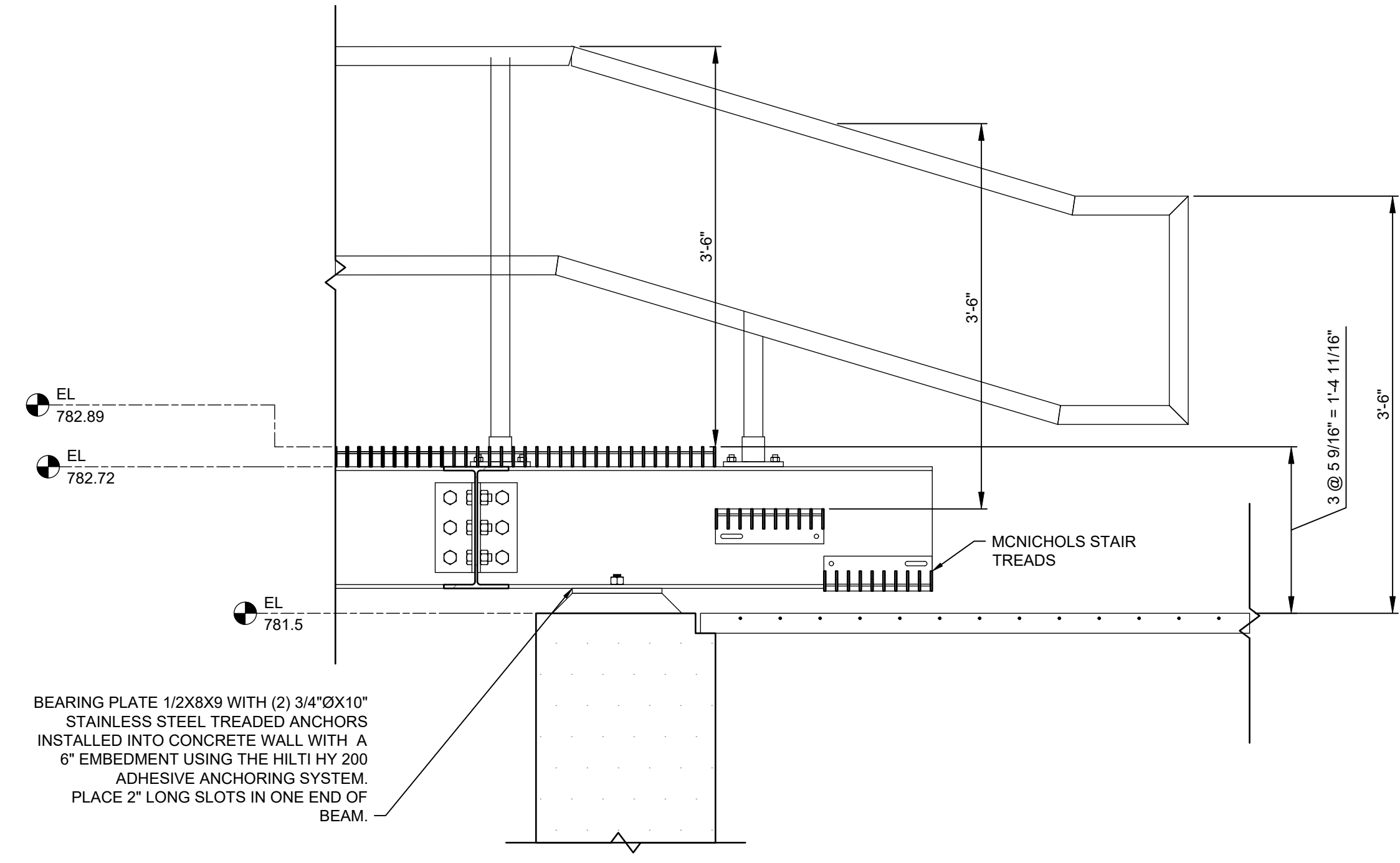
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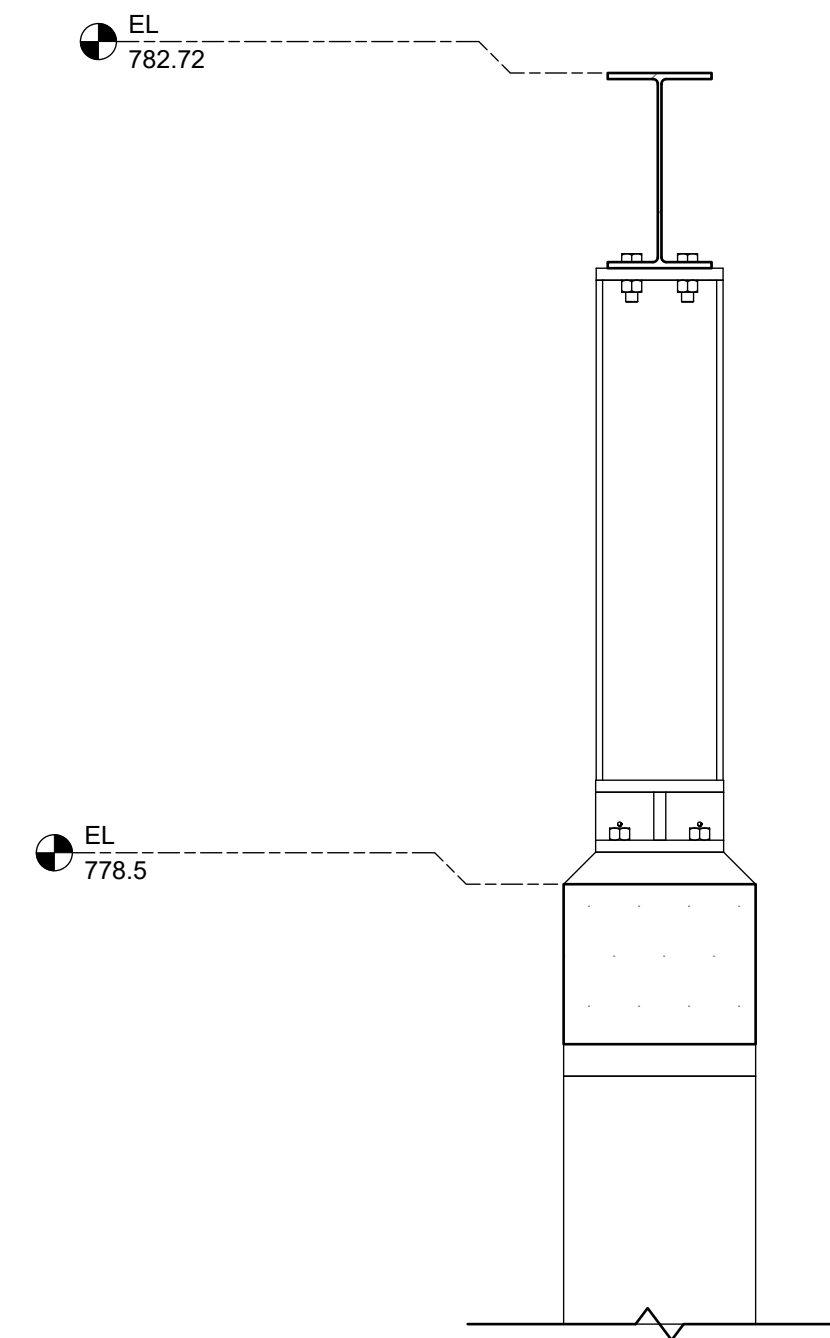
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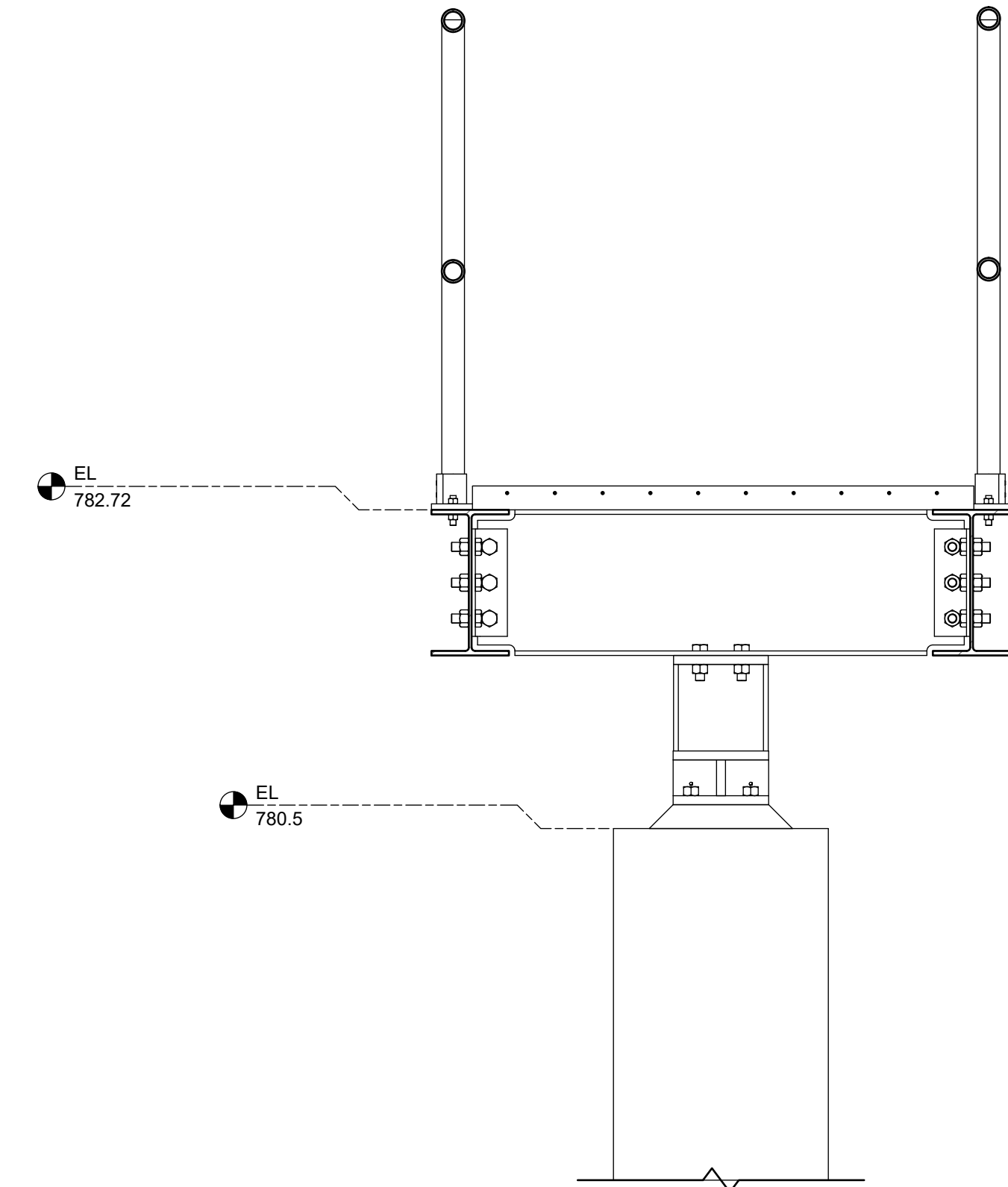
1 TYPICAL STAIR SECTION TO GRADE
SCALE: 1"=1'-0"



2 TYPICAL STAIR SECTION TO GRATING
SCALE: 1"=1'-0"



3 TYPICAL ELEVATION VIEW AT EXISTING BEAMS
SCALE: 1/32"=1'-0"



4 TYPICAL SECTION VIEW AT NEW COLUMNS
SCALE: 1/32"=1'-0"

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CLIENT PROJECT NO. 184-4006
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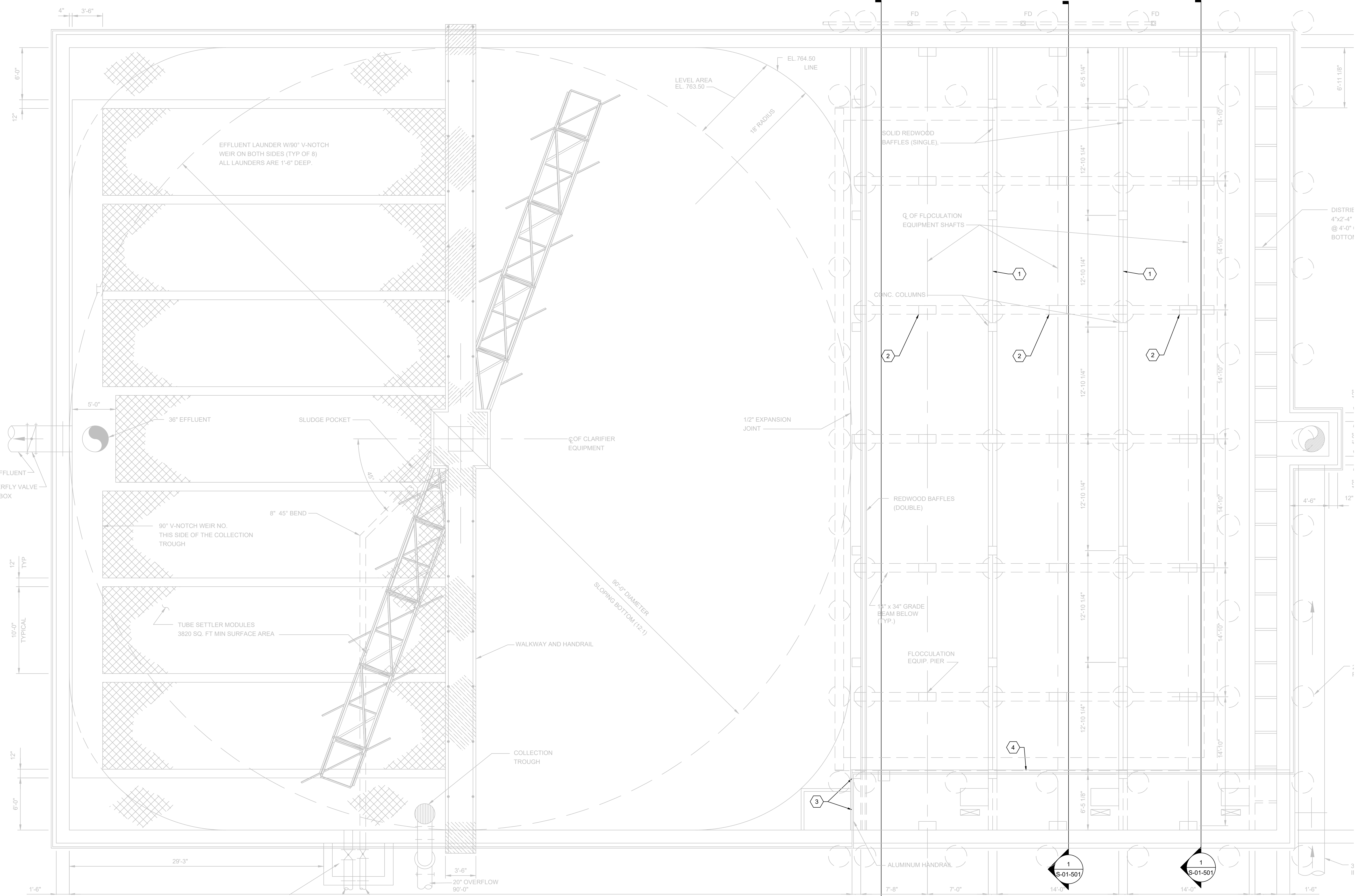
**GENERAL STRUCTURAL NOTES
AND TYPICAL DETAILS**
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

NO.	DESCRIPTION	DATE	BY	DESIGNED
1	ADDITIONAL #2	12/29/20	JRM	JRM
				JRM
				JRM
				JRM

SCALE CHECK: _____ THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

DATE: DECEMBER, 2020
SCALE: AS SHOWN
SHEET NO.

S-00-004

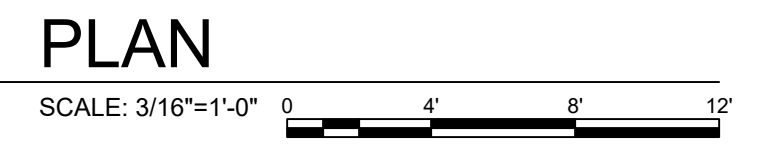


GENERAL SHEET NOTES:

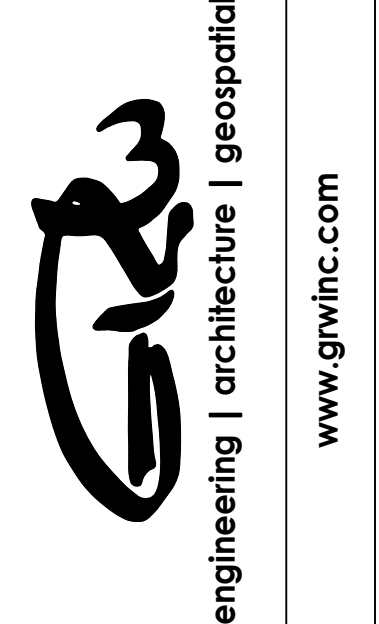
- SEE PROCESS DRAWINGS FOR PROCESS EQUIPMENT TO BE DEMOLISHED.
- DEMOLISH EXISTING HANDRAIL ONLY AT THE TIE IN LOCATIONS OF NEW WALKWAYS. DEMOLISH ONLY ENOUGH TO PROPERLY ALLOW THE TIE IN TO OCCUR.

SHEET KEYNOTES:

- REMOVE BEAMS AND COLUMNS THIS GRID LINE ONLY. GRIND REMAINING CONCRETE FLUSH WITH CONCRETE SLAB AND WALLS AND APPLY SIKA GUARD 62 TO EXPOSED REINFORCING BARS FOR CORROSION PROTECTION.
- REMOVE ALL FLOCCULATOR PIERS AND EQUIPMENT ON THIS GRID LINE. GRIND REMAINING CONCRETE FLUSH WITH CONCRETE SLAB AND WALLS AND APPLY SIKA GUARD 62 TO EXPOSED REINFORCING BARS FOR CORROSION PROTECTION.
- CHIP AWAY CONCRETE TO DETERMINE IF COLUMN STEEL AND TIES, AND BEAM STEEL AND TIES EXIST IN WALL PRIOR TO FULL DEMOLITION OF WALL IN THIS LOCATION ONLY.
- DEMOLISH EXISTING WALLS. GRIND REMAINING CONCRETE FLUSH WITH CONCRETE SLAB AND WALLS AND APPLY SIKA GUARD 62 TO EXPOSED REINFORCING BARS FOR CORROSION PROTECTION.



GRW PROJECT NO. 4789
 CLIENT PROJECT NO. 184-4006



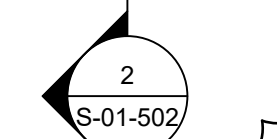
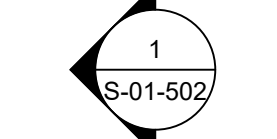
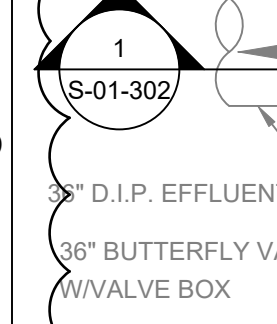
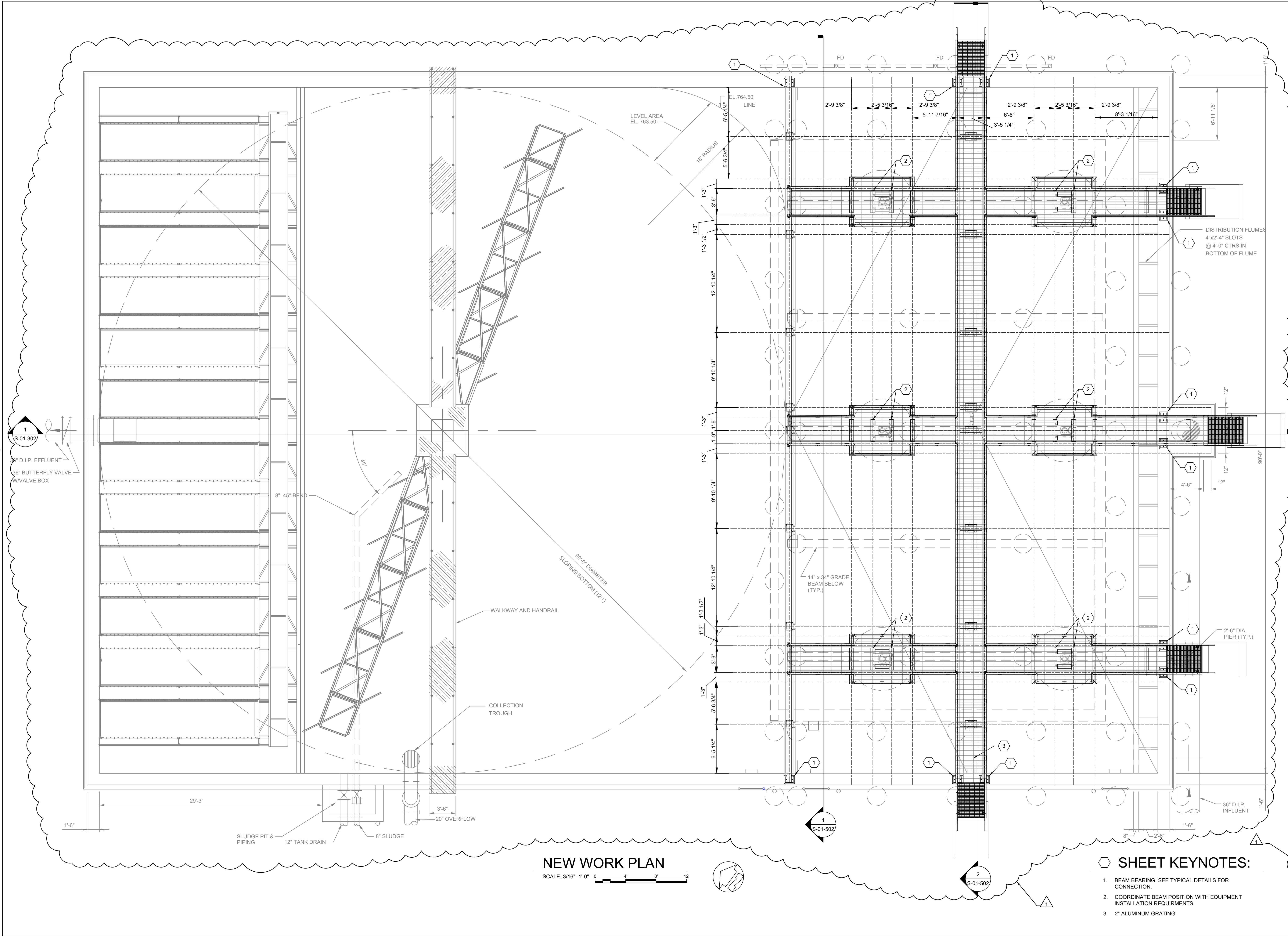
BASIN NO. 1 - PLAN
DEMOLITION
 FT THOMAS WATER TREATMENT PLANT
 BASIN IMPROVEMENTS - PHASE 2
 NORTHERN KENTUCKY WATER DISTRICT

DESIGNED	JRM
DRAWN	JRM
REVIEWED	JRM
APPROVED	JRM

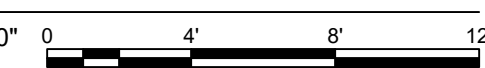
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1	ADDED	12/29/20	JRM

DATE: **DECEMBER, 2020**
 SCALE: 3/16"=1'-0"

SHEET NO. **S-01-101**



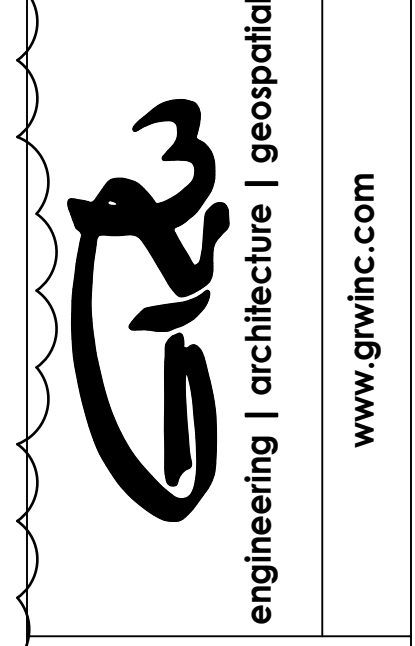
NEW WORK PLAN
SCALE: 3/16"=1'-0"



SHEET KEYNOTES:

1. BEAM BEARING. SEE TYPICAL DETAILS FOR CONNECTION.
2. COORDINATE BEAM POSITION WITH EQUIPMENT INSTALLATION REQUIREMENTS.
3. 2" ALUMINUM GRATING.

GRW PROJECT NO. 4789
CLIENT PROJECT NO. 184-4006



BASIN NO. 1 - PLAN
NEW WORK
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

REVISIONS	DATE	BY	DESIGNED	DRAWN	REVIEWED	APPROVED
1	12/29/20	JRM	JRM	JRM	JRM	JRM

DATE: DECEMBER, 2020
SCALE: 3/16"=1'-0"
SHEET NO.

S-01-102

PLOTTED BY: jMacrum

PRINTED: 12/29/2020 @ 8:47AM

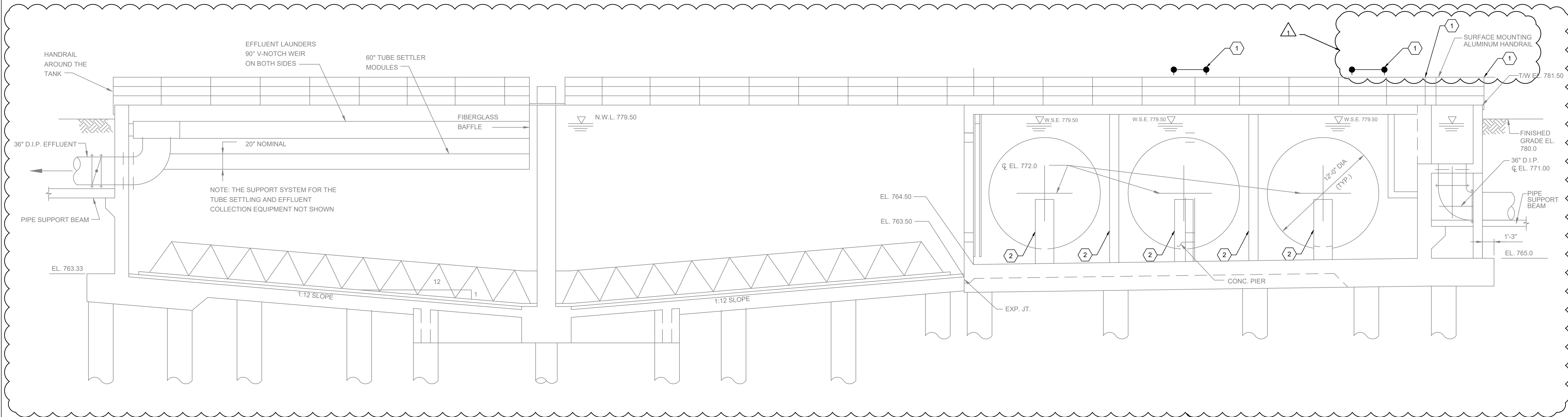
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GENERAL SHEET NOTES:

- SEE PROCESS DRAWINGS FOR PROCESS EQUIPMENT TO BE DEMOLISHED.

SHEET KEYNOTES:

- COORDINATE REMOVAL OF EXISTING HANDRAIL TO ACCOMMODATE THE NEW WALKWAY HANDRAILS.
- REMOVE THE EXISTING CONCRETE COLUMNS AND PIERS SUPPORTING THE FLOCCULATORS AND BAFFLES.



1 SECTION
 SCALE: 3/16"=1'-0"
 0 4' 8' 12'

GRW PROJECT NO. 4789
 CLIENT PROJECT NO. 184-4006

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BASIN NO. 1 - SECTION
DEMOLITION
 FT THOMAS WATER TREATMENT PLANT
 BASIN IMPROVEMENTS - PHASE 2
 NORTHERN KENTUCKY WATER DISTRICT

NO.	DATE	DESCRIPTION	DESIGNED	BY
1	12/29/20	ADDITIONAL #2	JRM	JRM
			JRM	JRM
			JRM	JRM
			JRM	JRM

SCALE CHECK: _____ THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

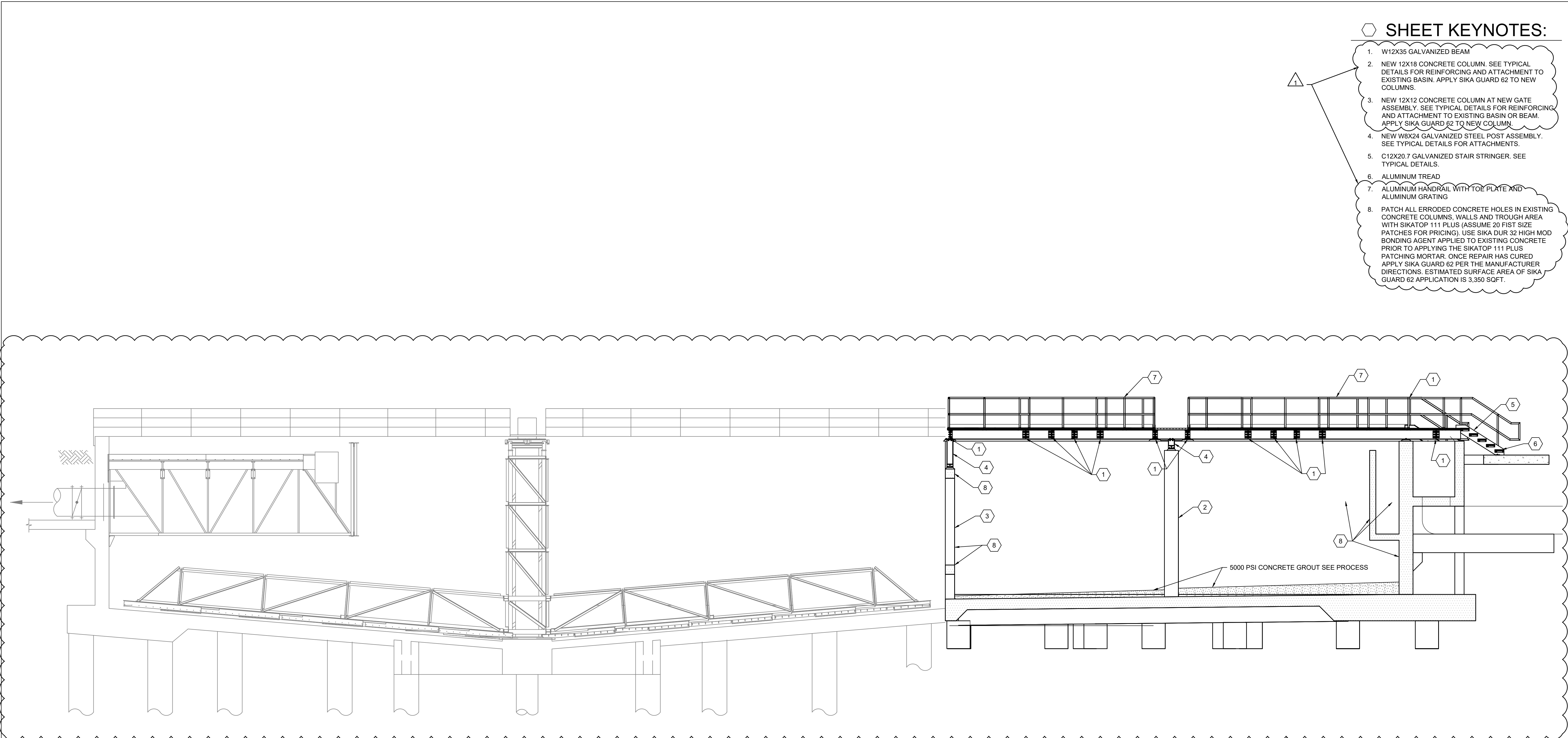
DATE: **DECEMBER, 2020**
 SCALE: **3/16"=1'-0"**
 SHEET NO. **S-01-301**

BID SET

PLOTTED BY: jMarrum

PRINTED: 12/29/2020 @ 9:51AM

FILE NAME: S:\789-NKWD FTTP\Basin\Working Drawings\AutoCAD\4789 Border.dwg



- SHEET KEYNOTES:**
1. W12X35 GALVANIZED BEAM
 2. NEW 12X18 CONCRETE COLUMN. SEE TYPICAL DETAILS FOR REINFORCING AND ATTACHMENT TO EXISTING BASIN. APPLY SIKA GUARD 62 TO NEW COLUMNS.
 3. NEW 12X12 CONCRETE COLUMN AT NEW GATE ASSEMBLY. SEE TYPICAL DETAILS FOR REINFORCING AND ATTACHMENT TO EXISTING BASIN OR BEAM. APPLY SIKA GUARD 62 TO NEW COLUMN.
 4. NEW W8X24 GALVANIZED STEEL POST ASSEMBLY. SEE TYPICAL DETAILS FOR ATTACHMENTS.
 5. C12X20.7 GALVANIZED STAIR STRINGER. SEE TYPICAL DETAILS.
 6. ALUMINUM TREAD
 7. ALUMINUM HANDRAIL WITH TOE PLATE AND ALUMINUM GRATING
 8. PATCH ALL ERRODED CONCRETE HOLES IN EXISTING CONCRETE COLUMNS, WALLS AND TROUGH AREA WITH SIKATOP 111 PLUS (ASSUME 20 FIST SIZE PATCHES FOR PRICING). USE SIKA DUR 32 HIGH MOD BONDING AGENT APPLIED TO EXISTING CONCRETE PRIOR TO APPLYING THE SIKATOP 111 PLUS PATCHING MORTAR. ONCE REPAIR HAS CURED APPLY SIKA GUARD 62 PER THE MANUFACTURER DIRECTIONS. ESTIMATED SURFACE AREA OF SIKA GUARD 62 APPLICATION IS 3,350 SQFT.

1 SECTION
 SCALE: 3/16"=1'-0"
 0 4' 8' 12'

GRW PROJECT NO. 4789
 CLIENT PROJECT NO. 184-4006
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BASIN NO. 1 - SECTION
NEW WORK
 FT THOMAS WATER TREATMENT PLANT
 BASIN IMPROVEMENTS - PHASE 2
 NORTHERN KENTUCKY WATER DISTRICT

NO.	DATE	DESCRIPTION	DESIGNED	BY
1	12/29/20	ADDED COLUMN #2	JRM	JRM
			JRM	JRM
			JRM	JRM
			JRM	JRM

DATE: DECEMBER, 2020
 SCALE: 3/16"=1'-0"
 SHEET NO. S-01-302

SCALE CHECK: THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

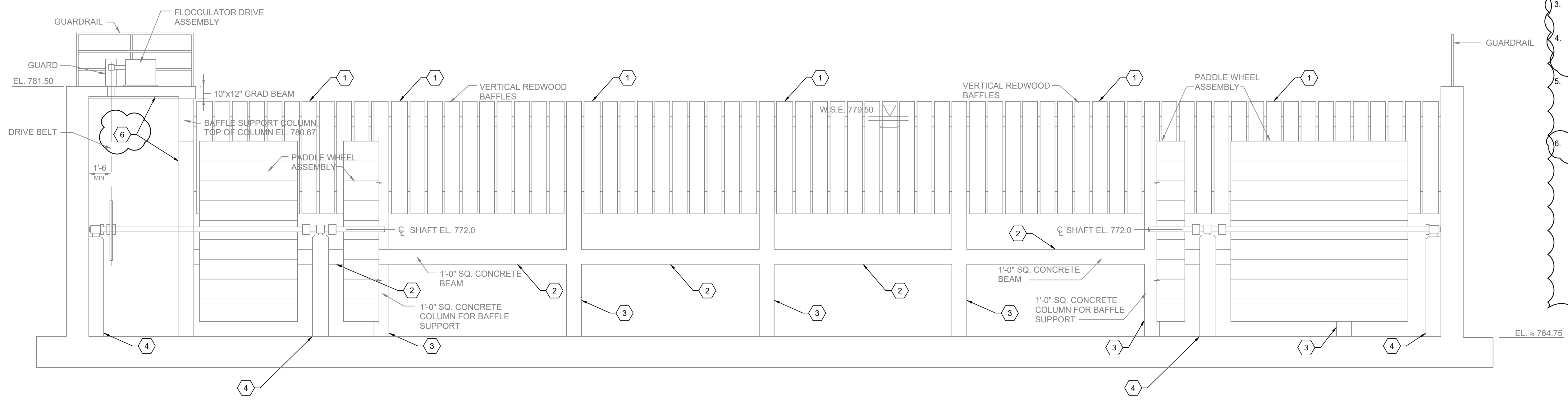
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GENERAL SHEET NOTES:

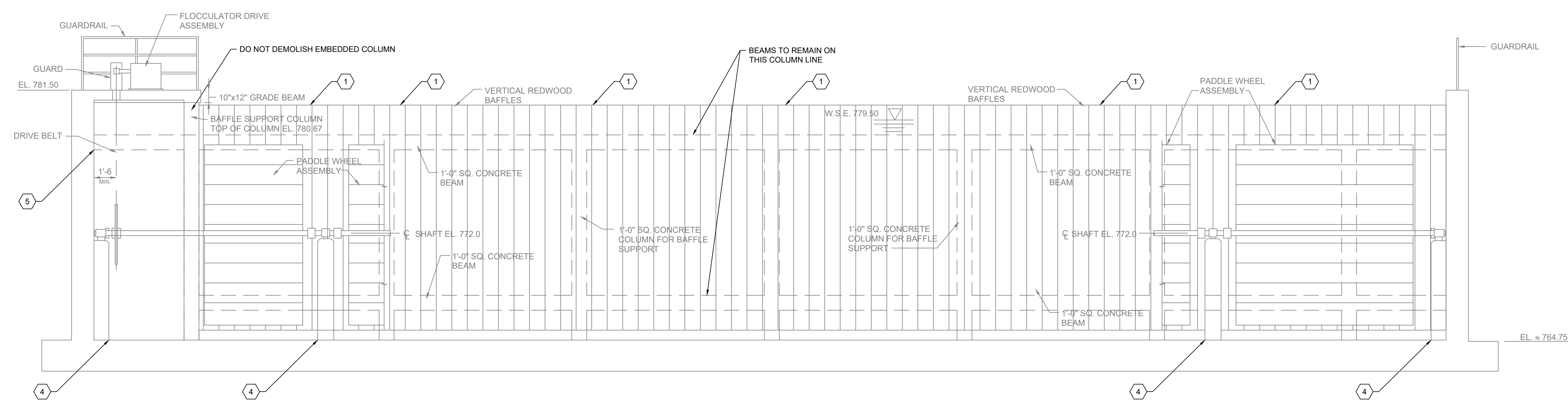
- SEE PROCESS DRAWINGS FOR PROCESS EQUIPMENT TO BE DEMOLISHED.

SHEET KEYNOTES:

- REMOVE EXISTING BAFFLE SYSTEM AND STRUCTURAL SUPPORTS.
- REMOVE EXISTING BEAMS BETWEEN EXISTING COLUMNS.
- REMOVE EXISTING COLUMNS AND GRIND SMOOTH TO FLOOR. APPLY SIKA GUARD 62 TO EXPOSED REINFORCING BARS FOR CORROSION PROTECTION.
- REMOVE EXISTING MACHINERY SUPPORTS AND GRIND SMOOTH TO FLOOR. APPLY SIKA GUARD 62 TO EXPOSED REINFORCING BARS FOR CORROSION PROTECTION PER MANUFACTURES INSTRUCTIONS.
- EXISTING BEAM TO REMAIN AFTER WALL IS REMOVED. INVESTIGATE BEAM/WALL FOR EXISTING BEAM TIES AND LINGITUDINAL REBAR BY CHIPPING AWAY CONCRETE TO VERIFY REINFORCING. IF BEAM TIES AND REINFORCING NOT PRESENT, REMOVE AND REPLACE WITH NEW BEAM.
- DEMOLISH EXISTING CAP SLAB AND SUPPORTING WALL BELOW.

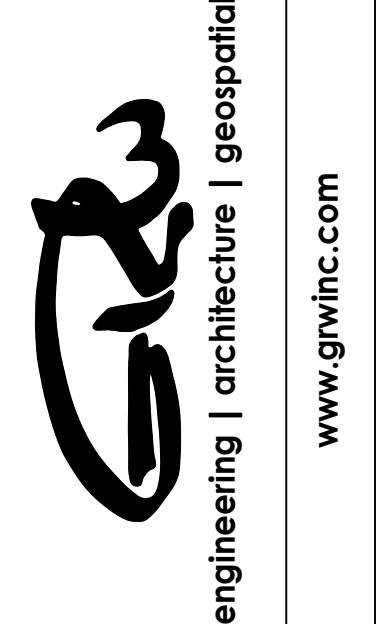


1 SECTION
SCALE: 1/4"=1'-0"
0 2 4 8'



2 SECTION
SCALE: 1/4"=1'-0"
0 2 4 8'

GRW PROJECT NO. 4789
CLIENT PROJECT NO. 184-4006



**BASIN NO. 1 - SECTION
DEMOLITION
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT**

DESIGNED: JRM
DRAWN: JRM
REVIEWED: JRM
APPROVED: JRM

NO.	DATE	DESCRIPTION
1	12/20/20	ADDITIONAL #2

DATE: DECEMBER, 2020
SCALE: 3/16"=1'-0"
SHEET NO.

S-01-501

PLOTTED BY: jmarcum

PRINTED: 12/29/2020 @ 8:41AM

FILE NAME: S:\789-NKWD FTTP\Basin\Working Drawings\AutoCAD\4789 Border.dwg

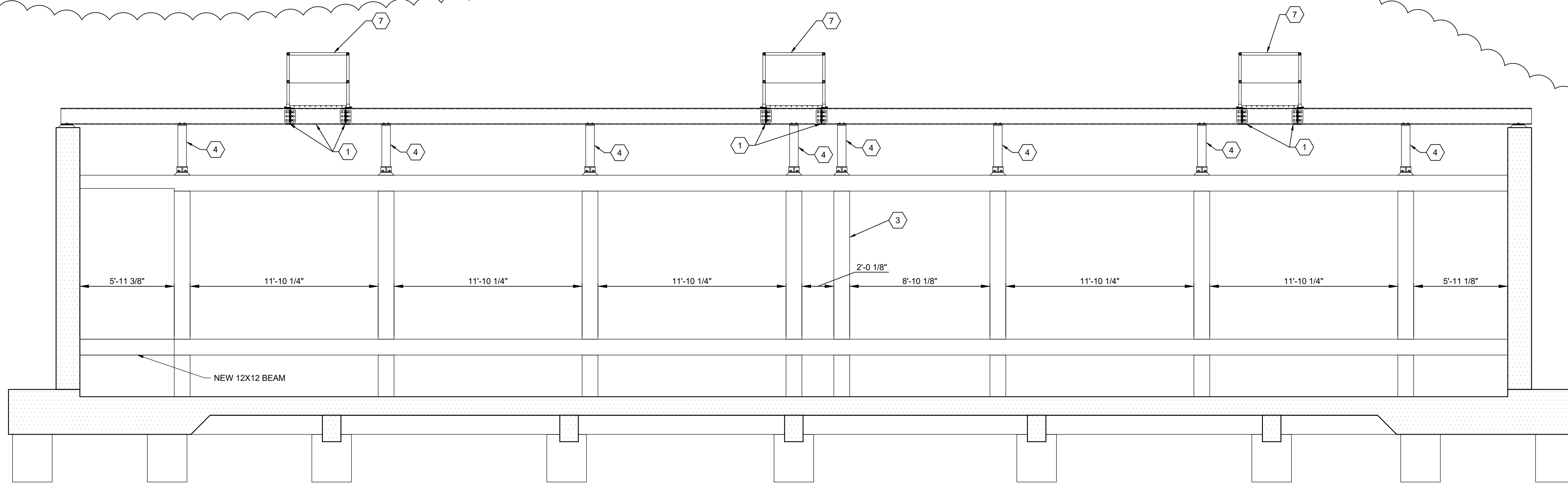
BID SET

PLOTTED BY: JMarcum

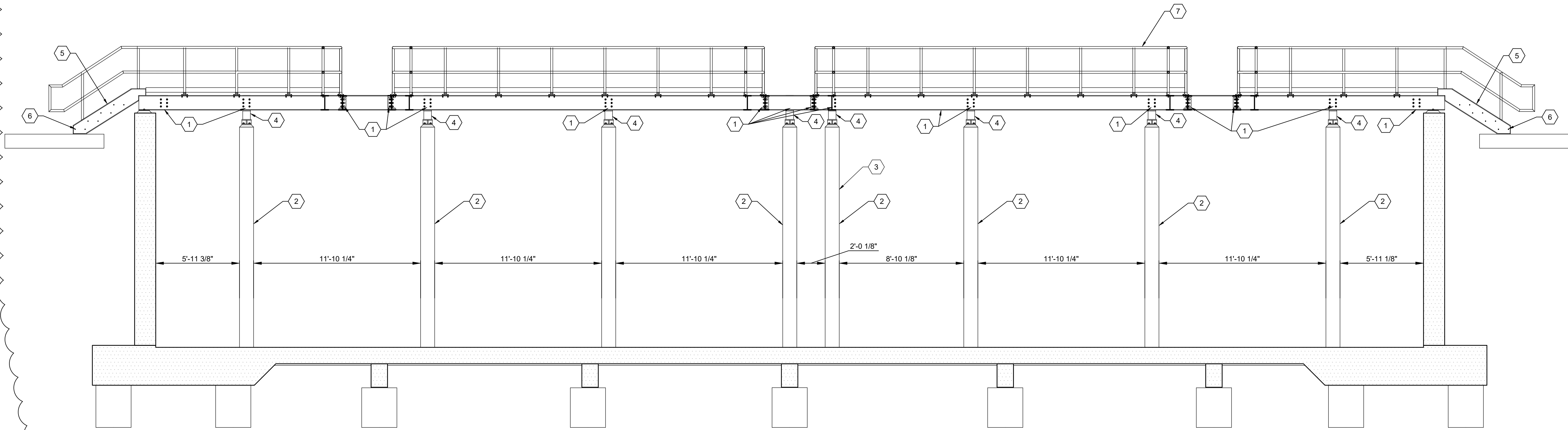
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FILE NAME: S:\789-NKWD FTTP\Basin\Working Drawings\AutoCAD\4789 Border.dwg

- SHEET KEYNOTES:**
1. W12X35 GALVANIZED BEAM
 2. NEW 12X18 CONCRETE COLUMN. SEE TYPICAL DETAILS FOR REINFORCING AND ATTACHMENT TO EXISTING BASIN. APPLY SIKA GUARD 62 TO NEW COLUMNS.
 3. NEW 12X12 CONCRETE COLUMN AT NEW GATE ASSEMBLY. SEE TYPICAL DETAILS FOR REINFORCING AND ATTACHMENT TO EXISTING BASIN OR BEAM. APPLY SIKA GUARD 62 TO NEW COLUMN.
 4. NEW W8X24 GALVANIZED STEEL POST ASSEMBLY. SEE TYPICAL DETAILS FOR ATTACHMENTS.
 5. C12X20.7 GALVANIZED STAIR STRINGER. SEE TYPICAL DETAILS.
 6. ALUMINUM TREAD
 7. ALUMINUM HANDRAIL, TOE PLATE AND ALUMINUM GRATING.



1 SECTION
SCALE: 1/4"=1'-0"
0 2' 4' 8'



2 SECTION
SCALE: 1/4"=1'-0"
0 2' 4' 8'

GRW PROJECT NO. 4789
CLIENT PROJECT NO. 184-4006

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BASIN NO. 1 - SECTION
NEW WORK
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

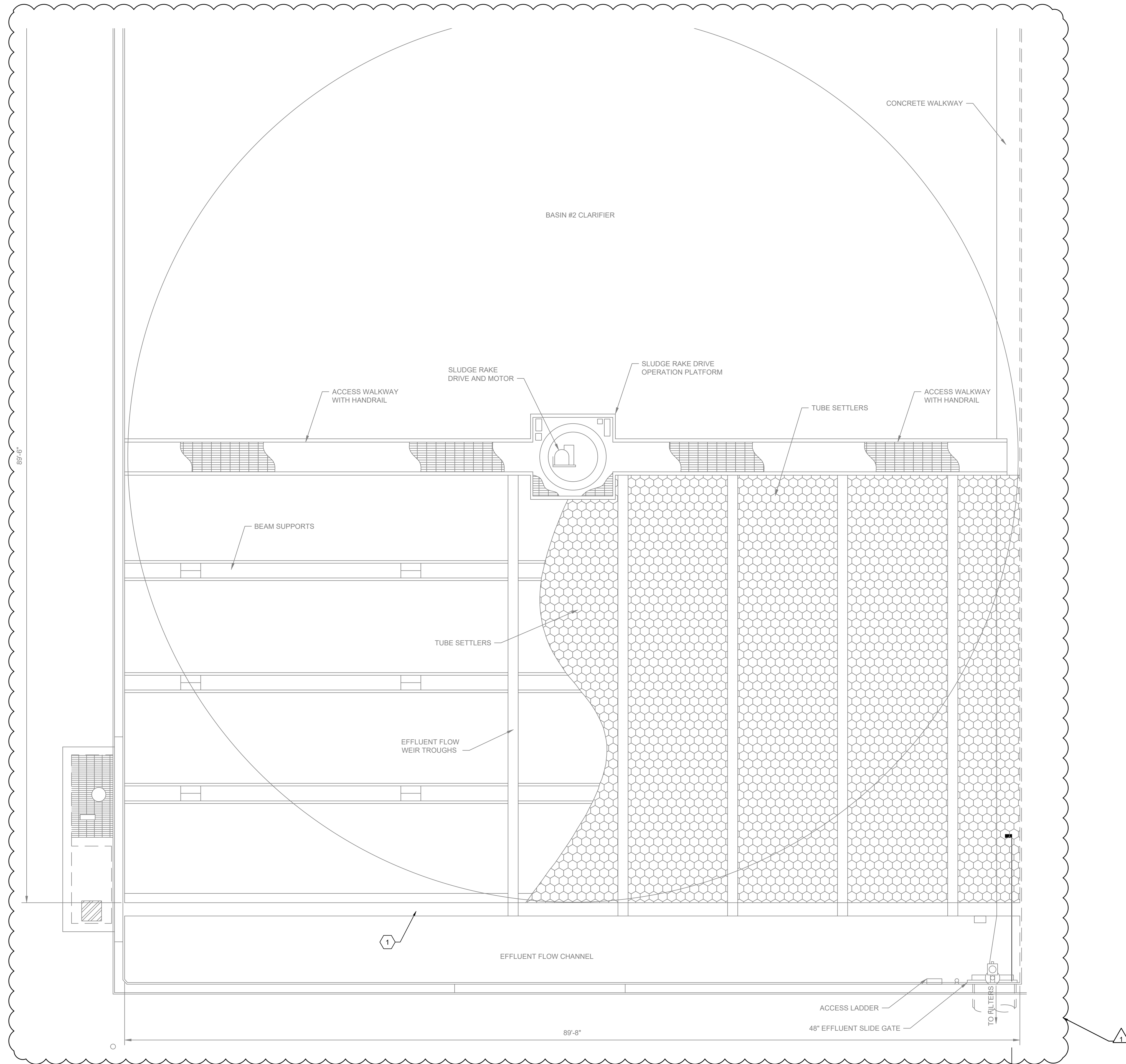
NO.	DATE	DESCRIPTION	DESIGNED	BY
1	12/29/20	ADDED COLUMN #2	JRM	JRM
			JRM	JRM
			JRM	JRM
			JRM	JRM

SCALE CHECK: _____ THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

DATE: DECEMBER, 2020
SCALE: 3/16"=1'-0"
SHEET NO.

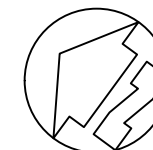
S-01-502

BID SET



PLAN

SCALE: 3/16"=1'-0"



1
S-02-301

GENERAL SHEET NOTES:

- SEE PROCESS DRAWINGS FOR PROCESS EQUIPMENT TO BE DEMOLISHED.

SHEET KEYNOTES:

- DEMO ONE COURSE OF CONCRETE BLOCK (12" WIDE X 7" HIGH) FROM TOP OF WALL

GRW PROJECT NO. 4789
CLIENT PROJECT NO. 184-4006

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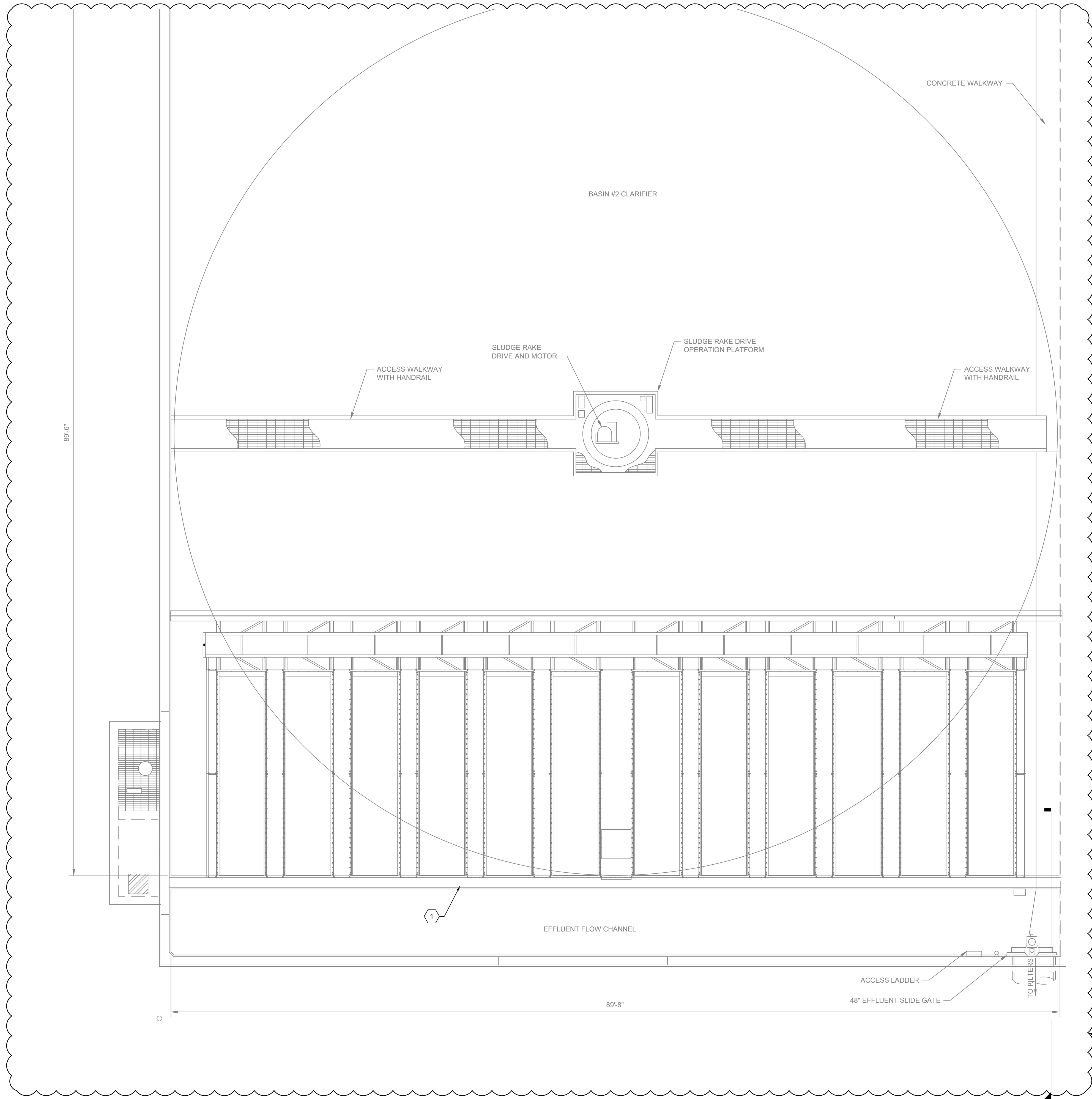
BASIN NO. 2 - PLAN
DEMOLITION
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

REVISED	DESIGNED	BY	DATE	DESCRIPTION
	JRM	JRM	12/29/20	ADDITIONAL #2
	JRM	JRM		
	JRM	JRM		
	JRM	JRM		

SCALE CHECK: THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

DATE: DECEMBER, 2020
SCALE: 3/16" = 1'-0"

SHEET NO. S-02-101



NEW WORK PLAN
 SCALE: 3/16"=1'-0" 0 4' 8' 12'

SHEET KEYNOTES:

1. INSTALL NEW CAST-IN-PLACE CONCRETE WALL EXTENSION ON TOP OF EXISTING WALL

GRW PROJECT NO. 4789
 CLIENT PROJECT NO. 184-4006
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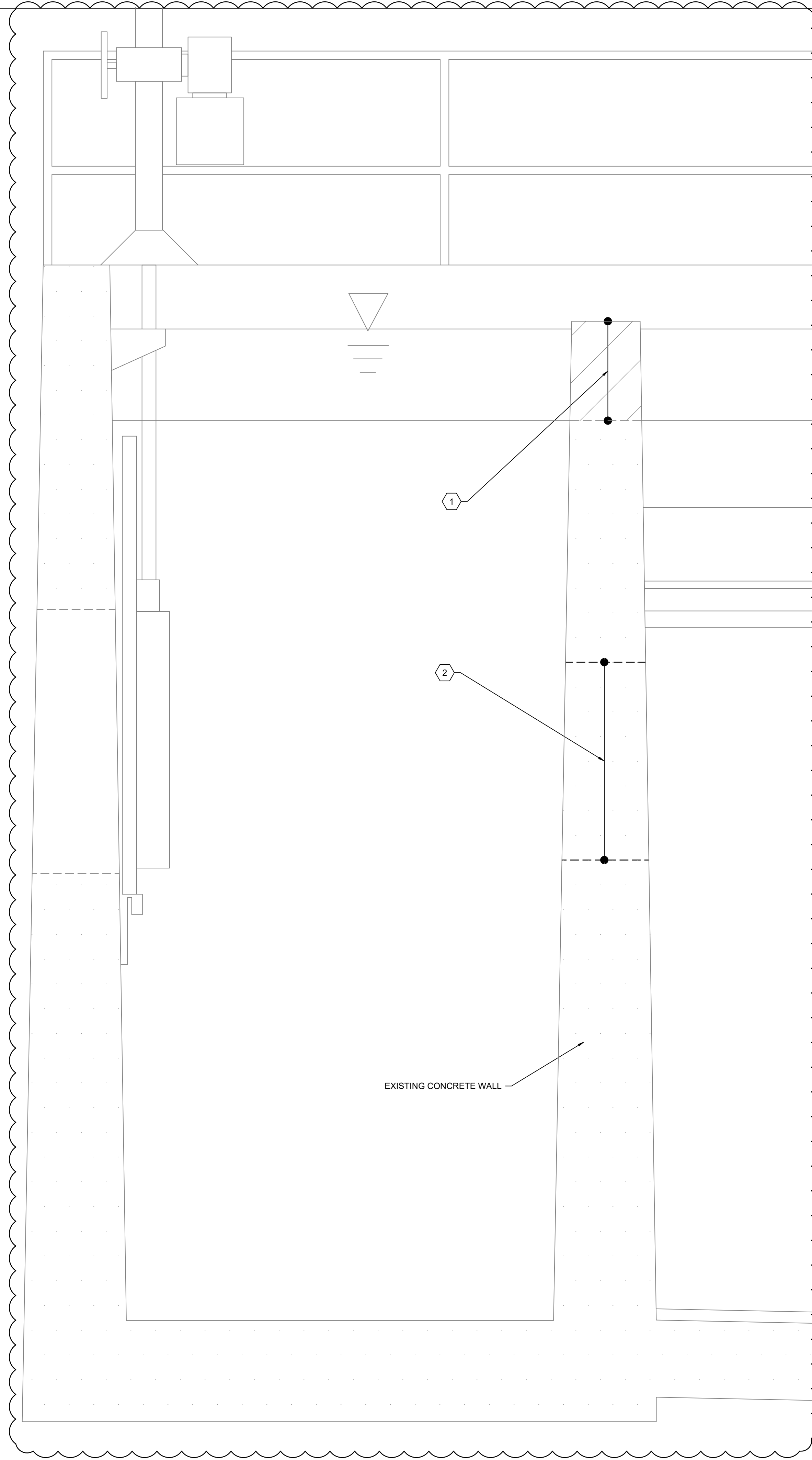
BASIN NO. 2 - PLAN
NEW WORK PLAN
 FT THOMAS WATER TREATMENT PLANT
 BASIN IMPROVEMENTS - PHASE 2
 NORTHERN KENTUCKY WATER DISTRICT

REVISED	DESIGNED	DATE	BY
	JRM	12/29/20	JRM
	DRAWN		JRM
	REVIEWED		JRM
	APPROVED		JRM

DESCRIPTION: A289004#2
 THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

DATE: DECEMBER, 2020
 SCALE: 3/16" = 1'-0"
 SHEET NO.

S-02-102



1 SECTION
 SCALE: 1"=1'-0"
 0 1/2' 1' 2'

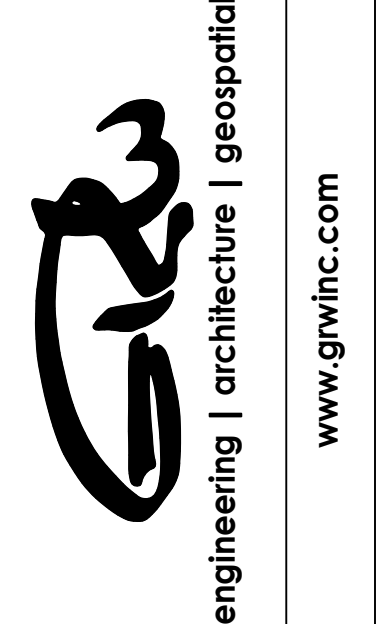
GENERAL SHEET NOTES:

- SEE PROCESS DRAWINGS FOR PROCESS EQUIPMENT TO BE DEMOLISHED.

SHEET KEYNOTES:

- DEMO ONE COURSE OF CONCRETE BLOCK (12" WIDE X 7" HIGH) FROM TOP OF WALL.
- CORE DRILL FOR 36" DI PIPE PENETRATION WITH LINK-SEAL AROUND 36" PIPE. COORDINATE CORE DRILL LOCATION WITH PLATE SETTLER SHOP DRAWING AND PIPE ELEVATION.

GRW PROJECT NO. 4789
 CLIENT PROJECT NO. 184-4006



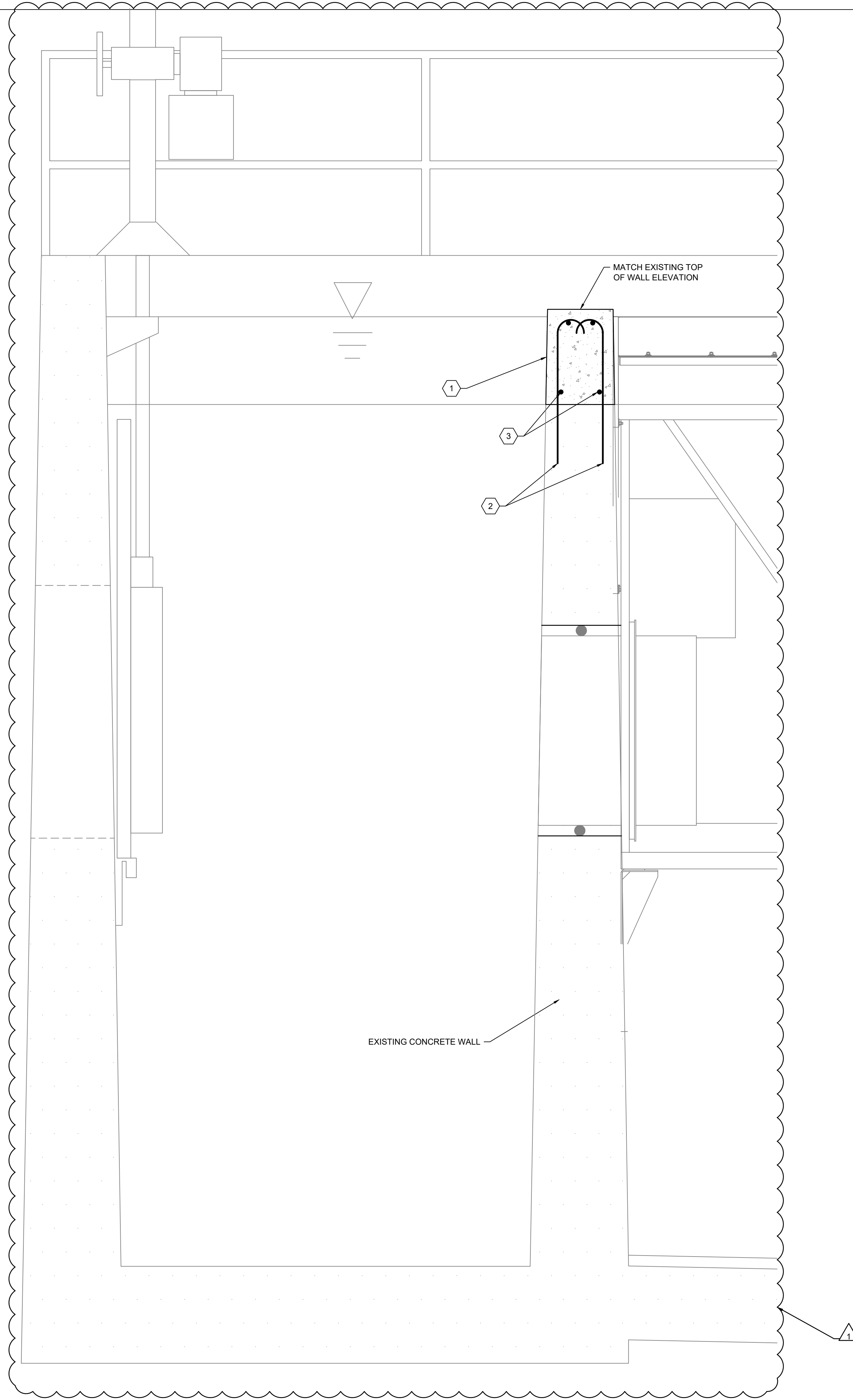
**BASIN NO.2 - SECTION
 DEMOLITION**
 FT THOMAS WATER TREATMENT PLANT
 BASIN IMPROVEMENTS - PHASE 2
 NORTHERN KENTUCKY WATER DISTRICT

DESIGNED	JRM
BY	JRM
DATE	12/29/20
REVIEWED	JRM
APPROVED	JRM

NO.	DESCRIPTION	DATE	BY

DATE: **DECEMBER, 2020**
 SCALE: **1"=1'-0"**
 SHEET NO.

S-02-301

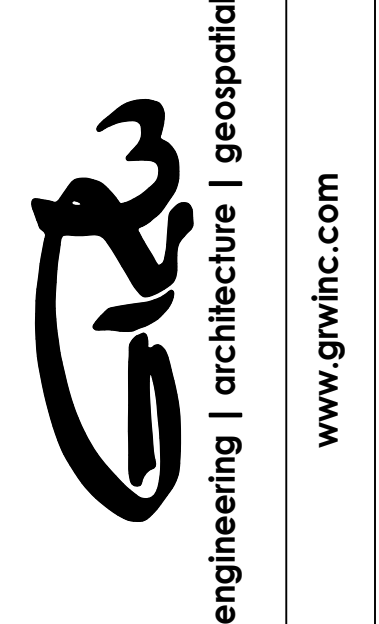


1 SECTION
 SCALE: 1"=1'-0"
 0 1/2' 1' 2'

SHEET KEYNOTES:

1. ROUGHEN EXISTING CONCRETE SURFACE TO A 1/4" AMPLITUDE, APPLY A CONCRETE BINDING AGENT AND INSTALL NEW CONCRETE WALL EXTENSION ON TOP OF EXISTING WALL.
2. #5S @ 18" OC
3. (4) #5S CONTINUOUS

GRW PROJECT NO. 4789
 CLIENT PROJECT NO. 184-4006
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**BASIN NO.2 - SECTION
 NEW WORK
 FT THOMAS WATER TREATMENT PLANT
 BASIN IMPROVEMENTS - PHASE 2
 NORTHERN KENTUCKY WATER DISTRICT**

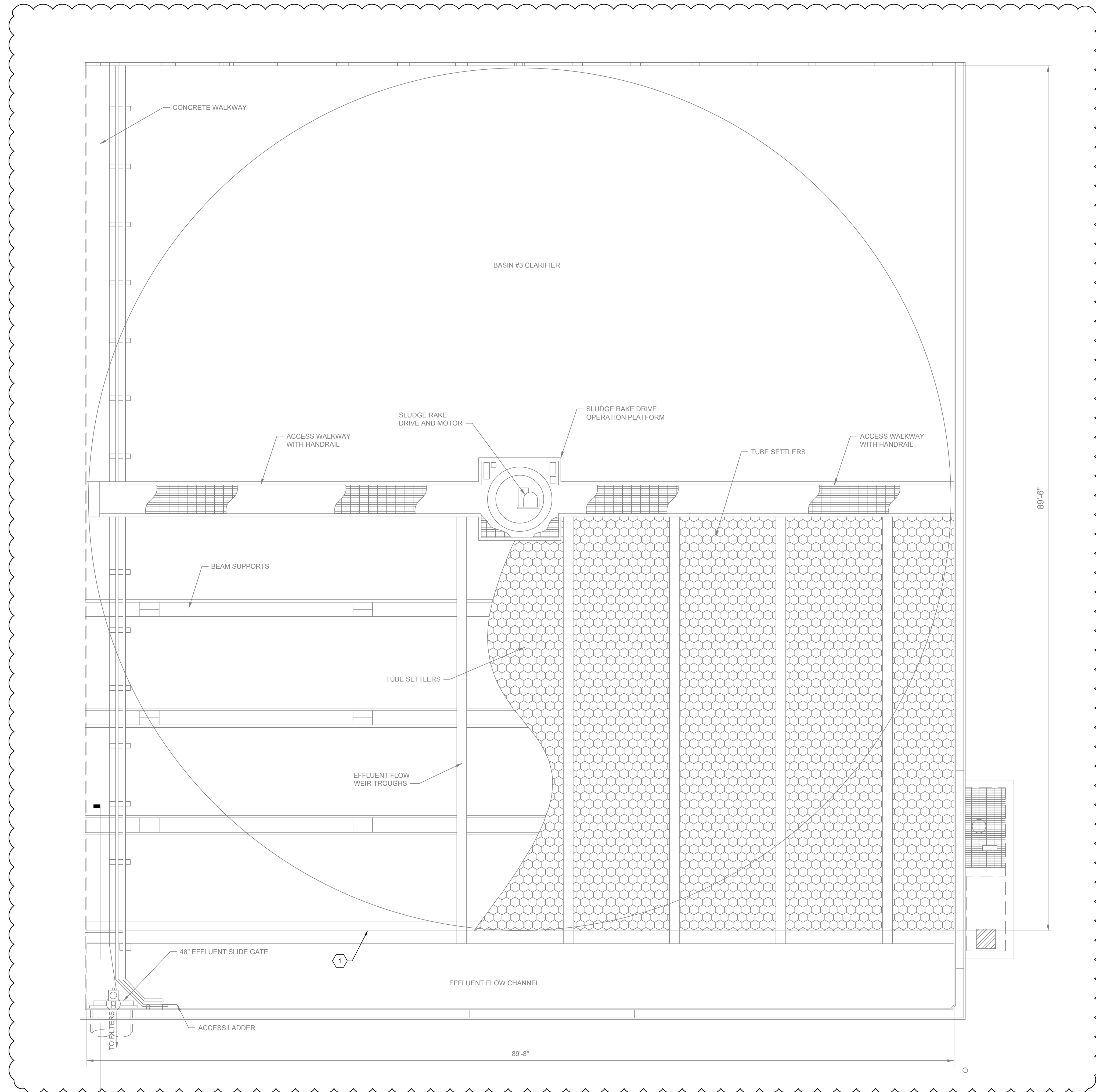
DESIGNED	JRM
BY	JRM
DATE	12/29/20
DRAWN	JRM
REVIEWED	JRM
APPROVED	JRM

NO.	DESCRIPTION	DATE	BY

SCALE CHECK: _____ THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

DATE: **DECEMBER, 2020**
 SCALE: **1"=1'-0"**

SHEET NO. **S-02-302**



GENERAL SHEET NOTES:

- 1. SEE PROCESS DRAWINGS FOR PROCESS EQUIPMENT TO BE DEMOLISHED.

SHEET KEYNOTES:

- 1. DEMO ONE COURSE OF CONCRETE BLOCK (12" WIDE X 7" HIGH) FROM TOP OF WALL

GRW PROJECT NO. 4789
 CLIENT PROJECT NO. 184-4006



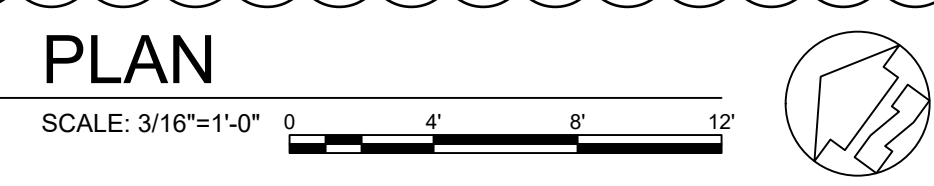
BASIN NO. 3 - PLAN
DEMOLITION
 FT THOMAS WATER TREATMENT PLANT
 BASIN IMPROVEMENTS - PHASE 2
 NORTHERN KENTUCKY WATER DISTRICT

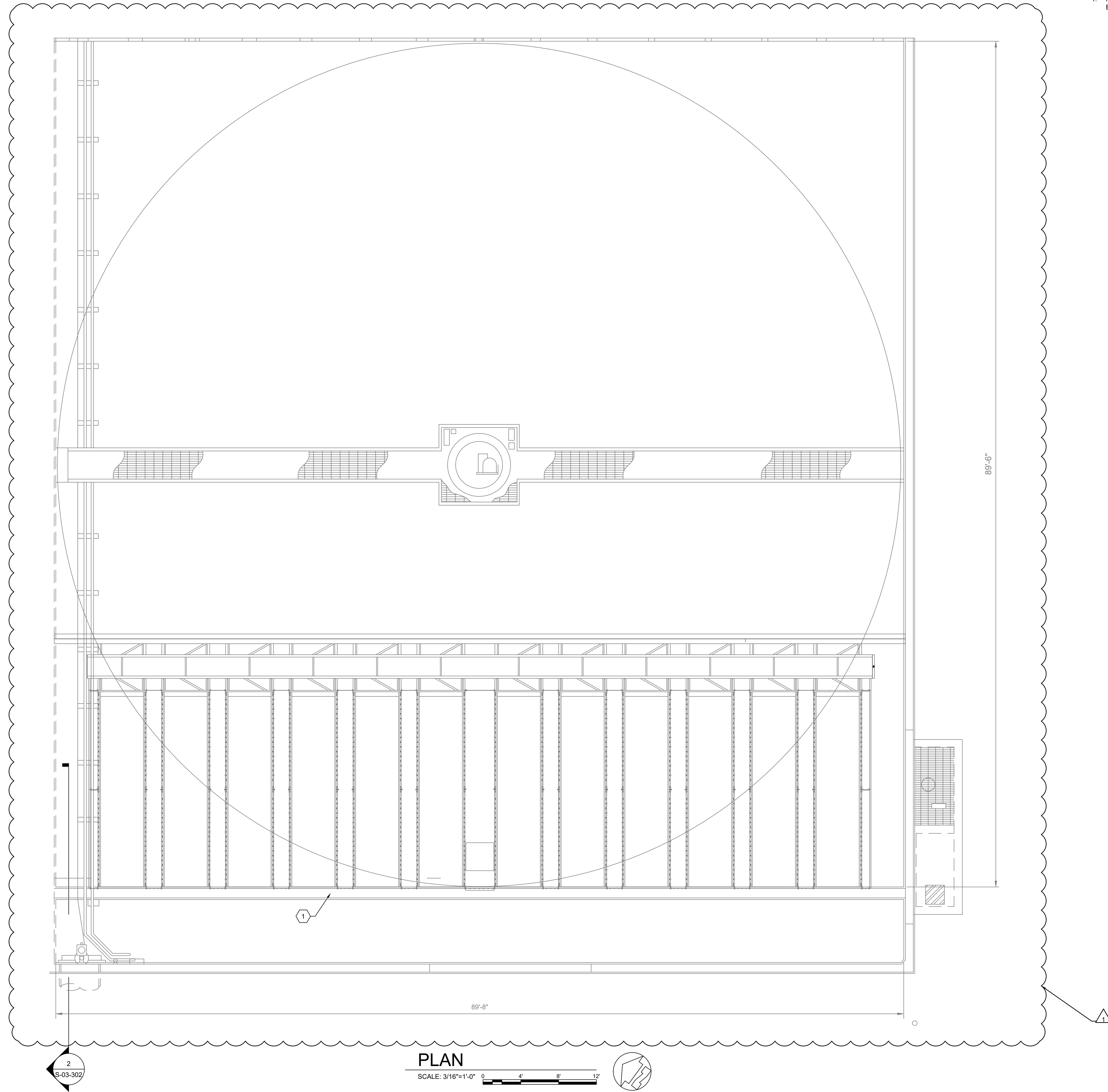
DESIGNED	JRM
DRAWN	JRM
REVIEWED	JRM
APPROVED	JRM

NO.	DATE	DESCRIPTION
1	12/29/20	ADDED QUANT #2

DATE: DECEMBER, 2020
 SCALE: 3/16" = 1'-0"
 SHEET NO.

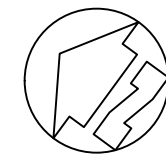
S-03-101





PLAN

SCALE: 3/16" = 1'-0"



SHEET KEYNOTES:

- 1. INSTALL NEW CAST-IN-PLACE CONCRETE WALL EXTENSION ON TOP OF EXISTING WALL.

BASIN NO. 3 - PLAN
NEW WORK PLAN
 FT THOMAS WATER TREATMENT PLANT
 BASIN IMPROVEMENTS - PHASE 2
 NORTHERN KENTUCKY WATER DISTRICT

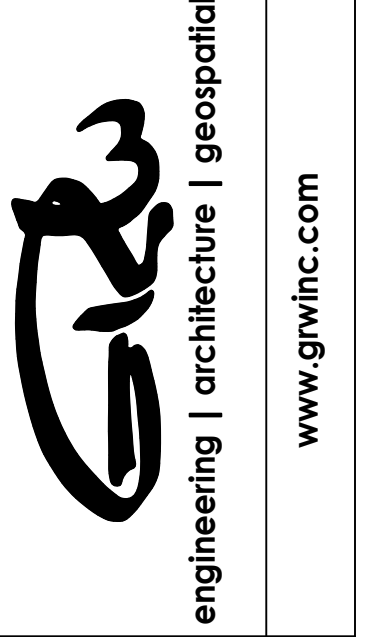
DESIGNED	JRM
BY	JRM
DATE	12/29/20
REVIEWED	JRM
APPROVED	JRM

NO.	DESCRIPTION	DATE	BY
1	ADDED DIM #2	12/29/20	JRM

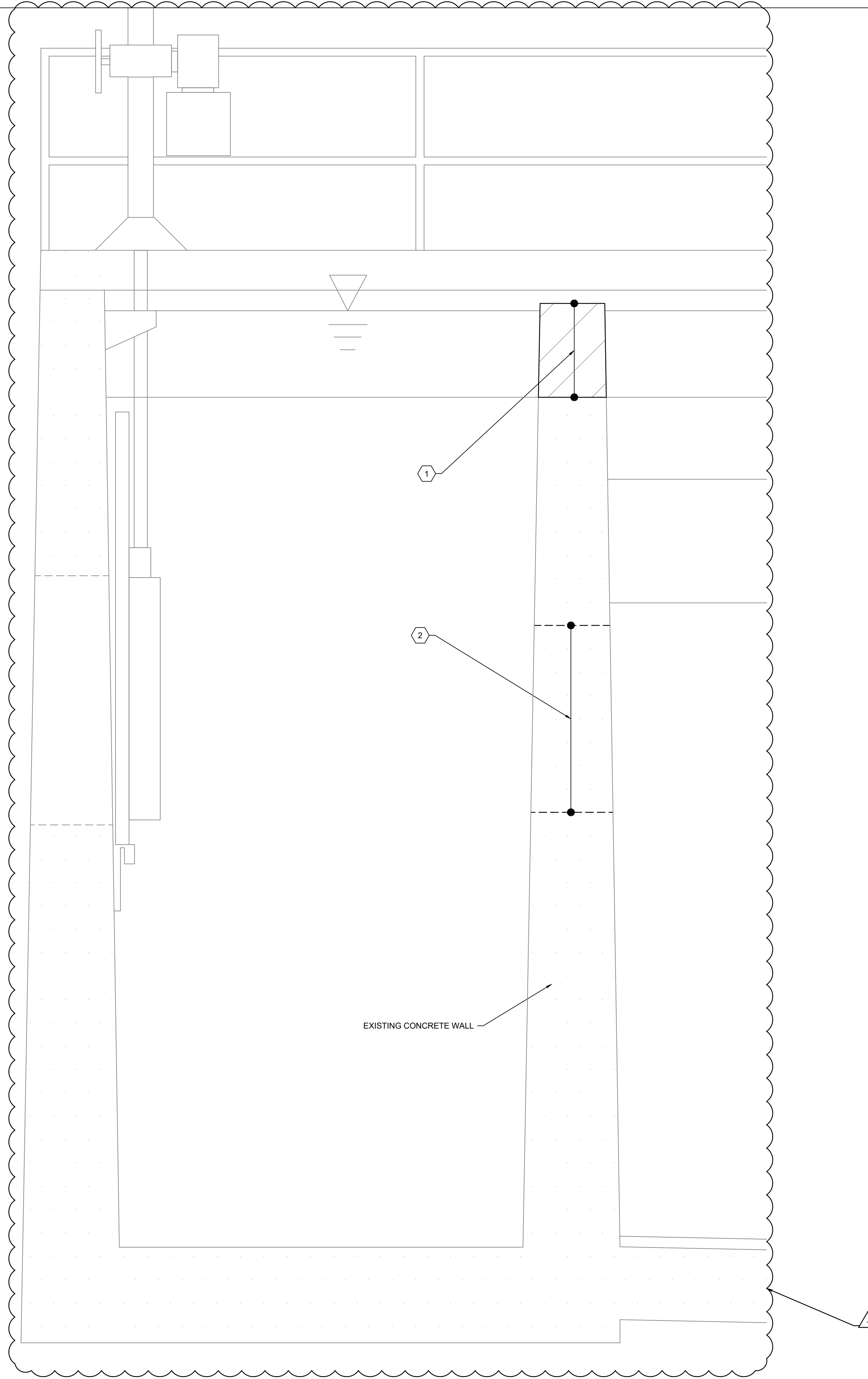
DATE: DECEMBER, 2020
 SCALE: 3/16" = 1'-0"
 SHEET NO.

S-03-102

GRW PROJECT NO. 4789
 CLIENT PROJECT NO. 184-4006




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1 SECTION
 SCALE: 1"=1'-0"
 0 1/2' 1' 2'

GENERAL SHEET NOTES:
 1. SEE PROCESS DRAWINGS FOR PROCESS EQUIPMENT TO BE DEMOLISHED.

SHEET KEYNOTES:
 1. DEMO ONE COURSE OF CONCRETE BLOCK (12" WIDE X 7" HIGH) FROM TOP OF WALL.
 2. CORE DRILL FOR 36" DI PIPE PENETRATION WITH LINK-SEAL AROUND 36" PIPE. COORDINATE CORE DRILL LOCATION WITH PLATE SETTLER SHOP DRAWING AND PIPE ELEVATION.

GRW PROJECT NO. 4789
 CLIENT PROJECT NO. 184-4006
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**BASIN NO.3 - SECTION
 DEMOLITION**
 FT THOMAS WATER TREATMENT PLANT
 BASIN IMPROVEMENTS - PHASE 2
 NORTHERN KENTUCKY WATER DISTRICT

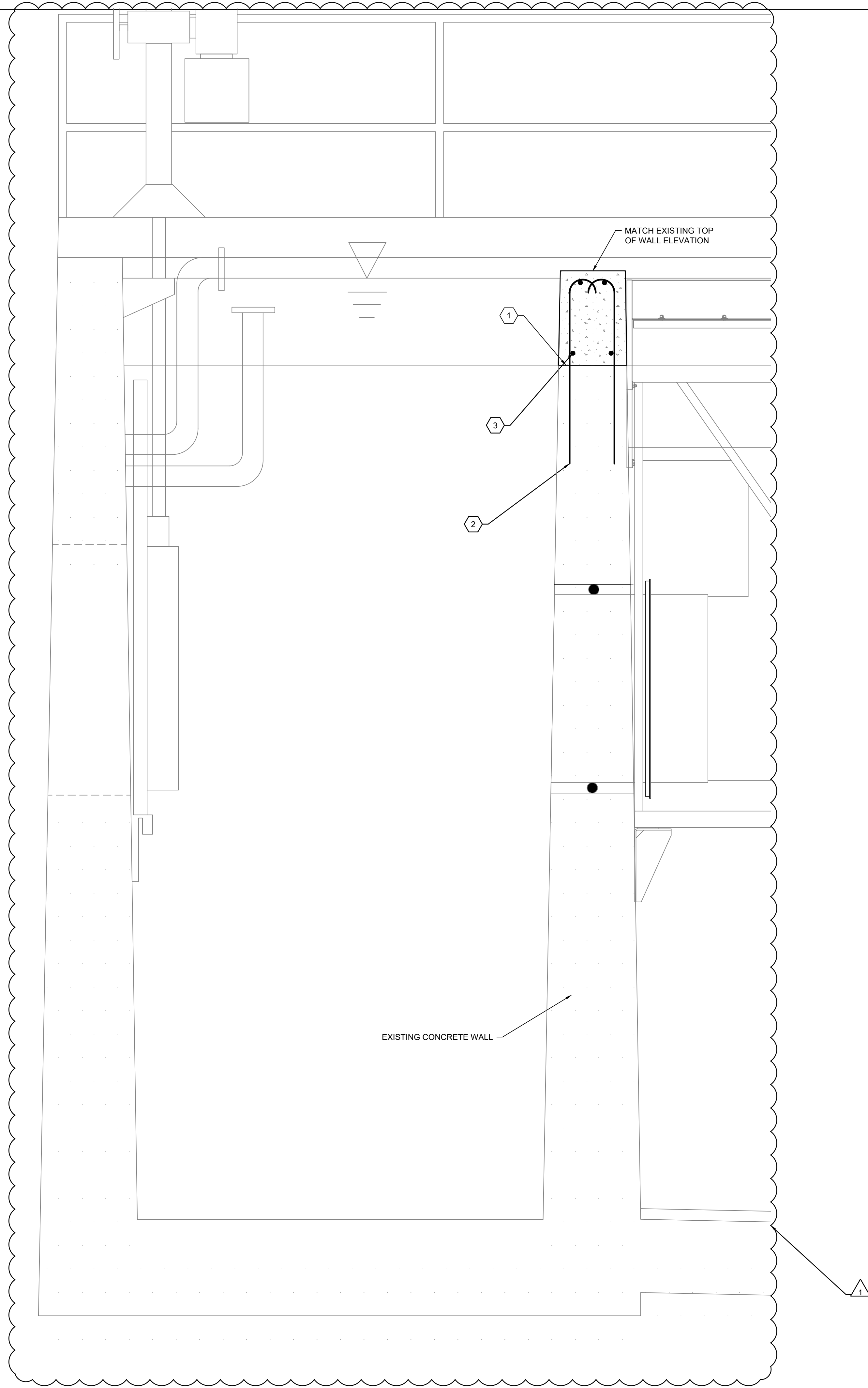
DESIGNED	JRM
BY	JRM
DATE	12/29/20
REVIEWED	JRM
APPROVED	JRM

NO.	DESCRIPTION	DATE	BY

SCALE CHECK: _____ THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

DATE: **DECEMBER, 2020**
 SCALE: **1"=1'-0"**

SHEET NO. **S-03-301**



1 SECTION
 SCALE: 1"=1'-0"
 0 1/2' 1' 2'

SHEET KEYNOTES:

1. ROUGHEN EXISTING CONCRETE SURFACE TO A 1/4" AMPLITUDE, APPLY A CONCRETE BINDING AGENT AND INSTALL NEW CONCRETE WALL EXTENSION ON TOP OF EXISTING WALL.
2. #5S @ 18" OC
3. (4) #5S CONTINUOUS

GRW PROJECT NO. 4789
 CLIENT PROJECT NO. 184-4006



**BASIN NO.3 - SECTION
 NEW WORK
 FT THOMAS WATER TREATMENT PLANT
 BASIN IMPROVEMENTS - PHASE 2
 NORTHERN KENTUCKY WATER DISTRICT**

DESIGNED	JRM
BY	JRM
DATE	12/29/20
DRAWN	JRM
REVIEWED	JRM
APPROVED	JRM

NO.	DESCRIPTION	DATE

DATE: **DECEMBER, 2020**
 SCALE: **1"=1'-0"**

SHEET NO. **S-03-302**

GENERAL SHEET NOTES:

1. SEE PROCESS DRAWINGS FOR PROCESS EQUIPMENT TO BE DEMOLISHED.
2. DEMOLISH EXISTING HANDRAIL ONLY AT TIE IN LOCATIONS OF NEW WALKWAYS. DEMOLISH ONLY ENOUGH TO PROPERLY ALLOW THE TIE IN TO OCCUR.

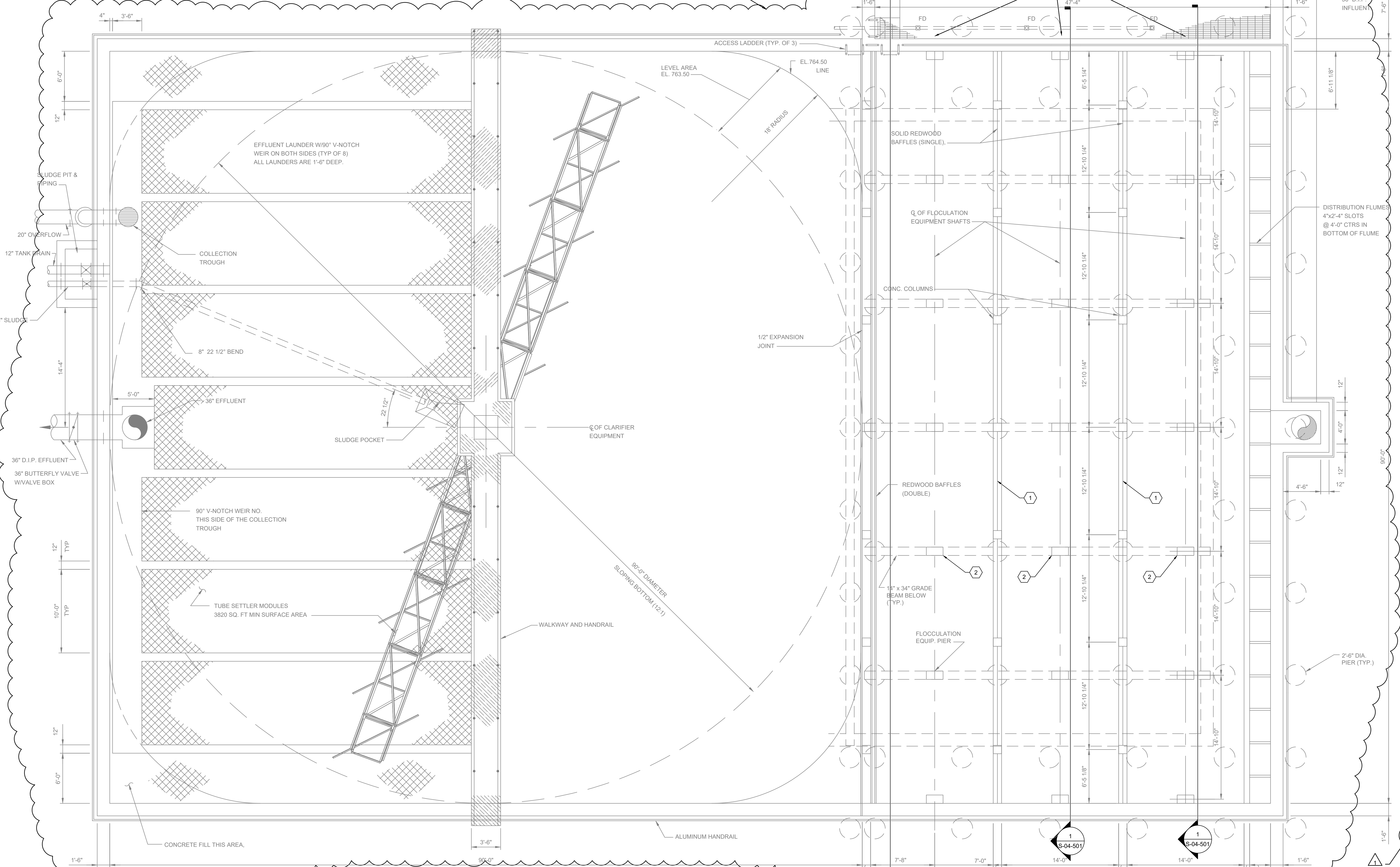
SHEET KEYNOTES:

1. REMOVE BEAMS AND COLUMNS THIS GRID LINE ONLY. GRIND REMAINING CONCRETE FLUSH WITH CONCRETE SLAB AND WALLS AND APPLY SIKA GUARD 62 TO EXPOSED REINFORCING BARS FOR CORROSION PROTECTION.
2. REMOVE ALL FLOCCULATOR PIERS AND EQUIPMENT ON THIS GRID LINE. GRIND REMAINING CONCRETE FLUSH WITH CONCRETE SLAB AND WALLS AND APPLY SIKA GUARD 62 TO EXPOSED REINFORCING BARS FOR CORROSION PROTECTION.
3. REMOVE CONCRETE PIERS FOR FLOCCULATOR DRIVES. GRIND REMAINING CONCRETE FLUSH WITH CONCRETE SLAB AND WALLS AND APPLY SIKA GUARD 62 TO EXPOSED REINFORCING BARS FOR CORROSION PROTECTION. FILL VOID FROM DRIVE SHAFT WITH SIKA TOP 111 PLUS AFTER APPLYING THE SIKA DUR 32 BONDING AGENT.

PLOTTED BY: JMacrum

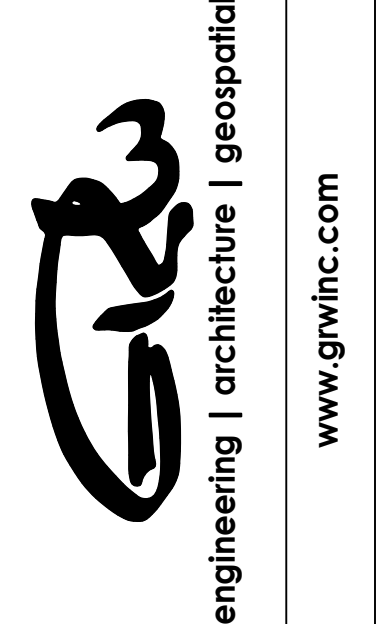
PRINTED: 12/29/2020 @ 8:39AM

FILE NAME: S:\4789-NKWD\FTTP\Basin\Working Drawings\AutoCAD\4789 Border.dwg



PLAN
SCALE: 3/16"=1'-0"

GRW PROJECT NO. 4789
CLIENT PROJECT NO. 184-4006



BASIN NO. 4 - PLAN
DEMOLITION
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

DESIGNED	JRM
DRAWN	JRM
REVIEWED	JRM
APPROVED	JRM

NO.	DATE	DESCRIPTION
1	12/29/20	ADDITIONAL #2

DATE: DECEMBER, 2020
SCALE: 3/16"=1'-0"

SHEET NO. S-04-101

BID SET

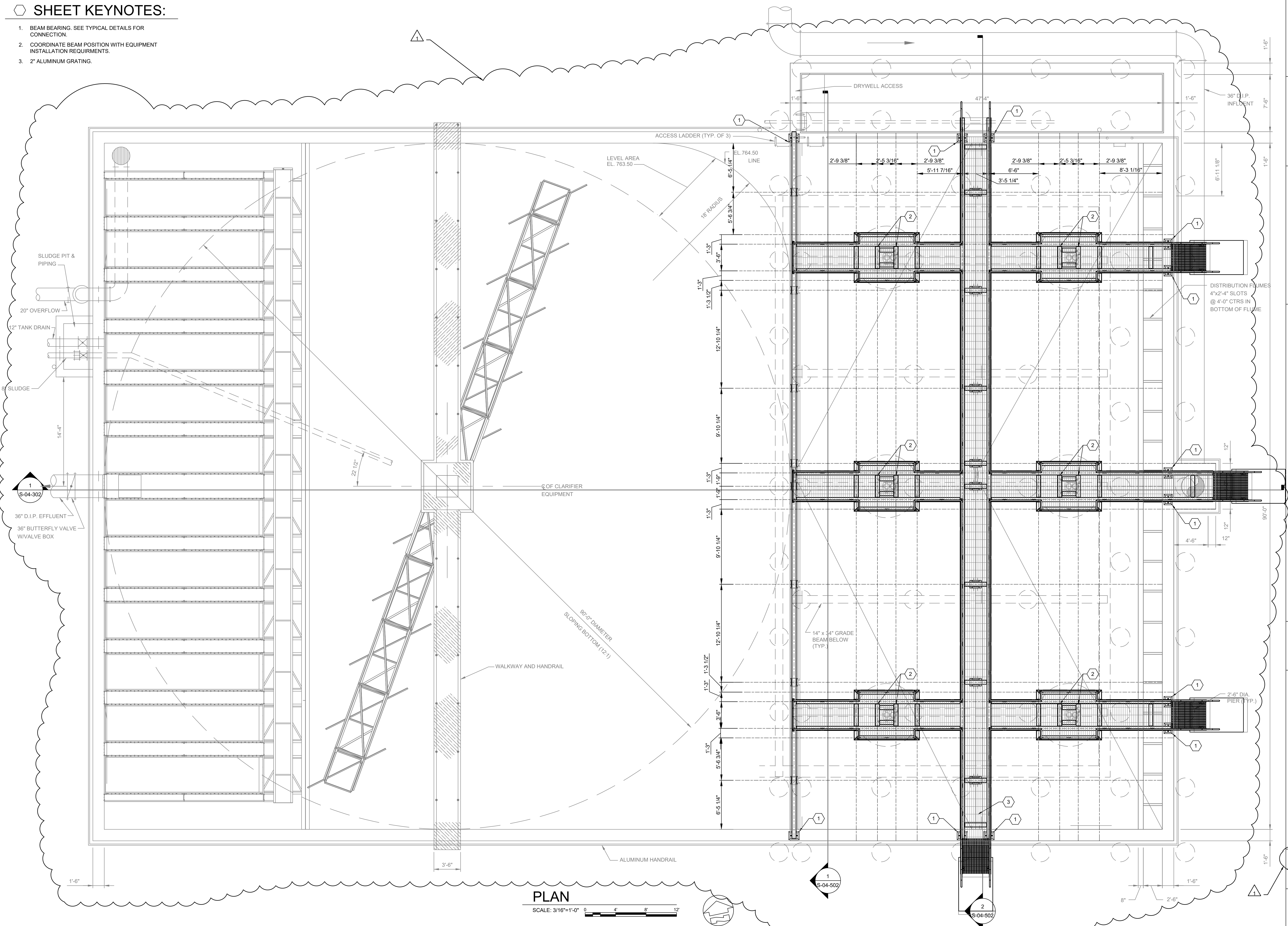
SHEET KEYNOTES:

1. BEAM BEARING. SEE TYPICAL DETAILS FOR CONNECTION
2. COORDINATE BEAM POSITION WITH EQUIPMENT INSTALLATION REQUIREMENTS.
3. 2" ALUMINUM GRATING.

PLOTTED BY: jMarrum

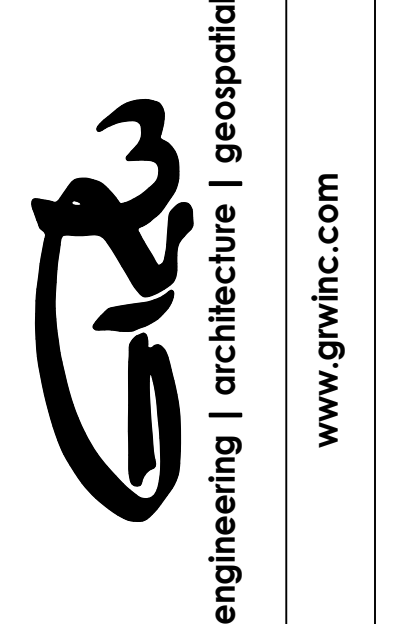
PRINTED: 12/29/2020 @ 8:38AM

FILE NAME: S:\4789-NKWD FTTP\Basin\Working Drawings\AutoCAD\4789 Border.dwg



PLAN
SCALE: 3/16"=1'-0"

GRW PROJECT NO. 4789
CLIENT PROJECT NO. 184-4006



BASIN NO. 4 - PLAN
NEW WORK
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

DESIGNED	JRM
DRAWN	JRM
REVIEWED	JRM
APPROVED	JRM

NO.	DATE	DESCRIPTION
1	12/29/20	ADDITIONAL #2

DATE: DECEMBER, 2020
SCALE: 3/16"=1'-0"
SHEET NO.

S-04-102

BID SET

PLOTTED BY: jmarcum

PRINTED: 12/29/20 @ 9:51AM

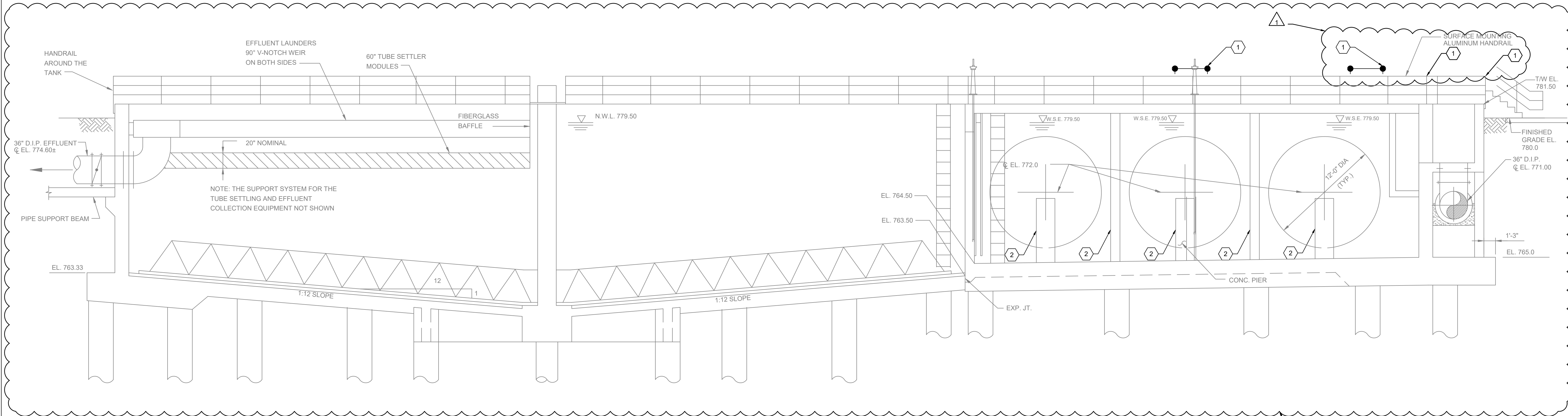
FILE NAME: C:\789-NKWD FTTPBasin\Working Drawings\AutoCAD\4789 Border.dwg

GENERAL SHEET NOTES:

- SEE PROCESS DRAWINGS FOR PROCESS EQUIPMENT TO BE DEMOLISHED.

SHEET KEYNOTES:

- COORDINATE REMOVAL OF EXISTING HANDRAIL TO ACCOMMODATE THE NEW WALKWAY HANDRAILS AND ACCESS LADDERS.
- REMOVE THE EXISTING CONCRETE COLUMNS AND PIERS SUPPORTING THE FLOCCULATORS AND BAFFLES.



1 SECTION
 SCALE: 3/16"=1'-0"
 0 4' 8' 12'

GRW PROJECT NO. 4789
 CLIENT PROJECT NO. 184-4006
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BASIN NO. 1 - SECTION
DEMOLITION
 FT THOMAS WATER TREATMENT PLANT
 BASIN IMPROVEMENTS - PHASE 2
 NORTHERN KENTUCKY WATER DISTRICT

NO.	DATE	DESCRIPTION	DESIGNED	BY
1	12/29/20	ADDED QUANT #2	JRM	JRM
			JRM	JRM
			JRM	JRM
			JRM	JRM

SCALE CHECK: _____ THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

DATE: DECEMBER, 2020
 SCALE: 3/16"=1'-0"
 SHEET NO.

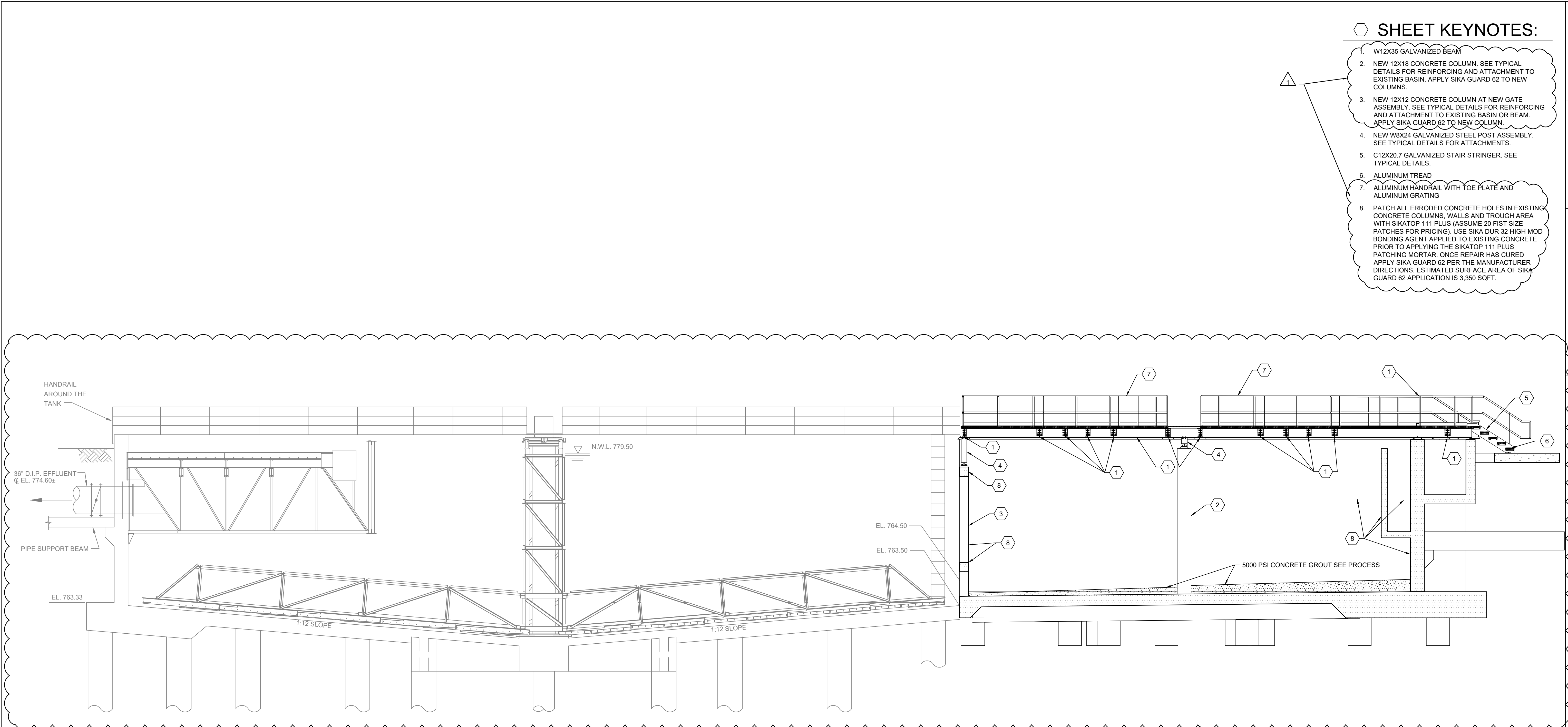
S-04-301

BID SET

PLOTTED BY: jMacrum

PRINTED: 12/29/2020 @ 9:53AM

FILE NAME: G:\789-NKWD FTTPBasin\Working Drawings\AutoCAD\4789 Border.dwg



SHEET KEYNOTES:

1. W12X35 GALVANIZED BEAM
2. NEW 12X18 CONCRETE COLUMN. SEE TYPICAL DETAILS FOR REINFORCING AND ATTACHMENT TO EXISTING BASIN. APPLY SIKA GUARD 62 TO NEW COLUMNS.
3. NEW 12X12 CONCRETE COLUMN AT NEW GATE ASSEMBLY. SEE TYPICAL DETAILS FOR REINFORCING AND ATTACHMENT TO EXISTING BASIN OR BEAM. APPLY SIKA GUARD 62 TO NEW COLUMN.
4. NEW W8X24 GALVANIZED STEEL POST ASSEMBLY. SEE TYPICAL DETAILS FOR ATTACHMENTS.
5. C12X20.7 GALVANIZED STAIR STRINGER. SEE TYPICAL DETAILS.
6. ALUMINUM TREAD
7. ALUMINUM HANDRAIL WITH TOE PLATE AND ALUMINUM GRATING
8. PATCH ALL ERRODED CONCRETE HOLES IN EXISTING CONCRETE COLUMNS, WALLS AND TROUGH AREA WITH SIKATOP 111 PLUS (ASSUME 20 FIST SIZE PATCHES FOR PRICING). USE SIKA DUR 32 HIGH MOD BONDING AGENT APPLIED TO EXISTING CONCRETE PRIOR TO APPLYING THE SIKATOP 111 PLUS PATCHING MORTAR. ONCE REPAIR HAS CURED APPLY SIKA GUARD 62 PER THE MANUFACTURER DIRECTIONS. ESTIMATED SURFACE AREA OF SIKA GUARD 62 APPLICATION IS 3,350 SQFT.

1 SECTION
 SCALE: 3/16"=1'-0" 0 4' 8' 12'

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 CLIENT PROJECT NO. 184-4006
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BASIN NO. 4 - SECTION
NEW WORK
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

NO.	DATE	DESCRIPTION	DESIGNED	BY
1	12/29/20	ADDED COLUMN #2	JRM	JRM
			JRM	JRM
			JRM	JRM
			JRM	JRM

DATE: **DECEMBER, 2020**
 SCALE: **3/16"=1'-0"**
 SHEET NO. **S-04-302**

SCALE CHECK: _____ THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

BID SET

PLOTTED BY: jmarcum

PRINTED: 12/29/2020 @ 8:18AM

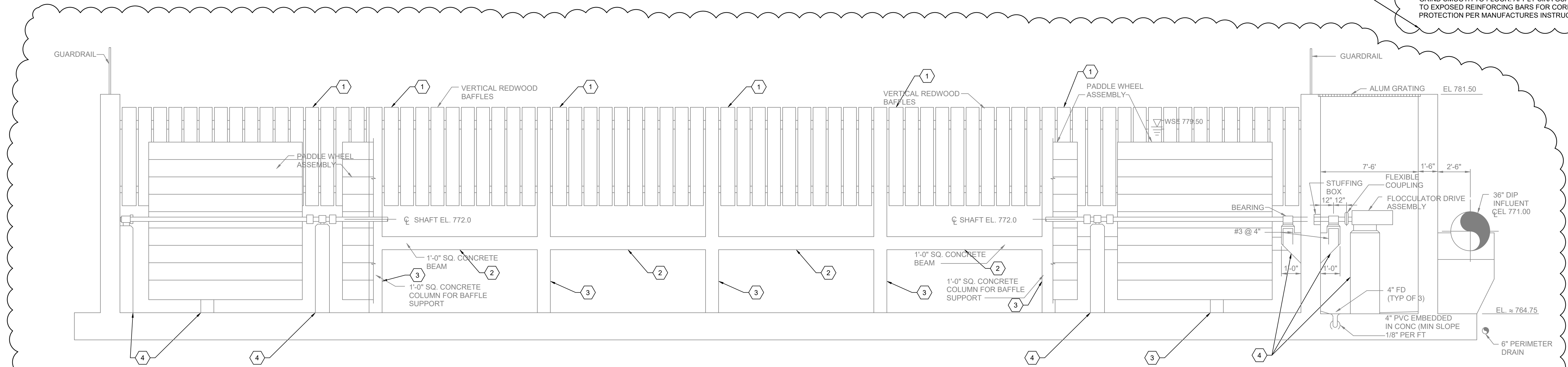
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GENERAL SHEET NOTES:

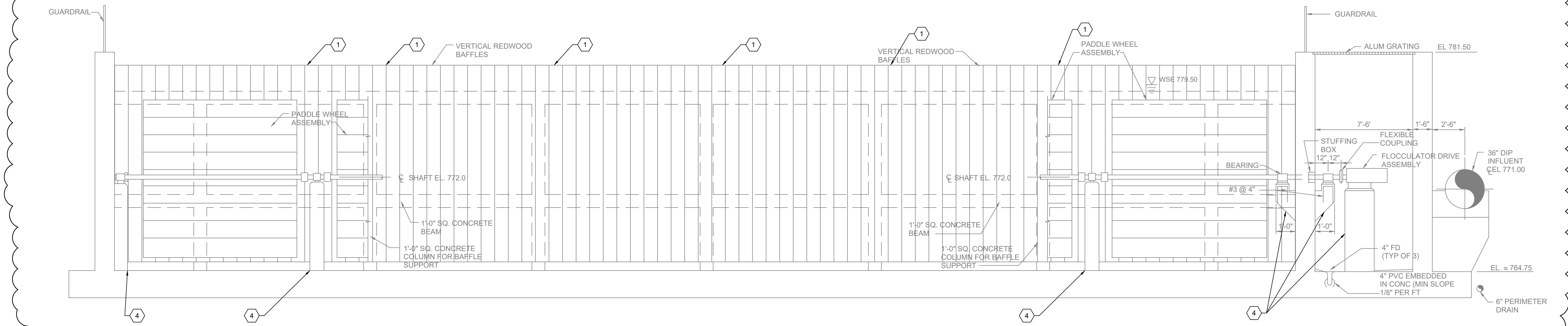
1. SEE PROCESS DRAWINGS FOR PROCESS EQUIPMENT TO BE DEMOLISHED.

SHEET KEYNOTES:

1. REMOVE EXISTING BAFFLE SYSTEM AND STRUCTURAL SUPPORTS.
2. REMOVE EXISTING BEAMS BETWEEN EXISTING COLUMNS.
3. REMOVE EXISTING COLUMNS AND GRIND SMOOTH TO FLOOR. APPLY SIKA GUARD 62 TO EXPOSED REINFORCING BARS FOR CORROSION PROTECTION.
4. REMOVE EXISTING MACHINERY SUPPORTS AND GRIND SMOOTH TO FLOOR. APPLY SIKA GUARD 62 TO EXPOSED REINFORCING BARS FOR CORROSION PROTECTION PER MANUFACTURES INSTRUCTIONS.



1 SECTION
SCALE: 1/4"=1'-0"
0 2' 4' 8'



2 SECTION
SCALE: 1/32"=1'-0"
0 16' 32' 64'

GRW PROJECT NO. 4789
CLIENT PROJECT NO. 184-4006

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**BASIN NO. 4 - SECTION
DEMOLITION**
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

DESIGNED	BY	DATE	REVIEWED	APPROVED
JRM	JRM	12/29/20	JRM	JRM

DATE: DECEMBER, 2020
SCALE: 3/16"=1'-0"
SHEET NO.

S-04-501

BID SET

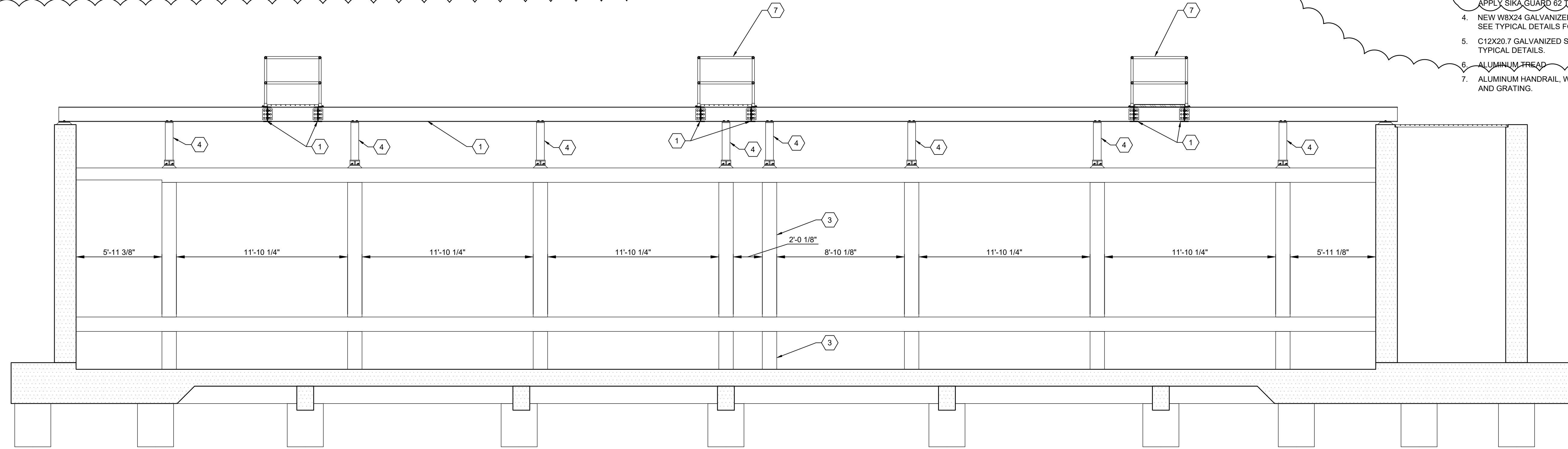
PLOTTED BY: jmarcum

PRINTED: 12/29/2020 @ 8:16AM

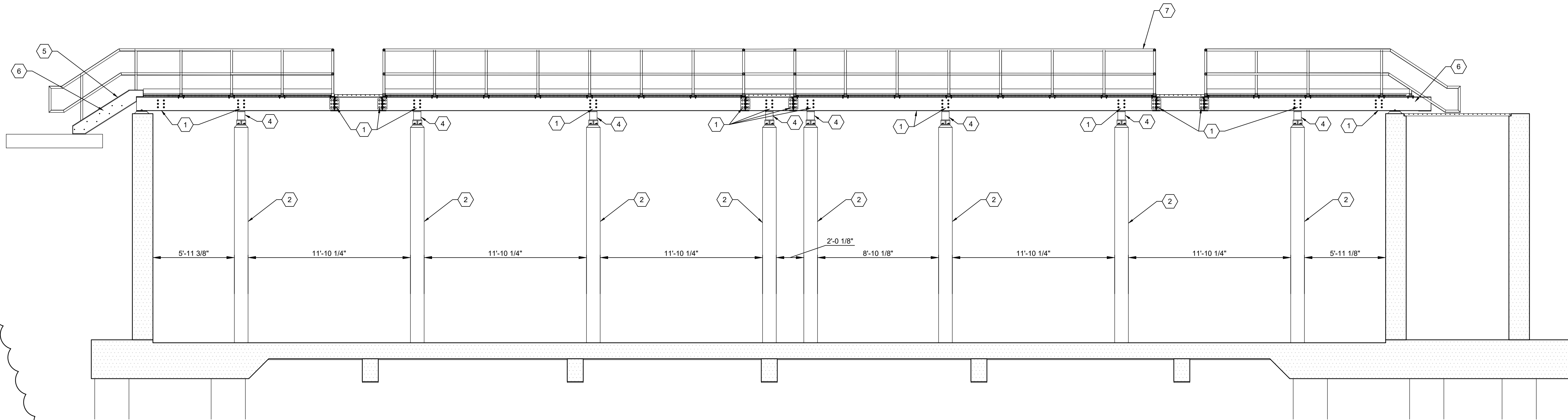
FILE NAME: S:\4789-NKWD FTTPBasin\Working Drawings\AutoCAD\4789 Border.dwg

SHEET KEYNOTES:

1. W12X35 GALVANIZED BEAM
2. NEW 12X18 CONCRETE COLUMN. SEE TYPICAL DETAILS FOR REINFORCING AND ATTACHMENT TO EXISTING BASIN. APPLY SIKA GUARD 62 TO NEW COLUMNS.
3. NEW 12X12 CONCRETE COLUMN AT NEW GATE ASSEMBLY. SEE TYPICAL DETAILS FOR REINFORCING AND ATTACHMENT TO EXISTING BASIN OR BEAM. APPLY SIKA GUARD 62 TO NEW COLUMN.
4. NEW W8X24 GALVANIZED STEEL POST ASSEMBLY. SEE TYPICAL DETAILS FOR ATTACHMENTS.
5. C12X20.7 GALVANIZED STAIR STRINGER. SEE TYPICAL DETAILS.
6. ALUMINUM TREAD
7. ALUMINUM HANDRAIL, WITH ALUMINUM TOE PLATE AND GRATING.



1 SECTION
SCALE: 1/4"=1'-0"
0 2 4 8



2 SECTION
SCALE: 1/4"=1'-0"
0 2 4 8

GRW PROJECT NO. 4789
CLIENT PROJECT NO. 184-4006

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**BASIN NO. 4 - SECTION
NEW WORK**
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

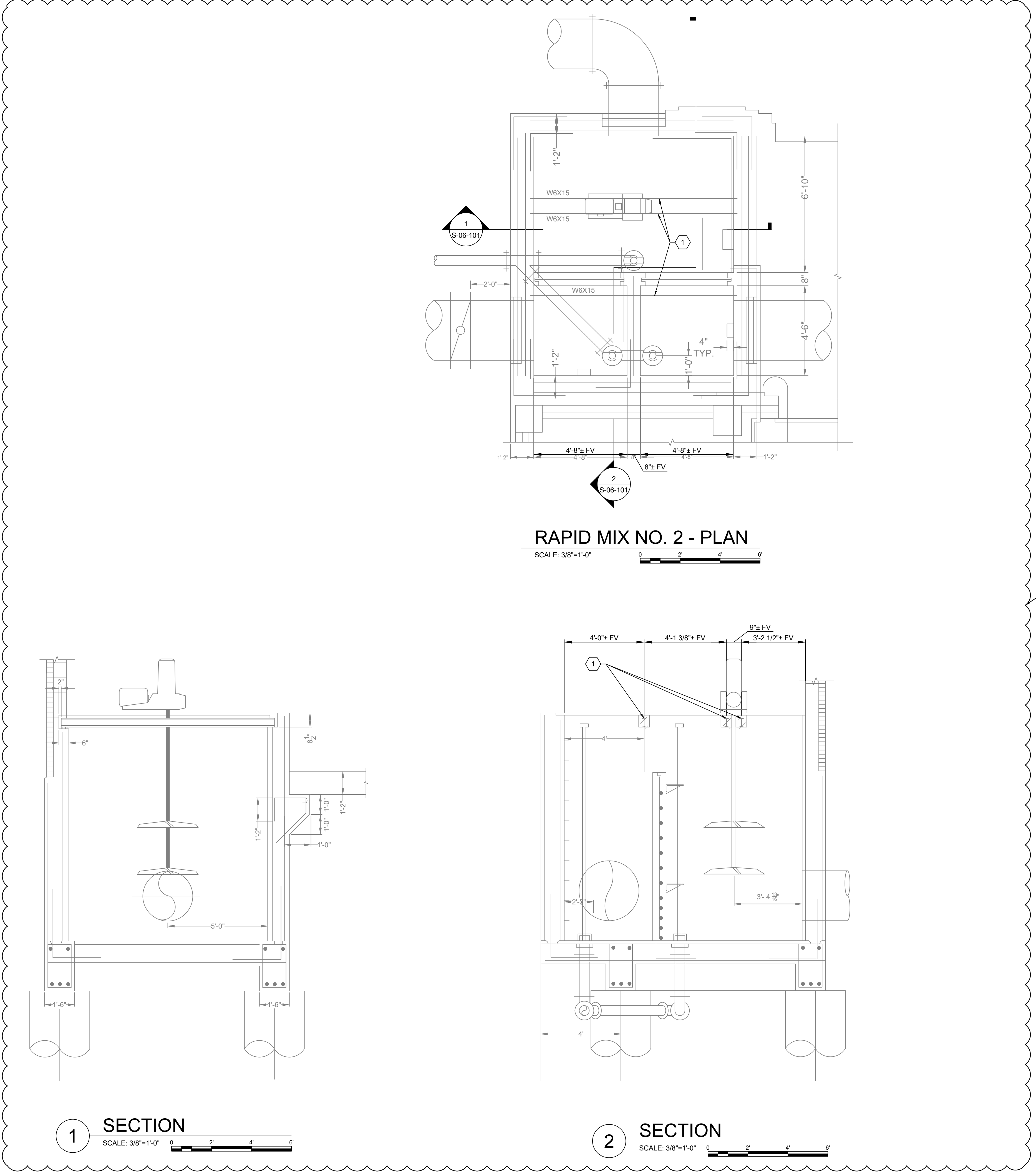
NO.	DATE	DESCRIPTION	DESIGNED BY	DRAWN BY	REVIEWED BY	APPROVED BY
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SCALE CHECK: _____ THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

DATE: DECEMBER, 2020
SCALE: 3/16"=1'-0"
SHEET NO.

S-04-502

BID SET



RAPID MIX NO. 2 - PLAN

SCALE: 3/8"=1'-0"

SECTION 1

SCALE: 3/8"=1'-0"

SECTION 2

SCALE: 3/8"=1'-0"

GENERAL SHEET NOTES:

- SEE PROCESS DRAWINGS FOR PROCESS EQUIPMENT TO BE DEMOLISHED.
- DEMOLISH EXISTING HANDRAIL ONLY AT TIE IN LOCATIONS OF NEW WALKWAYS. DEMOLISH ONLY ENOUGH TO PROPERLY ALLOW THE TIE IN TO OCCUR.

SHEET KEYNOTES:

- TEMPORARILY SHORE ANY FLOOR PLATES AND/OR EQUIPMENT THAT IS TO REMAIN, AND REMOVE EXISTING SUPPORT BEAMS AND BEARING PLATES.

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 CLIENT PROJECT NO. 184-4006
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RAPID MIX NO. 2 - PLAN & SECTIONS
DEMOLITION PLAN
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

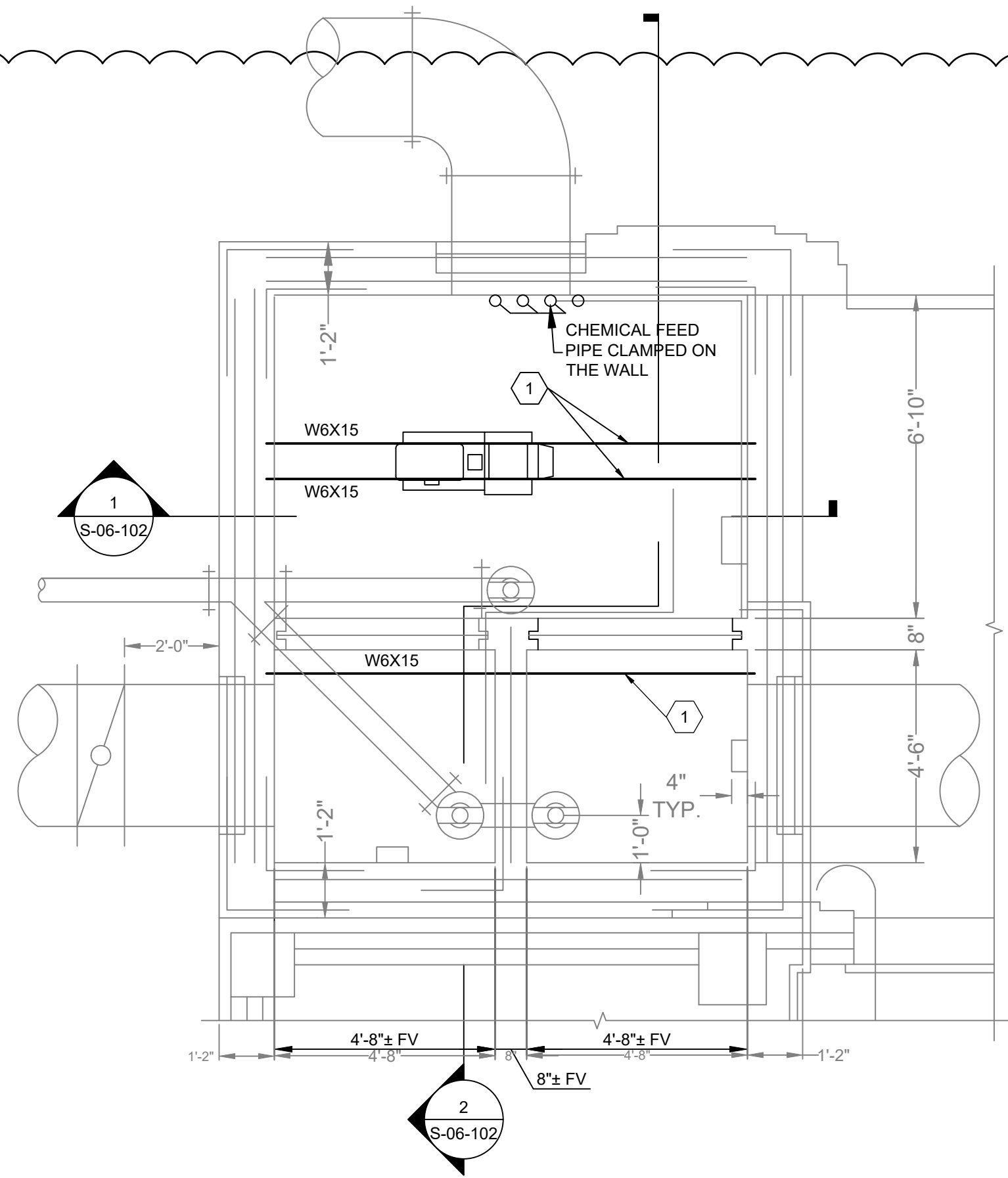
DESIGNED	JRM
BY	JRM
DATE	12/29/20
REVIEWED	JRM
APPROVED	JRM

DATE: **DECEMBER, 2020**
 SCALE: **3/8" = 1'-0"**
 SHEET NO.

S-06-101

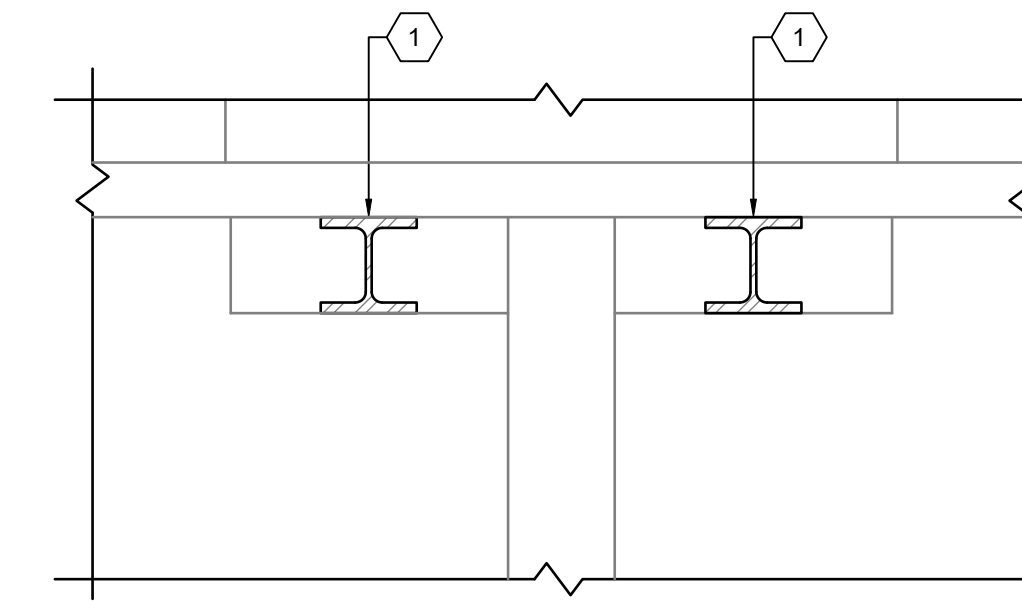
SHEET KEYNOTES:

- 1. ADD NEW HOT DIPPED GALVANIZED W6x15 SUPPORT BEAMS AND BEARING PLATES TO MATCH ORIGINAL ASSEMBLY..



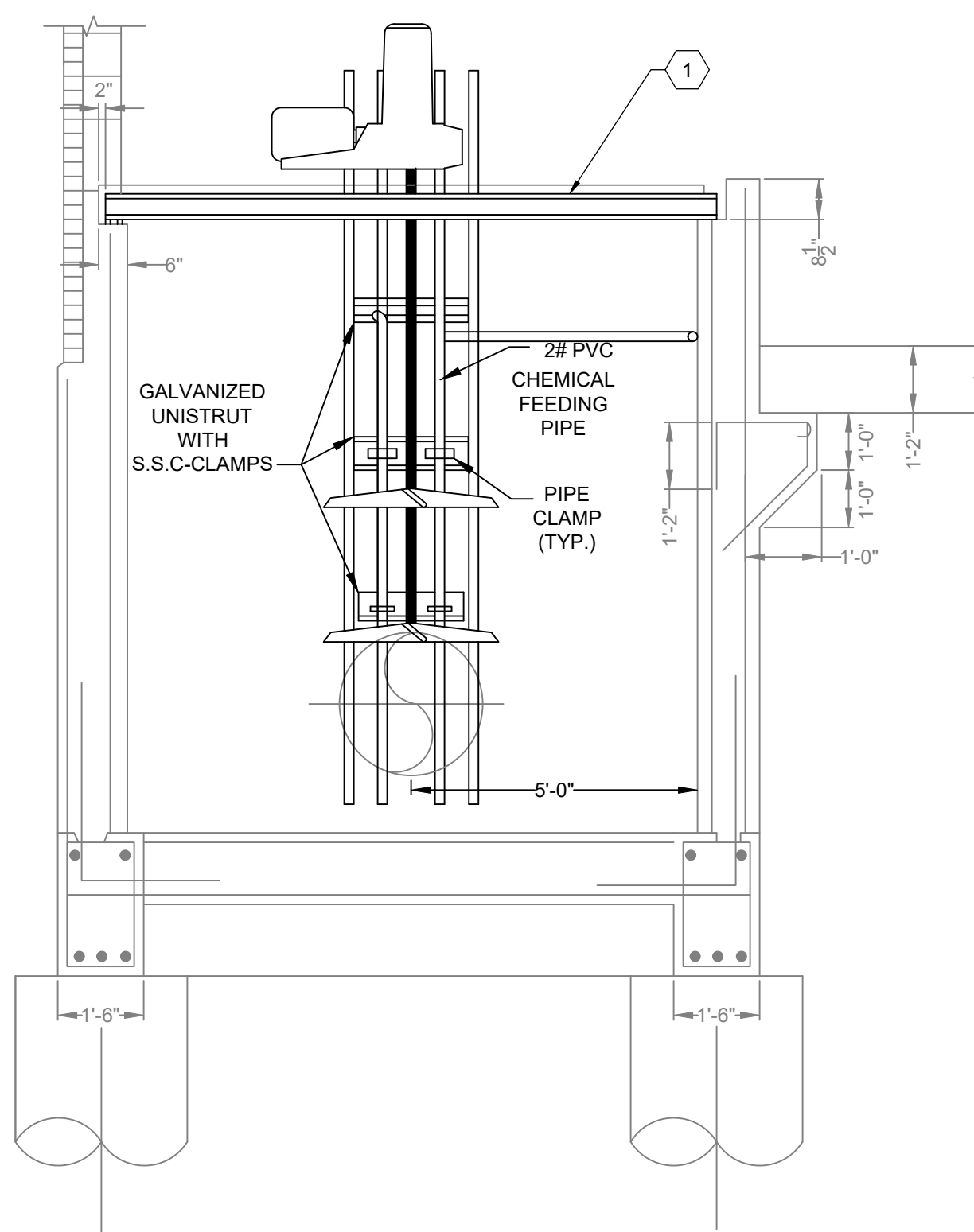
RAPID MIX NO. 2 - PLAN

SCALE: 3/8"=1'-0"



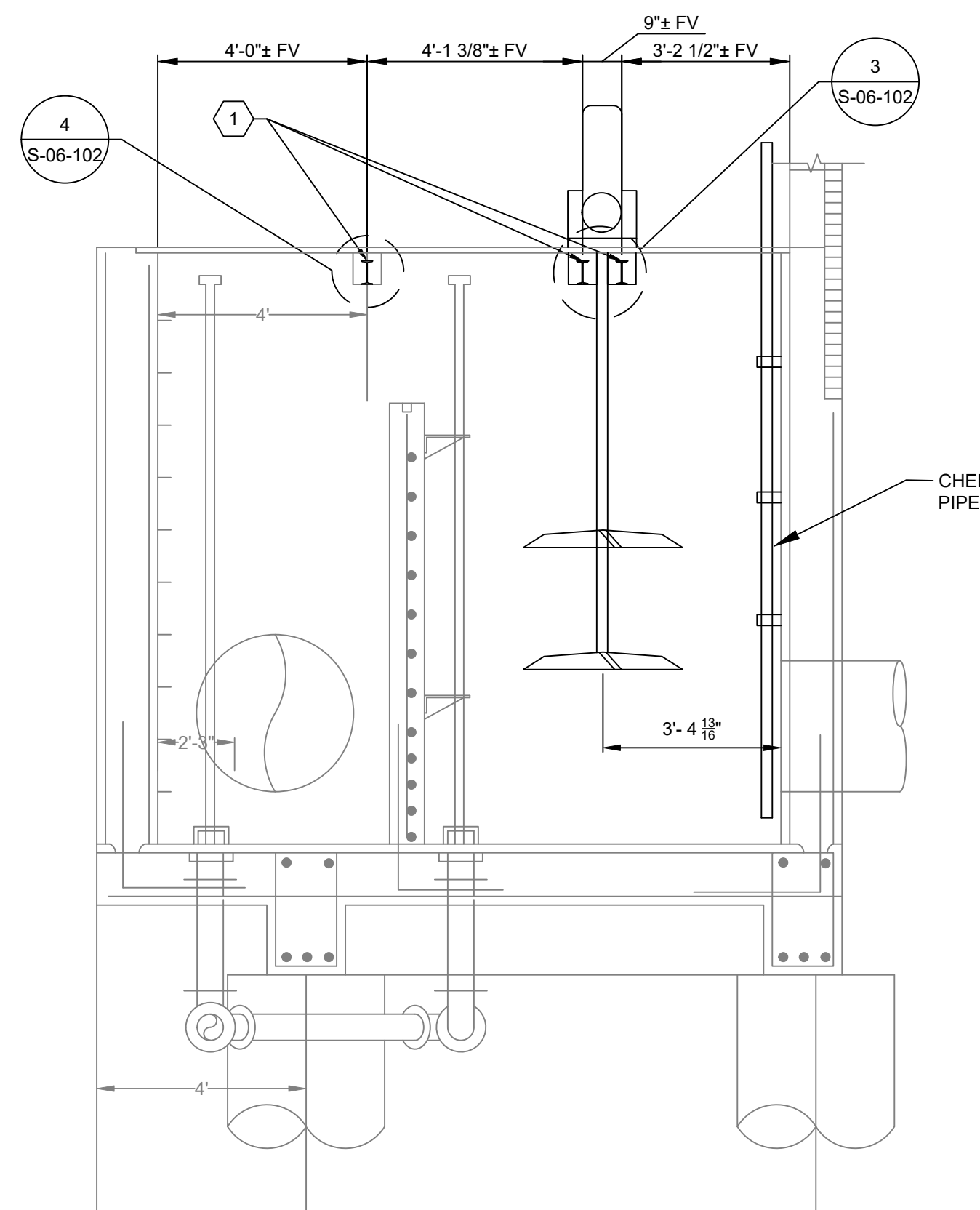
3 SECTION

SCALE: 1"=1'-0"



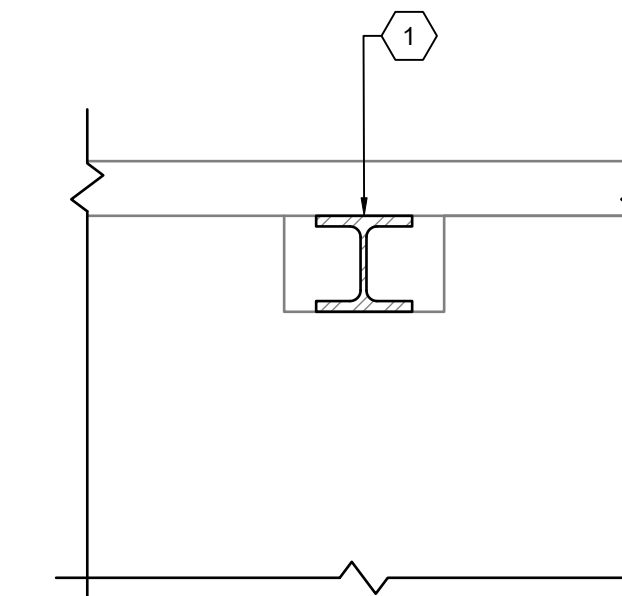
1 SECTION

SCALE: 3/8"=1'-0"



2 SECTION

SCALE: 3/8"=1'-0"



4 SECTION

SCALE: 1"=1'-0"

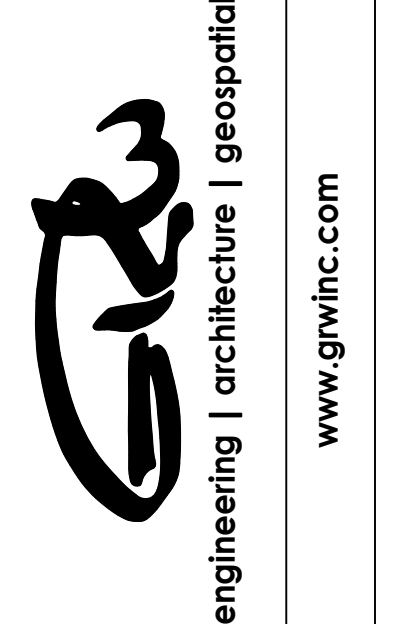
RAPID MIX NO. 2 - PLAN & SECTIONS
NEW BEAMS
FT THOMAS WATER TREATMENT PLANT
BASIN IMPROVEMENTS - PHASE 2
NORTHERN KENTUCKY WATER DISTRICT

DESIGNED	JRM
BY	JRM
DATE	12/29/20
DRAWN	JRM
REVIEWED	JRM
APPROVED	JRM

SCALE CHECK: _____ THIS MARK SHOULD MEASURE EXACTLY 1" WHEN PLOTTED

DATE: DECEMBER, 2020
SCALE: 3/8" = 1'-0"
SHEET NO.

S-06-102



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CLIENT PROJECT NO. 184-4006
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PLOTTED BY: P.Balsdon

PRINTED: 12/29/2020 @ 9:28AM

FILE NAME: G:\789-NKWD\FTP\Basin\Working Drawings\AutocAD\789-HQ-601.dwg

LEGEND:

- EXISTING DATA HIGHWAY PLUS (DH+) FIBER OPTIC CABLE
- EXISTING ETHERNET FIBER OPTIC CABLE
- EXISTING NETWORK CABLE AS NOTED
- EXISTING ETHERNET HUB
- EXISTING FIBER OPTIC PATCH PANEL
- EXISTING ETHERNET SWITCH
- EXISTING ETHERNET TRANSCEIVER
- ETHERNET FIBER OPTIC CABLE
- UTP ETHERNET CAT 6
- CONTROLNET COAX

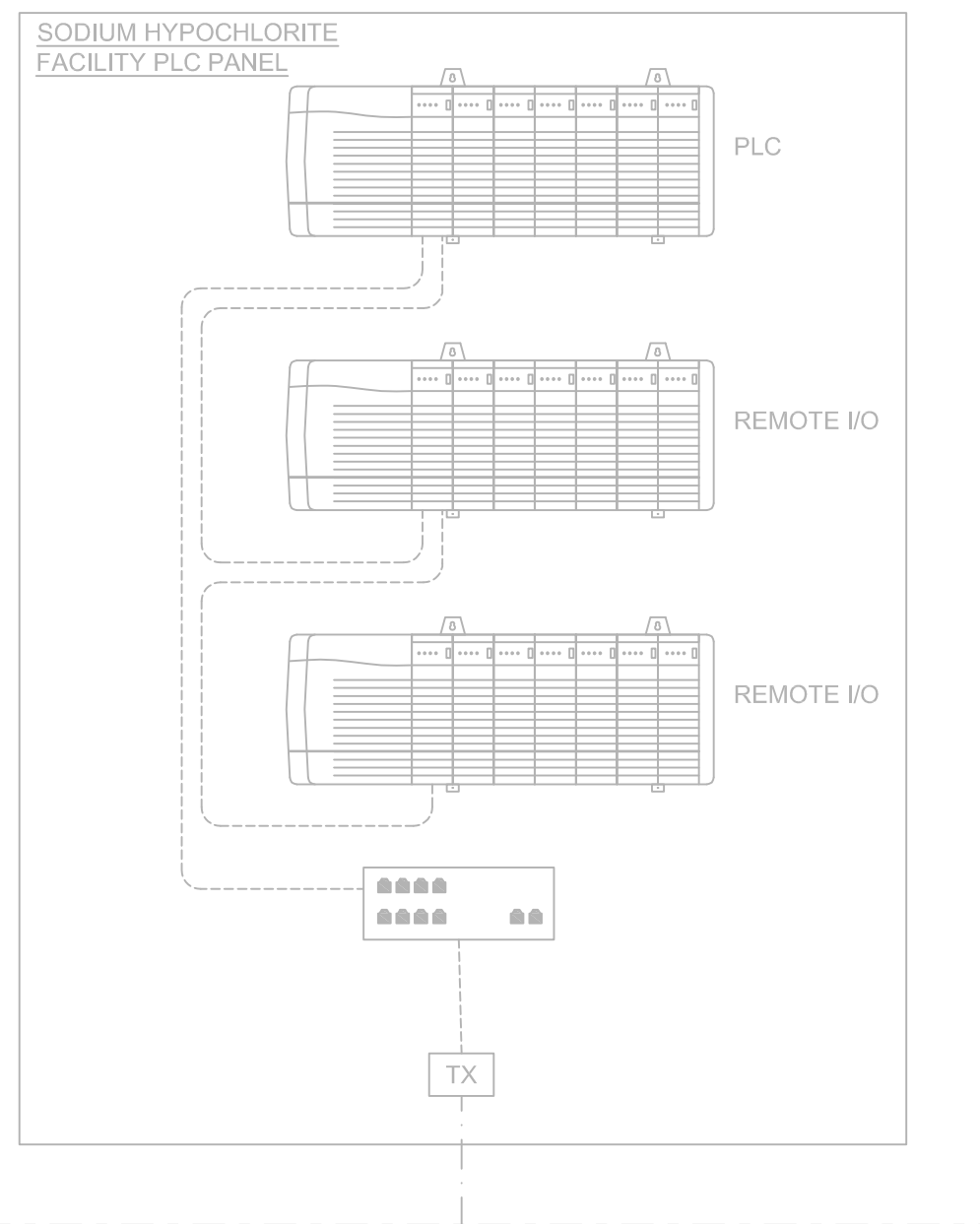
GENERAL NOTE:

1. ALL PLC WORK SHALL BE COMPLETED AS EARLY AS POSSIBLE IN THE PROJECT SCHEDULE. PROGRAMMING FOR ALL PLCs WILL BE PERFORMED BY A SEPARATE CONTRACT (OWNER'S SCADA DESIGN AND CONSTRUCTION 2020 PROJECT).

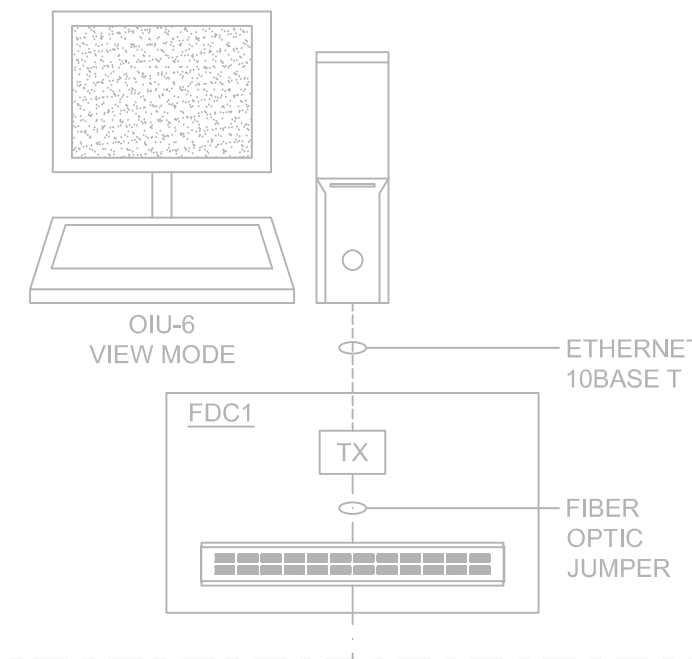
SHEET KEYNOTES:

1. REPLACE EXISTING ALLEN BRADLEY PLC 5 (PLC1) WITH NEW ALLEN BRADLEY CONTROLLOGIX PLC. REFER TO INPUT/OUTPUT MODULES ON SHEETS I-00-704 THROUGH I-00-715.
2. REPLACE EXISTING ALLEN BRADLEY PLC 5 (PLC2) WITH NEW ALLEN BRADLEY CONTROLLOGIX PLC. REFER TO INPUT/OUTPUT MODULES ON SHEETS I-00-719 THROUGH I-00-731.
3. NEW ALLEN BRADLEY CONTROLLOGIX PLC (PLC2 - RACK 3). REFER TO INPUT/OUTPUT MODULES SHOWN THE PLC2 - RACK 3 POINTS LIST ON SHEET I-00-732.
4. EXISTING FIBER OPTIC PATCH PANEL
5. MOXA EDS-G512E SERIES 12G-PORIT MANAGED ETHERNET SWITCH (NO EQUIVALENT).
6. BELDEN CAT 6 DATATUFF CABLE, SHIELDED, PART NO. 7953A OR EQUAL FOR DROPS IN CLOSE PROXIMITY TO VFD'S (OR INSIDE VFD CABINETS) - TYPICAL OF 12.

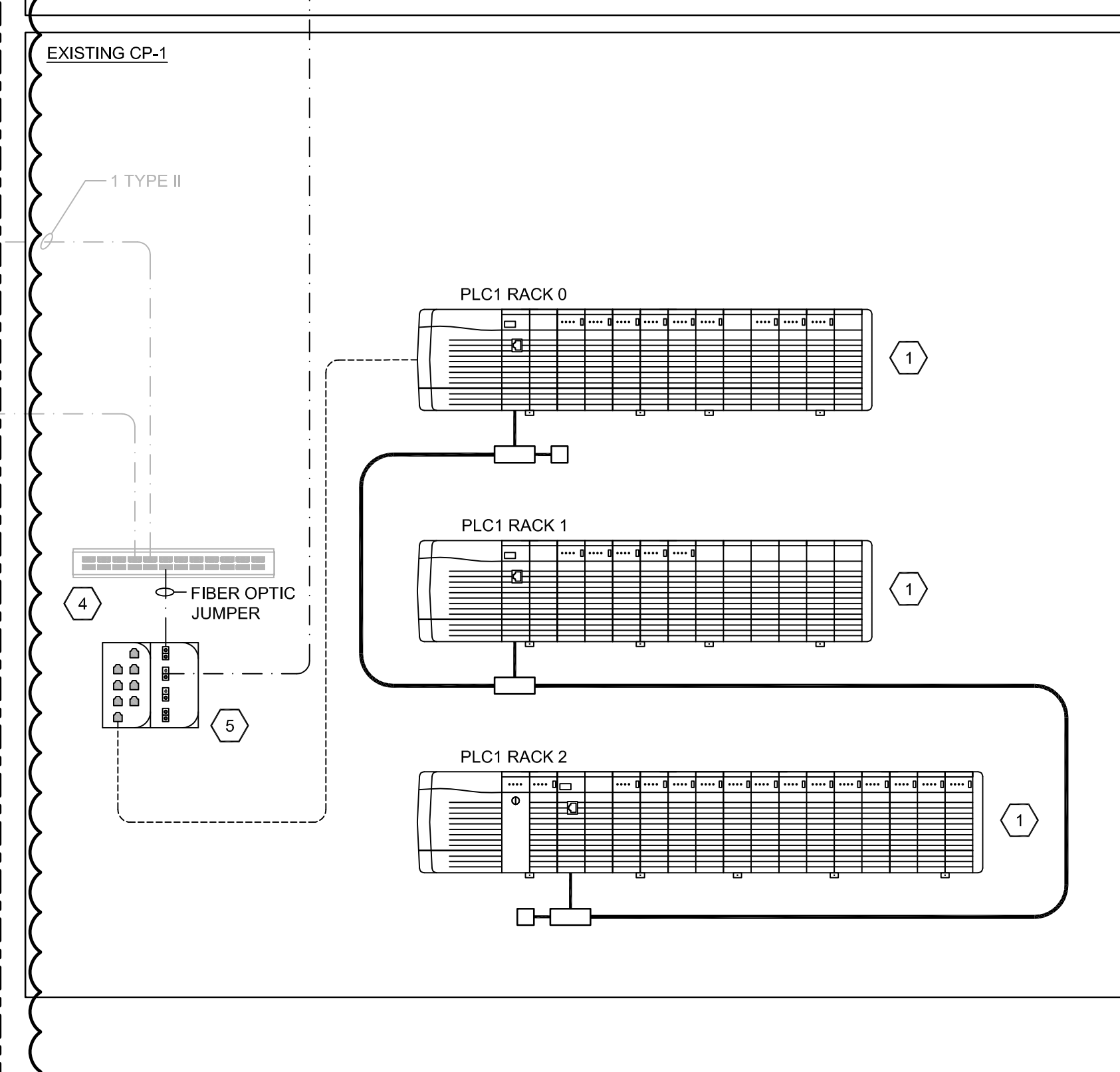
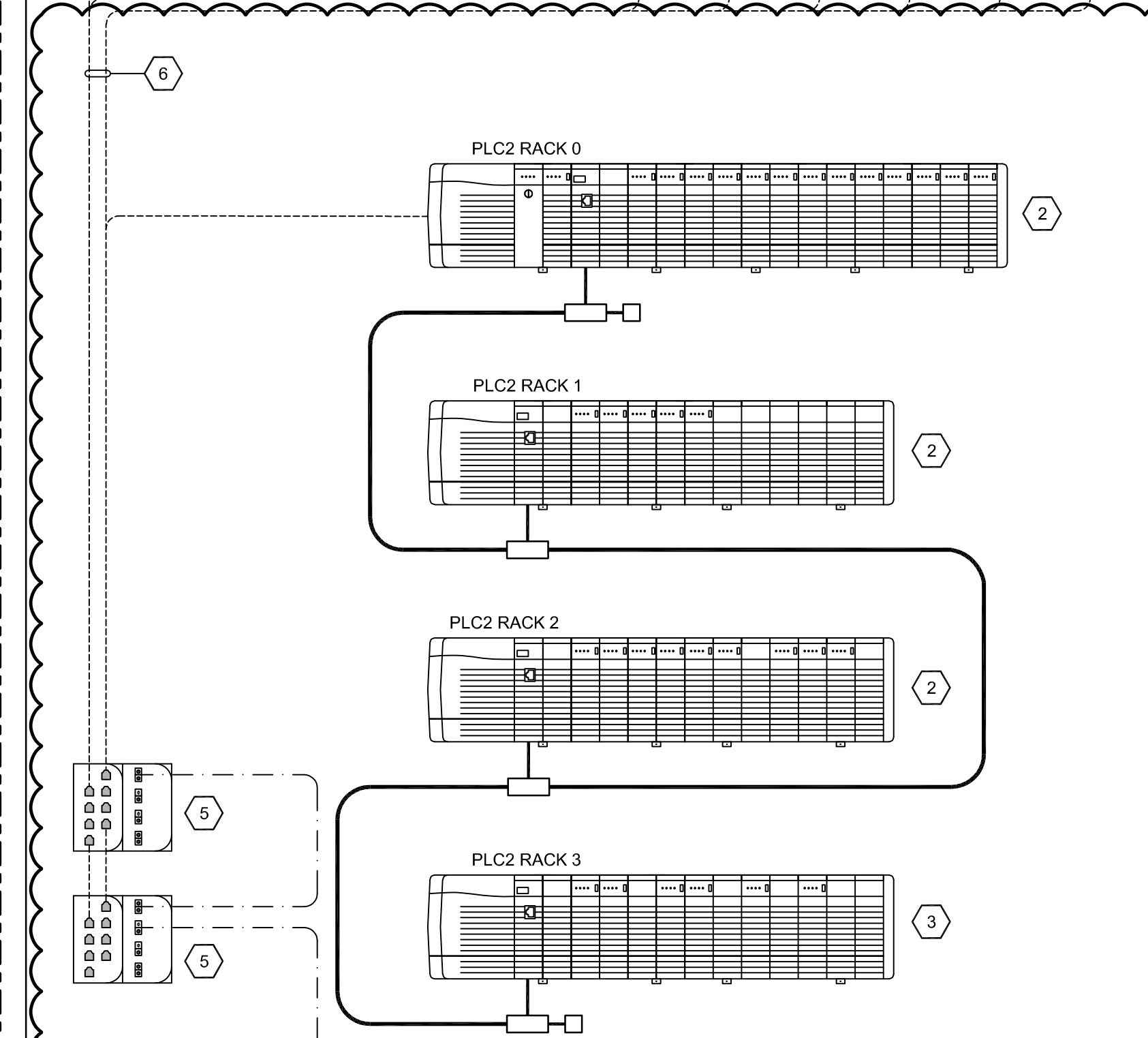
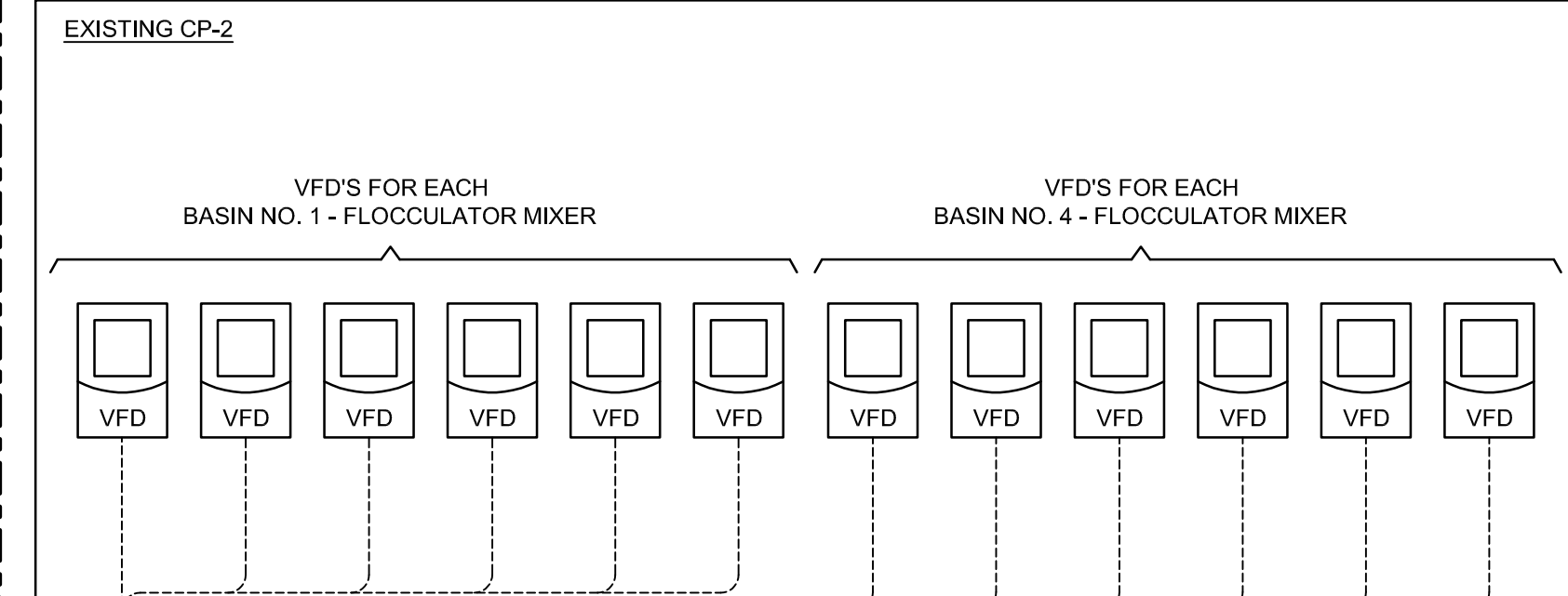
SODIUM HYPOCHLORITE FACILITY



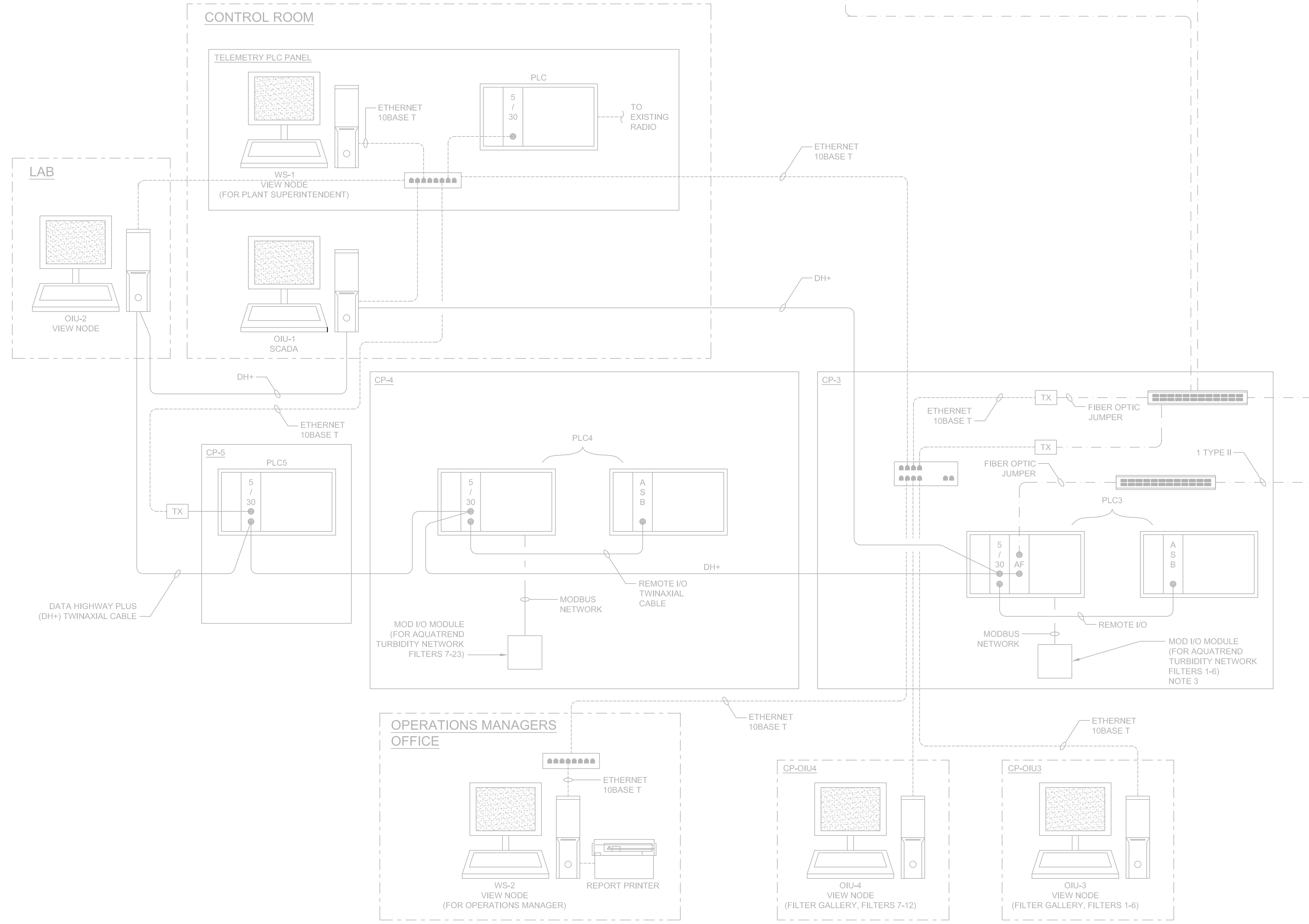
BELT PRESS BUILDING



CHEMICAL BUILDING



FILTER BUILDING



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 CLIENT PROJECT NO. 184-006
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PLANT NETWORKING DIAGRAM
 FT THOMAS WATER TREATMENT PLANT
 BASIN IMPROVEMENTS - PHASE 2
 NORTHERN KENTUCKY WATER DISTRICT

NO.	REVISIONS	DATE	BY	REVISIONS	DATE	BY
1	ADDENDUM NO. 2					

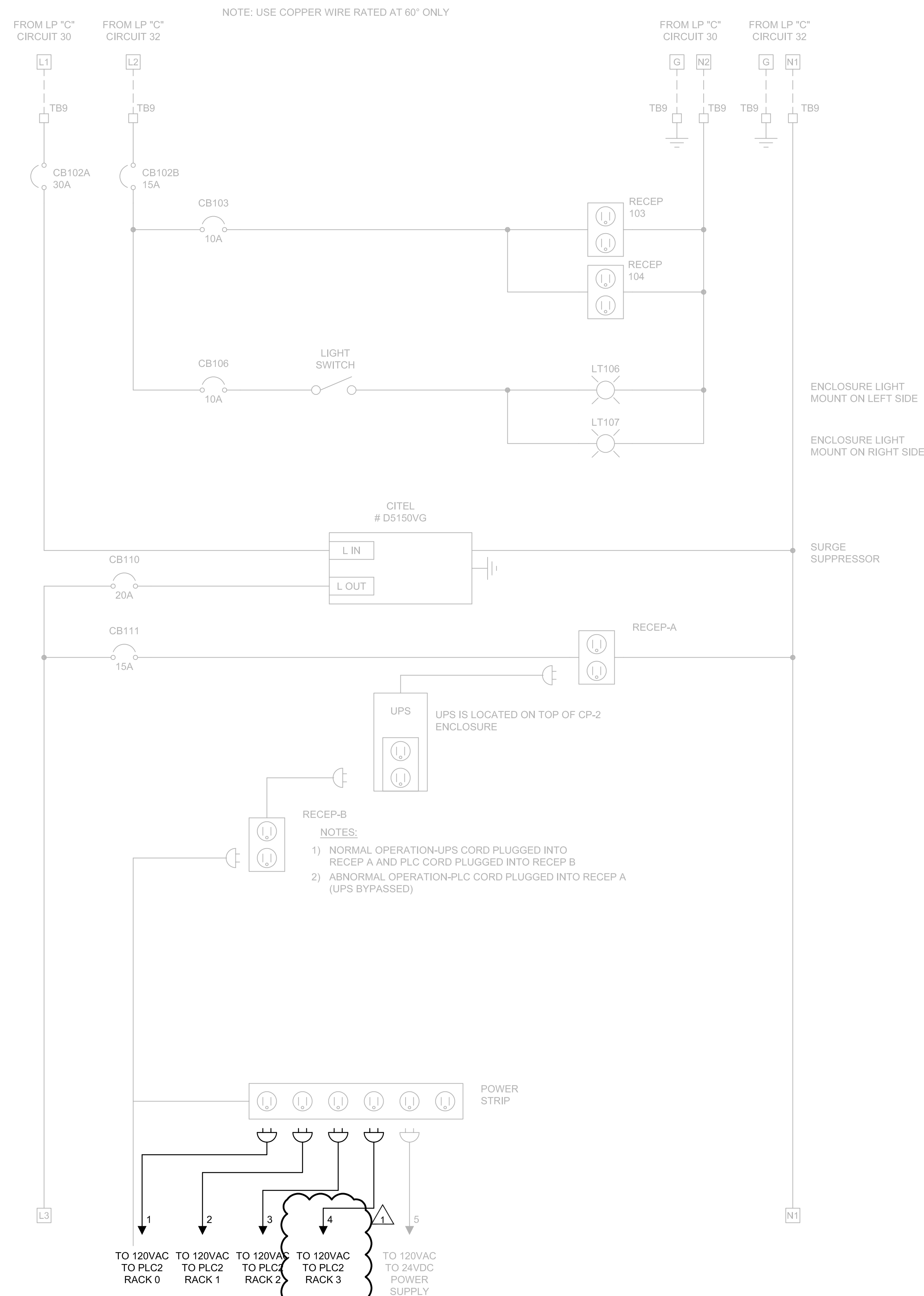
DATE: DECEMBER, 2020
 SCALE: NOT TO SCALE
 SHEET NO. I-00-601

BID SET

PLOTTED BY: P.Balsden

PRINTED: 12/28/2020 @ 5:52PM

FILE NAME: G:\789-NK\WD FTP\Bastin\Working Drawings\AutocAD\789-HQC-716.dwg



- 1) ALL WIRE TAGS TO BE SNAP OR SLIP ON PVC
 2) UNLESS NOTED ON THE SCHEMATICS USE THE FOLLOWING TYPE MTW FOR WIRING:
- | | |
|---------------------|------------------|
| PLC DISCRETE I/O | #18 AWG |
| AC CONTROL | RED #16 AWG |
| DC CONTROL | BLUE #16 AWG |
| NEUTRAL | WHITE #16 AWG |
| GROUND | GREEN #16 AWG |
| REMOTE POWER SOURCE | YELLOW #16 AWG |
| ANALOG | #18 AWG SHIELDED |

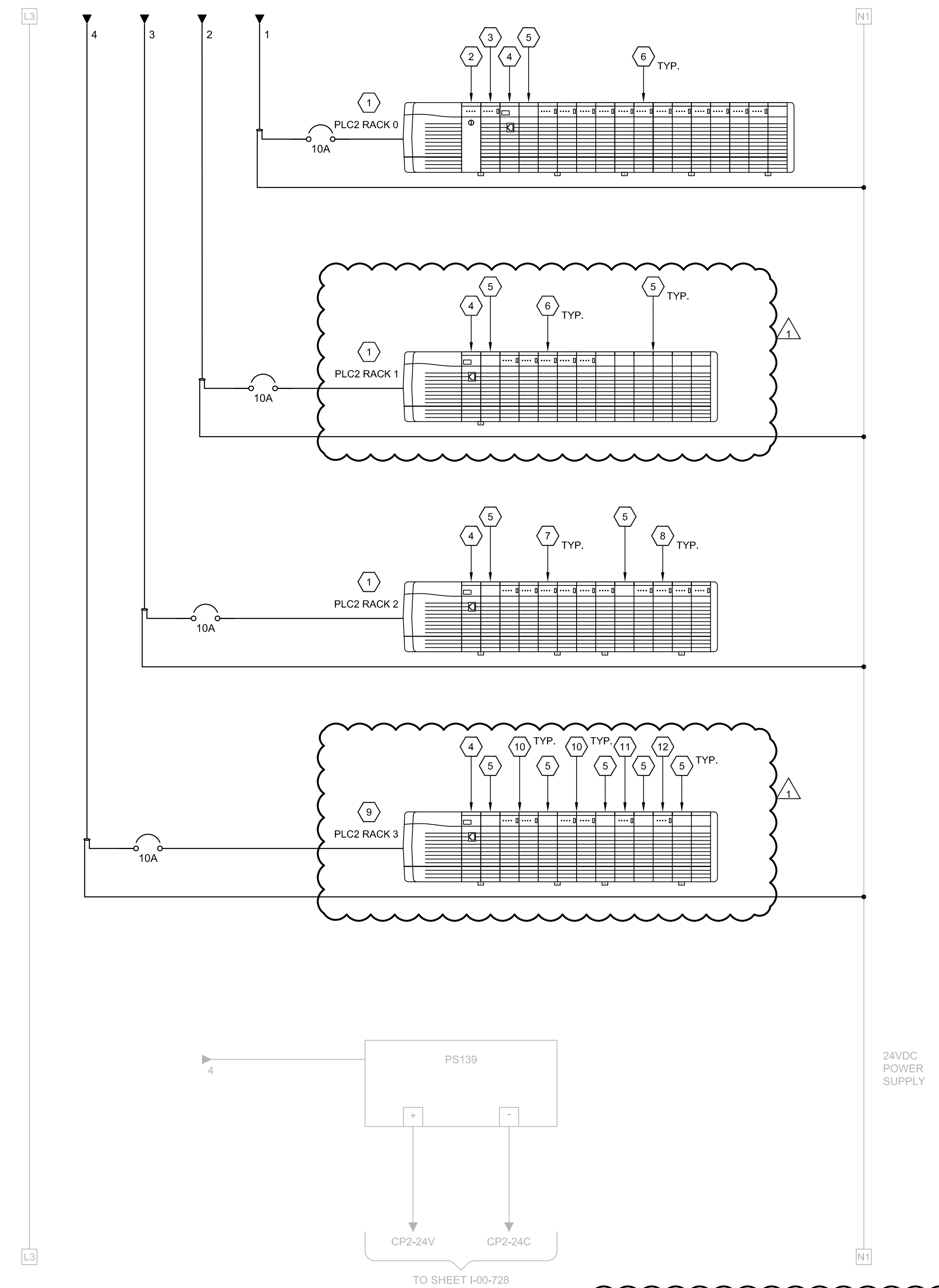


GENERAL NOTES:

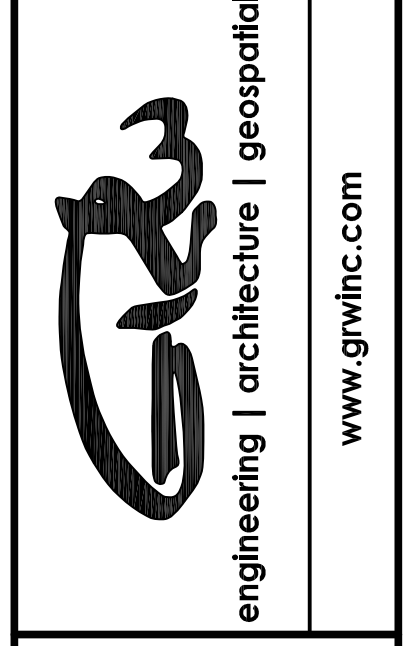
1. WORK SHOWN IN LIGHT PEN (SHADED) IS EXISTING TO REMAIN.
2. WORK SHOWN IN HEAVY PEN (BOLD) IS NEW WORK REQUIRED AS PART OF THIS CONTRACT.

SHEET KEYNOTES:

1. REPLACE EXISTING ALLEN BRADLEY PLC 5 WITH NEW ALLEN BRADLEY CONTROLLOGIX PLC.
2. CPU MODULE.
3. ETHERNET MODULE.
4. CONTROLNET MODULE.
5. SLOT FILLER MODULE.
6. DIGITAL INPUT/OUTPUT MODULES. REFER TO SHEETS I-00-719 THROUGH I-00-727 FOR QUANTITIES.
7. ANALOG INPUT MODULES. REFER TO SHEETS I-00-728 THROUGH I-00-729 FOR QUANTITIES.
8. ANALOG OUTPUT MODULES. REFER TO SHEETS I-00-730 THROUGH I-00-731 FOR QUANTITIES.
9. NEW ALLEN BRADLEY CONTROLLOGIX PLC FOR THE NEW PROCESS EQUIPMENT FOR BASIN NO. 1 AND NO. 4.
10. DIGITAL INPUT/OUTPUT MODULES. REFER TO PLC2 - RACK 3 POINTS LIST ON SHEET I-00-732.
11. SPARE ANALOG INPUT MODULE.
12. SPARE ANALOG OUTPUT MODULE.



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 CLIENT PROJECT NO. 184-406
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EXISTING SCADA SYSTEM CONTROL PANEL, CP-2 MODIFICATIONS I FT THOMAS WATER TREATMENT PLANT BASIN IMPROVEMENTS - PHASE 2 NORTHERN KENTUCKY WATER DISTRICT

DESIGNED: PJB
 DRAWN: PJB
 REVIEWED: PJB
 APPROVED: PJB

NO.	DESCRIPTION	DATE	BY
1	ADDENDUM NO. 2	12/29/20	PJB

SCALE CHECK: THIS SCALE SHOULD BE EXACTLY THE SAME AS THE SCALE OF THE SHEET IT IS REFERRED TO.

DATE: DECEMBER, 2020

SCALE: NOT TO SCALE

SHEET NO. I-00-716

BID SET



ADDENDUM NO. 3

**Fort Thomas Treatment Plant Basin Improvements
Phase 2 of WX21117210
Fort Thomas, Kentucky**

GRW Project No. 4789

January 8, 2020

DRAWINGS

1. **Drawing S-01-302, Basin No. 1 Section – [Modify the following]**
 - a. Keynote #8 shall be modified by changing 3,350 SQFT to 4,800 SQFT.
 - b. Revised drawing not attached. Drawing revision will be made on Conformance Drawings.

2. **Drawing S-04-302, Basin No. 4 Section – [Modify the following]**
 - c. Keynote #8 shall be modified by changing 3,350 SQFT to 4,800 SQFT.
 - d. Revised drawing not attached. Drawing revision will be made on Conformance Drawings.

CONTRACTOR QUESTIONS AND ANSWERS

SET 4

- Q1: Are the VFD's required to be Nema 4X since the VFD's are located indoors in a controlled environment. For what it's worth, there are other Eaton VFD's in the same area that I believe are not Nema 4X?
- A1: Panelboards and VFDs within the Rapid Mix Building (Sheet E-06-102) may be NEMA 12 in lieu of NEMA 4X.
- Q2: There is a note on Drawing E-00-702 for the Flocculator control that states Ethernet cable shall be Allen Bradley. If the VFD is not Allen Bradley does the Ethernet cable still need to be Allen Bradley?
- A2: An equivalent cable manufacturer is acceptable.
- Q3: Is it also acceptable to installed rigid aluminum conduit in the Rapid Mix Building drawing E-06-102?

- A3: Rigid aluminum conduit is acceptable within Rapid Mix Building.
- Q4: Is it acceptable to route conduits on the side of the structural support for the Basin No.1 and Basin No.4 Clarifiers? Drawing E-01-102 & E-04-102?
- A4: Yes. That was the intention of keynote #3 on Drawing E-01-102 and keynote #11 on Drawing E-04-102.
- Q5: Is Motor Control training required per 260000 1.18 since we are just installing new buckets with breakers and new buckets with starters. If required what do we train on, no specification.
- A5: Motor control training, as intended, is for manufacturer training for the motor control center. This motor control training is not required.
- VFD training by the manufacturer is still required.
- Q6: Is it also acceptable for SPD's to be interior to the panels?
- A6: SPDs may be integral to panelboards.

SET 5

- Q1: We see no specifications for site restoration. Can the engineer please provide specification sections for this work (i.e. seeding, asphalt paving, concrete paving, sidewalks)?
- A1: Concrete paving and sidewalks – Restore back to match existing. Install Class A concrete per KYTC standards.
- Seeding - See attached Lawns and Grasses specification section 329200.
- Q2: Please confirm that the SIKA Guard 62, found on S-01-302 notes 2 & 3, is to be used to coat the entire 12x12 and 12x18 columns. Are these columns included in the 3,350 SQFT given in note 8 of S-01-302?
- A2: Yes the SIKA Guard 62 is to be used to coat the entirety of the new 12x12 and 12x18 columns in Basins Nos. 1 and 4 as described in Keynotes 2 and 3 on S-01-302 (Basin No. 1) and S-04-302 (Basin No. 4). Coating of these new columns is NOT included in the 3,350 SQFT described in Keynote 8 on S-01-302 and S-04-302 and as a result must be accounted for separately by the contractor. Note that Keynote 8 on S-01-302 and S-04-302 is for the rehabilitation of the existing concrete surfaces in the basins and does not address the coating of new concrete surfaces such as the new 12x12 and 12x18 columns.

SET 6

Q1: Spec section 409700-2.3.a - Electric Gate/Valve Operators – The end of the paragraph calls for all components to be “NEMA 4X, 6, and IP68. IP68 submersible actuators shall be certified to a depth of 15 meters for 168 hours.”

- A. Are there any exceptions to this? To our knowledge, there is no known standard electric actuator that can meet these submersible requirements of 15 meters for 168 hours. Is this referring to the gearbox only given the controls are at ground level?
- B. Should the gearbox connection be at the valve within the pit?

A1: Clarification. All actuators shall be NEMA 4X/6 rated, with exception of the actuator associated with Sludge Valve (FCV-15-3501) at Basin No. 1.

The actuator for Sludge Valve (FCV-15-3501) at Basin No. 1 shall be provided with an actuator that is NEMA 4X,6 and IP68 rated (IP68 certified for submersion to 15m for 96 hours). The associated auxiliary control station shall be NEMA 4X/6 rated.

SET 7

Q1: In order to ensure that the maximum weir loading rate (22,727 gpd/ft of weir length) for the plate settlers is not exceeded would GRW/NKWD consider changing the minimum number of troughs to 13 (10 inside, 1 inside collection & 2 outside) to meet the weir loading rate?

A1: The plate settler specification includes a 22,727 gpd/ft of weir length maximum weir loading rate requirement which we believe sufficiently addresses the concern about the potential to exceed the weir loading rate. The plate settler manufacturer shall submit weir loading rate calculations with their shop drawing.

GRW Engineers, Inc.



Todd Solomon, PE
Project Manager

Attachments:

Specification Section 329200

SECTION 329200 - LAWNS AND GRASSES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Provide all labor, materials, equipment, and services required for seeding of all disturbed areas caused by construction activities.

1.2 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to Work of this Section.

1.3 MAINTENANCE

- A. Maintenance shall begin immediately following the last operation of installation for each portion of lawn.
- B. Lawns shall be maintained by watering, mowing, and for resodding for a period of forty-five (45) days. At the end of this period an inspection will be made and any deficiencies, which may be attributable to the Contractor, will be noted in writing. At this time, the Owner will assume the maintenance. Another inspection will be made at the beginning of the next planting season, and any of the previously noted deficiencies still existing shall be repaired by the Contractor.

1.4 INSPECTION FOR ACCEPTANCE

- A. The Inspection of the Work:
 - 1. The inspection of the work of lawns to determine the completion of contract work exclusive of the possible replacement of plants, will be made by the Architect/Engineer upon written notice requesting such inspection submitted by the Contractor at least ten (10) days prior to the anticipated date.
- B. Acceptance:
 - 1. After inspection, the Contractor will be notified in writing by the Owner of acceptance of all work of this Section, exclusive of the possible replacement of plants subject to guaranty, or if there are any deficiencies of the requirements of completion of the Work.

PART 2 - PRODUCTS

2.1 WATER

- A. Water used in this work shall be suitable for irrigation and free from ingredients harmful to plant life.
- B. Hose and other watering equipment required for the Work shall be furnished by the Contractor.

2.2 TOPSOIL

- A. The Contractor shall furnish and place sufficient topsoil for the seeding.

2.3 FERTILIZER

- A. Commercial fertilizer for lawn areas shall be complete fertilizer, formula 10-10-10, for lawns and shall conform to the applicable state fertilizer laws. Fertilizer shall be uniform in composition, dry and free flowing and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guarantee analysis. Any fertilizer which becomes caked or otherwise damaged making it unsuitable for use will not be accepted.
- B. Fertilizer shall be applied at the rate of 25 pounds per 1,000 square feet.

2.4 GRASS SEED

- A. The seed mixture to be sown shall be in the following proportions:

<u>Common Name</u>	<u>Proportion By Weight</u>	<u>% of Purity</u>	<u>% of Germination</u>
Fine Lawn Fescue	40	90	85
Chewings Fescue	25	90	85
Italian Rye Grass	20	90	85
Red Top	10	90	85
White Clover	5	95	90

- B. All seed shall be fresh and clean and shall be delivered mixed, in unopened packages, bearing a guaranteed analysis of the seed mixture.
- C. Germination must be certified to conform to the following minimums:

Purity	90%
Germination	85%

2.5 MULCH

- A. Mulch for seeded areas shall be Conwed Hydro Mulch, Silva-Fiber, or equal. It shall be suitable for use in a water slurry or for application with hydraulic equipment.
- B. Clean straw is acceptable as mulch. It shall be spread at the rate of one (1) bale per 1,000 feet (approximately 2 inch loose depth).
- C. Mulch on slopes greater than 1: 3 shall be held in place with turf reinforcing mat.
- D. Mulch on areas subject to surface water run-off or in drainage ditches shall be held in place with erosion control netting.

PART 3 - EXECUTION

3.1 TIME OF PLANTING

- A. Planting operations shall be conducted under favorable weather conditions during seasons which are normal for such work as determined by accepted practice in the locality of the project. At the option and on full responsibility of the Contractor, planting operations may be conducted under unseasonable conditions without additional compensation.

3.2 LAWNS

- A. Areas of cut and fill and where existing ground has been disturbed by construction operations shall be seeded.
- B. Fertilizer:
 - 1. Fertilizer shall be applied at the rate of 25 pounds per 1,000 square feet to the lawn area being prepared for planting and mixed lightly into the top few inches of topsoil. Fertilizer may be mixed with and distributed with grass seed.
- C. Planting of Lawns:
 - 1. Sowing of Seed:
 - a. Immediately before any seed is to be sown, the ground shall be scarified as necessary, and shall be raked until the surface is smooth, friable and of uniformly fine texture. Lawn areas shall be seeded evenly with a mechanical spreader at the rate of 4 pounds per 1,000 square feet of area, lightly raked, rolled with a 200-pound roller and watered with a fine spray. The method of seeding may be varied at the discretion of the Contractor on his own responsibility to establish a smooth, uniform turf composed of the grasses specified. The sowing of seed shall be done only within the season extending from March 1st to May 15th and from September 1st to October 15th, unless other seasons may be approved by the Owner.

2. Mulching:

- a. All seeded areas are to be mulched with Conwed Hydro Mulch, Silva-Fiber, or equal, or with clean straw as specified under PRODUCTS. Mulch shall be applied at the rate of 1,500 pounds per acre. It may be applied with hydraulic equipment or may be added to the water slurry in a hydraulic seeder and the seeding and mulching combined in one operation. Clean straw may be spread by hand to cover the seeded areas at a depth of two (2) inches. Erosion control netting shall be installed and anchored per manufacturer's instructions in areas of slopes, ditches, or surface water runoff.

3.3 CLEAN UP

- A. All soil, peat or similar material which has been brought over paved areas by hauling operations or otherwise, shall be removed promptly, keeping these areas clean at all times. Upon completion of the planting all excess soil, stone and debris which have not previously been cleaned up shall be removed from the site or disposed of as directed by the Owner. All lawns shall be prepared for final inspection.

3.4 OTHER WORK

- A. The Contractor also shall be responsible for the repair of any damage caused by his activities or those of his subcontractors, such as the storage of topsoil or other materials, operations or equipment, or other usages to all on-site areas outside the contract limits. Such repair operations shall include any regrading, seeding or other work necessary to restore such areas to an acceptable condition.

3.5 QUALITY CONTROL

- A. Areas seeded shall be protected until a uniform stand develops, when it will be accepted and the Contractor relieved of further responsibility for maintenance. Displaced mulch shall be replaced or any damage to the seeded area shall be repaired promptly, both in a manner to cause minimum disturbance to the existing stand of grass. If necessary to obtain a uniform stand, the Contractor shall refertilize, reseed and remulch as needed. Scattered bare spots up to one (1) square foot in size will be allowed up to a maximum of 10 percent of any area.

END OF SECTION 329200

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

CERTIFIED STATEMENTS

Affidavit (B.1)

Franchises (B.2)

Plan Review and Permit Status (B.3)

Easements and Right-of-Way Status (B.4)

Construction Dates and Proposed Date In Service (B.5)

Plant Retirements (B.6)

State Debt Officer Notification (B.7)

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

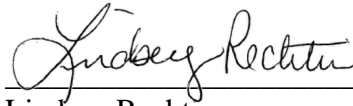
184-4006

Affidavit

AFFIDAVIT

Fort Thomas Treatment Plant Basin Improvements – Phase 2

Affiant, Lindsey Rechten, being the first duly sworn, deposes and says that she is the Vice President of Finance and Support Services of the Northern Kentucky Water District, which she is the Applicant in the proceeding styled above; that she has read the foregoing “Fort Thomas Treatment Plant Basin Improvements – Phase 2” Application and knows the contents thereof, and that the same is true of her own knowledge, except as to matters which are therein stated on information or belief, and that is to those matters she believes them to be true.



Lindsey Rechten.
Vice President, Finance & Support Services
Northern Kentucky Water District

Subscribed and sworn to before me in said County to be her act and deed by
Lindsey Rechten, Vice President of Finance and Support Services of the Northern
Kentucky Water District, this

2nd day of February 2021.



NOTARY PUBLIC ID # KYNP17828
Campbell County, Kentucky
My commission expires December 21, 2024

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

Franchises (B.2)

Plan Review and Permit Status (B.3)

Easements and Right-of-Way Status (B.4)

Construction Dates and Proposed Date In Service (B.5)

Plant Retirements (B.6)

Franchises required – None

Plan Review and Permit Status –

The District has reviewed and approved the plans and specifications prepared by GRW, Inc., titled “Fort Thomas Treatment Plant Basin Improvements – Phase 2” dated November 2020, sealed by a P.E.

The Kentucky Division of Water approval is attached.

Easements and Right-of-Way Status – No easements will be needed for this project.

Start date of construction – May 2021

Proposed date in service – May 2023

Plant retirements – There are no retirements as a result of this project.

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

PLAN REVIEW AND PERMIT STATUS

Approval Letter from Kentucky Division of Water



ANDY BESHEAR
GOVERNOR

REBECCA W. GOODMAN
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

ANTHONY R. HATTON
COMMISSIONER

300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601

October 20, 2020

Amy Kramer, P.E.
Northern KY Water District
2835 Crescent Springs Rd
Erlanger, KY 41018

RE: Fort Thomas WTP Basin Improvements Ph2
F20-044
Campbell County, KY
Northern KY Water District
AI #: 2485, FGL20200006

Dear Amy Kramer:

The Kentucky Division of Water (DOW) has reviewed for completeness and adequacy the construction plans and specifications submitted for the above referenced contract(s). The DOW now approves these plans and specifications with respect to sanitary features of design in accordance with the requirements contained in this letter. The plans consist of the replacement of Rapid Mix #2 and modifications to basins #1 and #4 including but not limited to the construction of inclined plate settlers, new clarifier mechanisms and new flocculators. The approval conditions and a list of eligible/ineligible items are enclosed. Please note that ineligible items cannot be funded using State Revolving Fund (SRF) monies, and must be paid by other funding sources.

We are enclosing one (1) set of approved plans and specifications. An identical set should be made available at the project site at all times. If modifications are made to these plans and specifications before bidding, two (2) complete sets of as-bid plans and specifications must be submitted to the DOW for approval. A second DOW construction approval must be issued by separate correspondence before proceeding with advertising for bids. Any red line changes that were made by DOW personnel on the approved plans shall be incorporated into the bid set plans unless an alternative is approved.

You may now advertise for bids on the construction of this project. In addition to other notifications, this project must be advertised in the newspaper of the largest daily circulation in the project area.

You are cautioned not to advertise unless you have a proper wage decision. The Federal Davis-Bacon wage rates are applicable for this project. Please contact all other funding sources for their requirements pertaining to federal wage rates.

You are reminded that the construction contracts are subject to the equal employment opportunity requirements contained in Executive Order 11246. Equal employment opportunity

affirmative action by the prime contractors and all subcontractors is mandated throughout the duration of the contract. Documentation of efforts to comply with Executive Order 11246, Equal Employment Opportunity is required to be kept by the borrower.

Review the attached Project Review and Cost Summary form for details of the information to be collected and retained in your files or to be submitted to DOW for review and approval. This form must be completed, signed by the recipient, and with the necessary information be then forwarded to the DOW. This signature will certify that all the information to be retained by the recipient has been secured and is available for review by the Division at the pre-construction conference. The required information must be approved by the DOW before executing any contracts.

Along with the Project Review and Cost Summary form, the following items must be submitted to the DOW for review and approval before executing any contracts:

- The bid advertisement
- Revised Project Budget
- Certified bid tabulation
- Documentation of compliance with DBE Good Faith Effort in accordance with 40 CFR 33.301

These items will be reviewed as a part of the Authority to Award process. The DOW will authorize you to award the contracts once these documents are approved

After the Notice to Proceed is signed, the DOW will need a copy of the executed contract documents, including plans and specifications.

Changes orders will require approval from the DOW before payment can be authorized from the State Revolving Fund. Submission of plans and specifications may be required for change order work.

Upon completion of the project, as-built drawings shall be provided to the DOW. As-builts shall be stamped, signed and dated by a professional engineer. A written certification stating that the project was constructed according to the approved plans shall be provided to the DOW by a professional engineer.

This letter has been issued under the provisions of KRS Chapter 224 and the regulations promulgated pursuant thereto. Issuance of this approval does not relieve the applicant from the responsibility of obtaining any other approvals, permits or licenses required by this Cabinet and other state, federal and local agencies.

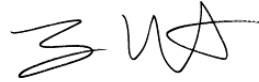
Unless construction on this project commences within two years from the date of this approval letter, Northern KY Water District shall re-submit the original plans and specifications for a new comprehensive review.

You are cautioned that the advertisement and award of this contract will be subject to the laws and regulations that govern the State Revolving Fund (SRF) and to the conditions of your loan

Taylor Mill and Ft. Thomas Plants
F20-044
Northern KY Water District
AI #: 2485, FGL20200006
October 20, 2020
Page 3 of 3

agreement. If we can be of further assistance, please call Mollye Malone, Project Engineer, at (502) 782-0148.

Sincerely,



Terry Humphries, P.E.
Supervisor, Engineering Section
Water Infrastructure Branch
Division of Water

MM: TH
Enclosures

Eligible List, Ineligible List, Approval Conditions
Project Review and Cost Summary Form
1 set plans and specification

C: Quest Engineers Inc
Kentucky Infrastructure Authority
Cabinet for Economic Development
Kenton County Health Department
Division of Plumbing

F20-044
Northern KY Water District

SRF ELIGIBLE ITEMS:

No ineligible items identified.

SRF INELIGIBLE ITEMS:

No ineligible items identified.

APPROVAL CONDITIONS:

1. Provide Clear Site Certificates
2. Complete and return the Project Review and Cost Summary Form.

PROJECT REVIEW AND COST SUMMARY

This questionnaire/checklist is furnished as an administrative aid and is required for use in supplying information and documents, reporting minor changes, and project status. The information and documents should be submitted to DOW as soon as possible after bid opening.

DRINKING WATER SRF

CLEAN WATER SRF

SECTION 1.

1. Project Name _____ Project Number _____

2. Changes: Have there been any changes in the project since DOW's approval of the plans and specifications?

Yes No Construction Drawings. If yes, submit revised drawings and addenda. **See Note***

Yes No Specifications. If yes, submit addenda. **See Note***

Yes No Site Changes. If so, new Clear Site Certificates are required prior to start of construction.

Yes No Authorized Representative (Mayor, City Manager, etc.). If so, provide name and title.

***Note:** Prior approval is required for changes in design, scope, type of treatment, size, capacity, time to complete the project, etc. Changes, which result in increase in the amount of a contract, must be procured in accordance with state and federal requirements, as applicable.

SECTION 2.

Date Bids Opened: _____ Date Bids Expire: _____

1. The following items should be submitted to DOW after bid opening:
 - a) Executed Project Review & Cost Summary Form (this form).
 - b) Revised (As-bid) Budget (form attached).
 - c) Original bid advertisement or copy of advertisement with affidavit of publication.
 - d) Certified Bid Tabulations with engineer's seal.
 - e) Davis-Bacon ATA Certification form (with Project Wage Rate Sheet HUD-4720 form).
 - g) Clear Site Certificates.
 - h) DBE Documentation (See Attachment No. 11 of the Supplemental General Conditions (SGC)):
 - (1) Disadvantaged Business Enterprise Participation Policy form from the successful low bidder with DBE certifications and executed subcontracts with DBEs or letters of intent signed by both parties; and documentation on the level of effort taken

to obtain DBEs including copies of correspondence with DBE contractors, requesting quotes and copies of any advertisements soliciting DBE contractors, copies of returned envelopes and certified mail receipts, telephone log, etc.

(2) Bidder's List Form from recipient and successful bidder.

2. The following items must be submitted to DOW at the Pre-construction Meeting:

- a) Executed Contract Documents (once contract is signed).
- b) Notice of Award, Notice to Proceed, Bid Bond, Payment Bond, and Performance Bond (generally included in executed contract).
- c) Technical Specification (generally included in executed contract).
- d) Contractor's Certification Regarding Lobbying (See Attachment No. 11 in the SGC).
- e) Contractor's Debarred Firm Certification (See Attachment No. 10 in the SGC).

3. A copy of the items identified in Section 2.1 and Section 2.2, above, and the following must be retained by the owner. This documentation is subject for review, by DOW, at the time of the pre-construction conference.

- a) Name and qualifications of the proposed resident inspector(s).
- b) Proposal of the successful bidder(s).
- c) EEO documentation required by Executive Order 11246 as amended. Items 1 through 11 (See Attachment No. 7 in the SGC), is required for all contracts over \$10,000 except supplier contracts. Supplier contracts require:
 - (1) Name, address, and telephone number.
 - (2) Materials to be supplied and dollar value.For contracts below \$10,000, the same information required for supplier contracts must be submitted.
- d) Engineer's letter to the loan recipient recommending award of the contract. Letter must include a description of work, dollar amount, and name of the low bidder. If award is recommended to be made to other than the low bidder, a justification indicating why the low bidder is not responsive or responsible.
- e) Contractor project construction schedule and payment schedule.
- f) Applicable wage rate determination letter.
- g) Tentative Award Resolution.

4. **Comments:** _____

I hereby certify that all documentation outlined in Section 2.1, 2.2 and 2.3 will be retained in our project files and all documentation outlined in Section 2.1 has been submitted to DOW and all documentation outlined in Section 2.2 will be submitted to DOW during the Pre-construction meeting.

Signature of Authorized Representative

Date

Print Name and Title

SRF Project Cost Summary

Project Title: _____

WRIS#: _____

Project Budget: **Estimated** enter date

As Bid enter date

Revised enter date

Cost Classification	SRF KIA Loan	Funding Source 1	Funding Source 2	Funding Source 3	Funding Source 4	Funding Source 5	Local Funds	Unfunded Costs	Total
1	Administrative Expenses								
2	Legal Expenses								
3	Land, Appraisals, Easements								
4	Relocation Expenses & Payments								
5	Planning								
6	Engineering Fees – Design								
7	Engineering Fees – Construction								
8	Engineering Fees – Inspection								
9	Engineering Fees – Other								
10	Construction								
11	Equipment								
12	Miscellaneous								
13	Contingencies								
	Total								

Funding Sources	Amount	Date Committed
1		
2		
3		
4		
5		
	Total	

Local Funding Sources	Amount	Date Committed
1		
2		
3		
	Total	

Total Funding \$ _____

Cost Categories	Funding Source	Total Cost
Treatment (DW)		
Transmission and Distribution (DW)		
Source (DW)		
Storage (DW)		
WWTP Secondary Portion (CW)		
WWTP Advanced Portion (CW)		
Inflow and Infiltration Correction (CW)		
Major Sewer Rehabilitation (CW)		
Collector Sewers (CW)		
Interceptor Sewers including Pump Station (CW)		
Combined Sewer Overflow Correction (CW)		
Purchase of Systems (DW and CW)		
Restructuring (DW and CW)		
Land Acquisition (DW and CW)		
	Total Costs	

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

State Debt Officer Notification



February 2, 2021

Mr. Dennis Keene
Commissioner and State Local Debt Officer
100 Airport Road, 3rd Floor
Frankfort, KY 40601

Re: Northern Kentucky Water District, PSC Case No. 2021-00047
Notice of Intent to Issue Securities

Dear Mr. Keene:

Pursuant to the regulations of the Kentucky Public Service Commission, specifically 807 KAR 5:001: Section 18(1)(g), please be advised that the Northern Kentucky Water District (the "District") hereby notifies the State Local Debt Officer that the District intends on issuing securities in the form of a bond anticipation note (a "BAN") in 2021 for the purpose of funding several projects necessary for the District, including the Fort Thomas Treatment Plant Basin Improvements – Phase 2 project with an estimated total budget of \$6,000,000, with \$2,065,000 issued as part of the BAN.

We will file the appropriate documents with your office in accordance with the requirements of KRS 65.117 once the securities are issued.

Very truly yours,

The Northern Kentucky Water District

A handwritten signature in black ink that reads "Lindsey Rechten".

By: Lindsey Rechten
Vice President of Finance & Support Services

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

BID INFORMATION

Bid Tabulation (C.1)

Engineer's Recommendation of Award (C.2)

Board Resolution (C.3)

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

Bid Tabulation

PROJECT BID

Fort Thomas Water Treatment Plant Basin Improvements - Phase 2
Northern Kentucky Water District
Phase 2 of WX21117210
GRW Project No. 4789



Bids were opened Wednesday, January 13, 2021 at 2:00 p.m. (Local Time)

CONTRACTORS:	Building Crafts, Inc. 2 Rosewood Drive Wilder, KY 41076	Dugan & Meyers LLC 11110 Kenwood Road Cincinnati, OH 45242	Pace Contracting, LLC 15415 Shelbyville Road Louisville, KY 40245	Smith Contractors P.O. Box 480 Lawrenceburg, KY 40342
BID BOND	10%	10%	10%	10%
	AMOUNT	AMOUNT	AMOUNT	AMOUNT
Total Lump Sum Bid¹	\$5,584,000.00	\$6,210,000.00	\$6,324,000.00	\$8,410,000.00
Total Lump Sum Deduct² (for removing the Basin 2 & 3 Plate Settlers from the project)	\$1,271,479.00	\$750,000.00	\$1,100,000.00	\$1,100,000.00

All addenda acknowledged.

¹ Basis for awarding project.

² Not a factor in awarding project.

I CERTIFY THAT, TO THE BEST OF MY KNOWLEDGE, THIS IS A TRUE AND CORRECT COPY OF BIDS AS RECEIVED.

Todd L. Solomon

Todd L. Solomon, P.E., Project Engineer

Todd L. Solomon



1-26-21

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

Engineer's Recommendation of Award



January 15, 2021

Mr. Kyle Ryan, P.E.
Northern Kentucky Water District
2835 Crescent Springs Road
P.O. Box 18640
Erlanger, KY 41018

RE: Fort Thomas Water Treatment Plant Basin Improvements
(Phase 2 of WX21117210)
Reference Letter for Building Crafts, Inc.
GRW Project No. 4789-02

Dear Mr. Ryan:

As you are aware, the low bid for the referenced project was submitted by **Building Crafts, Inc.** on Wednesday, January 13th, 2021. The Bidder submitted all required information for the Bid including the signed bid form, questionnaire, subcontractors list and bid bond. All these items appear to be in order. The bid amounts were as follows:

Building Crafts, Inc.	\$5,584,000.00
Dugan & Meyers, LLC	\$6,210,000.00
Pace Contracting, LLC	\$6,324,000.00
Smith Contractors, Inc.	\$8,410,000.00

I have also enclosed a complete copy of the bid tabulation for the referenced project for your information.

GRW has contacted references provided by Building Crafts, Inc. A summary of our reference checks are as follows:

General

The bidder's questionnaire, completed by Building Crafts, states that Building Crafts has been in business as a general contractor for 48 years. The previous projects list submitted along with the Bid indicates that Building Crafts has performed work related to water treatment plants throughout the region. Discussions with their references validated this response.

Project References

Building Crafts listed Kendall Bates, JMT Engineers, as a project reference for the Memorial Parkway Treatment Plant Clearwell Rehab project for Northern Kentucky Water District. The project consisted of structural repairs, concrete rehab including crack repair, exterior coatings, interior pipe recoating, and roof replacement including installation of a rubber membrane roof on the clearwell. Mr. Bates stated that they had no problem completing the job on time, even with inclement weather affecting working conditions. He stated that Building Crafts cleaned up the site well. Mr. Bates said that communication was great and project supervision was excellent. He also stated that they submitted paperwork on time. Mr. Bates said that he has worked with Building Crafts on three or four projects, and would not hesitate to recommend them.

Building Crafts listed GRW Engineers as a project reference for the Disinfection and Chemical Feed Improvements project for the Frankfort, KY Water Treatment Plant. Joe Henry of GRW Engineers was the project manager and Mr. Henry was contacted regarding Building Craft's performance on the project. The project consisted of replacement of all the chemical feed equipment at the plant including the sodium hypochlorite feed. One project difficulty that was successfully addressed by Building Crafts was keeping the plant in operation during replacement of the chemical feed equipment. Mr. Henry stated that they had no problem completing the job on time and that there were no issues with site cleanup. Mr. Henry said that communications with Building Crafts was good and that they had a good project supervisor. He also stated that they submitted paperwork on time. Mr. Henry said that he has worked with Building Crafts on several projects before and he would not hesitate to recommend them.



Mr. Ryan
January 15, 2021
Page 2 of 2

Supplier Reference

Darcie Kierns, McWane Plant and Industrial, was listed as a supplier reference. We spoke with Mrs. Kierns regarding her history with Building Crafts. She said that she has worked with Building Crafts for 19 years. She said that their average billing ran at 30 days and always paid as agreed. She said their credit limit is high and they have no outstanding charges. Mrs. Kierns said that she has never had any problems with Building Crafts on any projects.

Joe Varatta, Rawdon Myers, Inc., was listed as another supplier reference. We spoke with Mr. Varatta regarding his history with Building Crafts. He said that he has worked with Building Crafts for over 41 years. He said that they always pay as agreed and have great communication with Building Crafts on any changes in billing cycles. He said their credit limit is high and they have no outstanding charges. Mr. Varatta said that he has never had any problems with Building Crafts on any projects.

Bank Reference

Aaron Mackris, U.S. Bank, was listed as a bank reference. Mr. Mackris stated that Building Crafts had been a customer of the bank for over 10 years. He said that they have always maintained their accounts in good standing. Mr. Mackris said that Building Crafts has a line of credit ranging in the low 7 figure range. He also stated their checking account ran in the mid 7 figures range. He stated that Building Crafts always pays as agreed. Mr. Mackris said that he sees no reason why Building Crafts wouldn't be able to complete the project.

Surety Reference

Ralph Perrine, Zurich insurance group, was listed as a surety reference for Building Crafts, Inc. Mr. Perrine answered reference questions on behalf of the company. Mr. Perrine said that he has worked with Building Crafts for over 30 years. He stated that Building Crafts is well within their bonding capacity, and that they have never had any forfeitures or problems with any of their bonds. Mr. Perrine saw no reason why Building Crafts would not be able to complete the project.

Based on the information provided and the above research, it is expected that Building Crafts, Inc. will be capable of completing the Fort Thomas Water Treatment Plant Basin Improvements project. If you have any questions or comments, please don't hesitate to contact me.

Regards,

A handwritten signature in black ink that reads "Todd L. Solomon".

Todd Solomon, P.E.
Project Engineer

Attachments

PROJECT BID

Fort Thomas Water Treatment Plant Basin Improvements - Phase 2
 Northern Kentucky Water District
 Phase 2 of WX21117210
 GRW Project No. 4789



Bids were opened Wednesday, January 13, 2021 at 2:00 p.m. (Local Time)

CONTRACTORS:	Building Crafts, Inc. 2 Rosewood Drive Wilder, KY 41076	Dugan & Meyers LLC 11110 Kenwood Road Cincinnati, OH 45242	Pace Contracting, LLC 15415 Shelbyville Road Louisville, KY 40245	Smith Contractors P.O. Box 480 Lawrenceburg, KY 40342
BID BOND	10%	10%	10%	10%
	AMOUNT	AMOUNT	AMOUNT	AMOUNT
Total Lump Sum Bid ¹	\$5,584,000.00	\$6,210,000.00	\$6,324,000.00	\$8,410,000.00
Total Lump Sum Deduct ² (for removing the Basin 2 & 3 Plate Settlers from the project)	\$1,271,479.00	\$750,000.00	\$1,100,000.00	\$1,100,000.00

All addenda acknowledged.

¹ Basis for awarding project.

² Not a factor in awarding project.

I CERTIFY THAT, TO THE BEST OF MY KNOWLEDGE, THIS IS A
 TRUE AND CORRECT COPY OF BIDS AS RECEIVED.

Todd L. Solomon

Todd L. Solomon, P.E., Project Engineer

Section 00300

BID FORM

PROJECT IDENTIFICATION: **Fort Thomas Treatment Plant Basin Improvements – Phase 2 (Phase 2 of WX21117210)**

THIS BID IS SUBMITTED TO:

Northern Kentucky Water District (Owner)
P.O. Box 18640
2835 Crescent Springs Road
Erlanger, Kentucky 41018

THIS BID IS SUBMITTED BY: Building Crafts, Inc.
(Bidder's Company Name)

1. 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 all Work as specified or indicated in the Contract Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.
2. Bidder accepts all of the terms and conditions of the Invitation to Bid and the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 calendar days after the Bid opening, or for such longer period of time to which the Bidder may agree in writing upon request of Owner. Bidder understands that certain extensions to the time for acceptance of this Bid may require the consent of the surety for the Bid Bond.
3. In submitting this Bid, Bidder represents and covenants, as set forth in the Agreement, that:
 - a. Bidder has examined and carefully studied the Contract Documents, the other related data identified in the Contract Documents, and the following Addenda, receipt of all of which is hereby acknowledged:

No. <u>1</u>	Dated <u>12/11/20</u>
No. <u>2</u>	Dated <u>12/29/20</u>
No. <u>3</u>	Dated <u>1/8/21</u>
 - b. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - c. Bidder is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

- d. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary explorations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.
- e. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- f. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- 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 Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Owner is acceptable to Bidder.
- i. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
- j. **[Check the one that applies]**

 X Bidder is a "resident bidder" as defined in KRS 45A.494(2) of Kentucky's resident bidder reciprocal preference statute AND submits with this Bid a properly executed and notarized Affidavit that affirms that Bidder meets the resident bidder criteria, which Affidavit is hereby incorporated herein and made a part of this Bid.

OR

 Bidder is a "nonresident bidder" as defined in KRS 45A.494(3) of Kentucky's resident bidder reciprocal preference statute AND its principal place of business as identified its Certificate of Authority to transact business in Kentucky as filed with Kentucky's Secretary of State or, if Bidder hereby represents and covenants that it is not required to obtain a Certificate of Authority to transact business in Kentucky, its mailing address, is:

k. Bidder's Organization Number from Kentucky's Secretary of State is # 187080 [if applicable] and Bidder is qualified to transact business in the State of Kentucky or hereby covenants to obtain such qualifications prior to award of the Contract.

4. Bidder further represents that this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.
5. The Bidder understands and agrees that during the performance of the Contract, it shall maintain a presence within such proximity of the Site which will allow it to respond to an emergency at the Site within one hour of receiving notice of an emergency, including emergencies occurring during non-working hours. The Bidder shall provide a list of emergency phone numbers for such purposes. If the Bidder does not have such a presence, it may satisfy this requirement by sub-contracting with a sub-contractor that does have such a presence, provided that any such sub-contractor must be approved by the Owner, in its sole discretion, prior to the project pre-construction meeting.
6. Bidder will complete all the Work described in the specifications and drawings for the following price:

- Notes:
1. Bids shall include sales tax, where required, and all other applicable taxes and fees.
 2. A Contract award will be based on the lowest responsive, responsible bidder based on the Base Bid Equipment Manufacturers, unless all bids are rejected. All bids shall not be rejected without proper justification. The Owner reserves the right to select any, all, or none of the alternates. Alternates will not be used to determine the lowest responsive, responsible bidder.

Total Lump Sum Bid (Based on Base Bid Equipment Manufacturers) of:

\$ 5,584,000.⁰⁰ in numbers

and Five Million Five hundred Eighty Four Thousand Dollars in words.

Alternative Equipment Information			
Equipment Item	Base Bid Equipment Manufacturer	Alternate Bid Equipment Manufacturer	Lump Sum Add / Deduct
1. Vertical Hyperbolic Flocculators	Invent Environmental Technologies, Inc.	a.	a.
		b.	b.
		c.	c.

- Notes:
- a. The design has been completed using listed Base Bid equipment manufacturers. Should the Owner select other Alternate Bid equipment, the Bidder, at no additional cost to the Owner, shall make any changes to structures, bridges/walkways, baffle walls, concrete walls/columns, piping, controls, electrical, instrumentation, mechanical, architectural, preliminary & final evaluations, engineering design, etc. that may be necessary to accommodate this equipment and provide Computational Fluid Dynamic (CFD) modeling in the case of alternate equipment to the vertical hyperbolic flocculators.
 - b. Space is provided within the above table for BIDDERS to offer lump sum additions or deductions for alternate equipment not listed under the Base Bid equipment manufacturer. BIDDERS are not required to offer alternate equipment. If the BIDDER chooses to offer alternate equipment, Bidder shall enter an amount for each alternate for furnishing and installing the equipment and also must indicate whether the alternate is an add or deduct by circling the word which does apply and crossing out the word which does not apply. If no amount is entered, Bidder agrees to furnish and install any listed alternate equipment at no change in cost. If neither add nor deduct is identified as stated herein, the Bidder agrees to furnish and install the alternate equipment as a deduct. Should the Bidder choose to offer for consideration to the Owner, any alternate manufacturers to those listed above, the Bidder shall provide a detailed submittal of applicable items such as catalog cut sheets, pump curves, hydraulic calculations, specifications, wiring diagrams, technical literature, dimensional drawings, etc., or any other information requested by the Owner. This submittal information shall be provided to the Owner within 72 hours of request for proper evaluation. These submittal items shall be in addition to the submittal requirements listed in the respective technical specifications section of the equipment item or product hereinafter. Alternates will not be evaluated or pre-qualified prior to Bid opening.
 - c. The best, lowest Bidder will be determined based on the equipment being provided by the Base Bid Equipment Manufacturers.

Total Lump Sum Deduct (for removing the Basin 2 & 3 Plate Settlers from the project) of:

\$ 1,271,479.⁰⁰ in numbers
and ONE Million Two Hundred Seventy ONE Thousand Four Hundred Seventy Nine Dollars in words

The lump sum deduct for removing the Basin 2 & 3 plate settles from the project will not be used to determine the best, lowest bidder.

7. Bidder agrees that the Work will be substantially complete within 660 calendar days after the date when the Contract Times commence to run as provided in paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.07.B of the General Conditions within 730 calendar days after the date when the Contract Times commence to run.

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

8. References

Contact Person	Company Name	Phone No.	Project Name
1. <u>Brad Miller</u>	<u>Building Crafts, Inc.</u>	<u>(859) 781-9500</u>	
2. _____			<u>Ft. Thomas Treatment Plant Basin Imp.</u>
3. _____			
4. _____			

SUBMITTED on January 13th, 2021.

9. Communications concerning this Bid shall be sent to Bidder at the following address:

2 Rosewood Drive
Wilder, KY 41076

10. The terms in this Bid, which are defined in the General Conditions included as part of the Contract Documents, have the meanings assigned to them in the General Conditions.

SIGNATURE OF BIDDER

If an Individual

Name (typed or printed): _____

By _____ (SEAL)
(Individual's signature)

doing business as _____

Business address _____

Phone No.: _____ Fax No.: _____

Date _____

If a Partnership

Partnership Name: _____ (SEAL)

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

Name (typed or printed): _____

Business address _____

Phone No. _____ Fax No.: _____

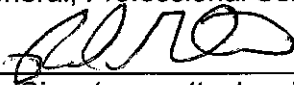
Date _____

If a Corporation

Corporation Name: Building Crafts, Inc. (SEAL)


State of Incorporation: Kentucky

Type (General, Professional Service): General

By 
(Signature - attach evidence of authority to sign)

Name (typed or printed): Brad Miller

Title: Vice President

Attest Ben Call, Estimator  (CORPORATE SEAL)

Business address 2 Rosewood Drive, Wilder, KY 41076

Phone No. (859) 781-9500 Fax No.: (859) 781-9505

Date 1/13/21

If a Limited Liability Company

Company Name: _____ (SEAL)

State of Organization: _____

Type (General, Professional): _____

By _____
Signature of Member or Manager (as applicable) - attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____ (COMPANY SEAL)

Attest _____

Business address _____

Phone No. _____ Fax No.: _____

Date _____

If a Joint Venture

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

Joint Venturer Name: _____ (SEAL)

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

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ Fax No.: _____

Date _____

Joint Venturer Name: _____ (SEAL)

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

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ Fax No.: _____

Date _____

Section 00301

SUPPLEMENTS TO BID FORM

1. FORMS TO BE SUBMITTED WITH BID

- A. Certification Regarding Debarment, Suspension and Other Responsibility Matters - EPA Form 5700-49 (Attachment No. 9 – Section 00810)
- B. Certification Regarding Lobbying (Attachment No. 10 – Section 00810)
- C. Statement of Bidder's Qualifications (Attachment No. 1)
- D. Bidder's Experience Record (Attachment No. 2)
- E. Proposed Subcontractors (Attachment No. 3)
- F. Bid Security (Specification Section 00410)
- G. Non-Collusion Affidavit (Specification Section 00460)
- H. Required Notarized Affidavit for Bidders, Offerors, and Contractors Claiming Kentucky Resident Bidder Status (Specification Section 00470)

2. FORMS TO BE SUBMITTED WITHIN 7 DAYS OF BID OPENING

Certain information and documentation is required by the funding agencies and other governing bodies prior to awarding a necessary approval for this project. The BIDDER acknowledges, through the act of submitting a Bid, a commitment to submit the following documentation or information within 7 days of Bid Opening or within 5 days of the formal request to do so, whichever is greater. Failure to produce any of this documentation or information within the prescribed period will serve as ground for rejection of the Bid. If the information is required from a subcontractor or vendor and is not produced within the prescribed time, it will serve as grounds to replace the subcontractor or vendor with another company or product.

Specific items to be submitted within 7 days of the Bid opening include:

- A. Disadvantage Enterprise Participation Policy (Attachment 11 – Section 00810)
- B. List of DBE Bidders of Subcontracts (Attachment 11 – Section 00810)

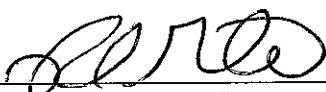
**CERTIFICATION REGARDING DEBARMENT,
SUSPENSION AND OTHER RESPONSIBILITY MATTERS**

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

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or Local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

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

Brad Miller, Vice President
Typed Name & Title of Authorized Representative

	1/13/21
Signature of Authorized Representative	Date

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

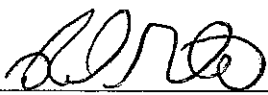
**CERTIFICATION REGARDING LOBBYING
CERTIFICATION FOR CONTRACTS,
GRANTS, LOANS, AND COOPERATIVE AGREEMENTS**

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

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, 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 undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

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

Brad Miller, Vice President
Typed Name & Title of Authorized Representative

 1/13/21
Signature of Authorized Representative Date

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

STATEMENT OF BIDDER'S QUALIFICATIONS

All questions shall be answered or the bid document will be incomplete. All data given shall be clear and comprehensive. This statement shall be notarized. If necessary, questions may be answered on separate sheets. The Bidder may submit any additional information it desires. If the Bidder is a joint venture, submit pervious joint venture projects. If joint venture has not completed prior projects of this magnitude then submit projects completed by joint venture partners.

1. Name of Bidder: Building Crafts, Inc.
2. Permanent main office address: 2 Rosewood Drive, Wilder, KY 41076
3. When organized: 5/16/72
4. If a corporation, where incorporated: Kentucky
5. How many years have you been engaged in operation of your business under your present firm or trade name: 48 years
6. Contracts on hand. (Schedule these, showing amount of each contract and the appropriate anticipated dates of completion.): See attached
7. General character of work performed by your company: General Construction
8. Have you ever failed to complete any job awarded to you? If so, where and why? No
9. Have you ever defaulted on a contract? If so, where and why? No
10. List the more important projects completed by your firm, stating the approximate cost for each, and the month and year completed on attached sheet. See attached
11. List your major equipment available for this work. See attached
12. Experience in work similar in complexity, size and/or dollar value to this project. List and describe at least four on the table "Project References".
13. Background and experience of the principal members of your organization, including the officers in this type of work. (Attach) See attached
14. Credit available: \$ 1,000,000
15. Give bank reference: \$ U.S. Bank
16. Will you, upon request, fill out a detailed financial statement and furnish any other information that may be required by the Owner? Yes No

17. The undersigned hereby authorizes and requests any person, firm or corporation to furnish any information required by the Owner in verification of the statements made comprising this Statement of Bidder's Qualifications:

Dated at 2:00 PM this 13th day of January

Building Crafts, Inc.
NAME OF BIDDER

BY [Signature]
Brad Miller

TITLE Vice President

STATE OF Kentucky

COUNTY OF Campbell

Brad Miller being duly sworn deposes and says that he or she is

Vice President of Building Crafts, Inc.
(NAME OF ORGANIZATION)

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

Subscribed and sworn to before me this 13th day of January, of this year 2021.

[Signature]
(NOTARY PUBLIC) Shannon Stallmeyer



My commission expires 2/2/24

BIDDER'S EXPERIENCE RECORD
(Projects need to be of similar size and nature)

Change Order Value				
Contract Value				
Size of Project (Length, Contract Duration)				
Project Type, Year of Completion				
Engineer Contact Name, Telephone #				
Project Name, Owner, Address, Telephone #	See attached			

PROPOSED SUBCONTRACTORS

The BIDDER's proposed subcontractors shall be listed below for the various branches of work included in the proposed contract. All subcontractors are subject to the approval of the OWNER.

Unless rejected or otherwise permitted by the OWNER, no substitutions or changes to the listing of the entities proposed to perform that branch of the work will be allowed following opening of the Bids.

Where the BIDDER proposes to perform the work with its own forces, the phrase "Prime Contractor" shall be entered in the box provided

Failure to submit a completed list shall be cause for rejection of the Bid.

Branch of Work	Name of Subcontractor
1. Electrical	Lake Erie Electric
2. Painting	Oh-Man Enterprises LLC
3.	
4.	
5.	

BID BOND

BIDDER (Name and Address)

Building Crafts, Inc.
2 Rosewood Drive, Wilder, KY 41076

SURETY (Name and Address of Principal Place of Business)

Fidelity and Deposit Company of Maryland
1299 Zurich Way, Schaumburg, IL 60196

OWNER (Name and Address)

Northern Kentucky Water District
2835 Crescent Springs Road, Erlanger, KY 41018

BID

BID DUE DATE 1/13/21
PROJECT (Brief Description Including Location) Ft. Thomas Treatment Plant Basin Improvement

BOND

BOND NUMBER 21131
DATE (Not later than Bid due date) 1/13/21
PENAL SUM Ten percent of total bid (Words) 10% (Figures)

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

BIDDER

Building Crafts, Inc. (Seal)
Bidder's Name and Corporate Seal
By [Signature]
Signature and Title Vice President

SURETY

Fidelity & Deposit Co. of Maryland (Seal)
Surety's Name and Corporate Seal
By [Signature]
Signature and Title Attorney-in-Fact
(Attach Power of Attorney)

Attest [Signature]
Signature and Title Ben Call, Estimator

Attest [Signature]
Signature and Title Ben Call, Estimator

- Note (1) Above addresses are to be used for giving required notice
- (2) Any singular reference to Bidder Surety OWNER or other party shall be considered plural where applicable

- 1 Bidder and Surety jointly and severally bind themselves their heirs executors administrators successors and assigns to pay to OWNER upon default of Bidder the penal sum set forth on the face of this Bond
- 2 Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents
- 3 This obligation shall be null and void if
- 3 1 OWNER accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents or
 - 3 2 All Bids are rejected by OWNER or
 - 3 3 OWNER fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and if applicable consented to by Surety when required by paragraph 5 hereof)
- 4 Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from OWNER which notice will be given with reasonable promptness identifying this Bond and the Project and including a statement of the amount due
- 5 Surety waives notice of and any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by OWNER and Bidder provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent
- 6 No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date
- 7 Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located
- 8 Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond Such notices may be sent by personal delivery commercial courier or by United States Registered or Certified Mail return receipt requested postage pre paid and shall be deemed to be effective upon receipt by the party concerned
- 9 Surety shall cause to be attached to this Bond a current and effective Power or Attorney evidencing the authority of the officer agent or representative who executed this Bond on behalf of Surety to execute seal and deliver such Bond and bind the Surety thereby
- 10 This Bond is intended to conform to all applicable statutory requirements Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length If any provision of this Bond conflicts with any applicable statute then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect
- 11 The term Bid as used herein includes a Bid offer or proposal as applicable

**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND
POWER OF ATTORNEY**

KNOW ALL MEN BY THESE PRESENTS: That the ZURICH AMERICAN INSURANCE COMPANY, a corporation of the State of New York, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, a corporation of the State of Illinois, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND a corporation of the State of Illinois (herein collectively called the "Companies"), by **Robert D. Murray, Vice President**, in pursuance of authority granted by Article V, Section 8, of the By-Laws of said Companies, which are set forth on the reverse side hereof and are hereby certified to be in full force and effect on the date hereof, do hereby nominate, constitute, and appoint, **Martin ZALLA, Darryl R. GEIMAN, Bradley T. MILLER, Troy R. HALL, Shannon R. STALLMEYER, all of Wilder, Kentucky, EACH**, its true and lawful agent and Attorney-in-Fact, to make, execute, seal and deliver, for, and on its behalf as surety, and as its act and deed: **any and all bonds and undertakings**, and the execution of such bonds or undertakings in pursuance of these presents, shall be as binding upon said Companies, as fully and amply, to all intents and purposes, as if they had been duly executed and acknowledged by the regularly elected officers of the ZURICH AMERICAN INSURANCE COMPANY at its office in New York, New York., the regularly elected officers of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at its office in Owings Mills, Maryland., and the regularly elected officers of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at its office in Owings Mills, Maryland., in their own proper persons.

The said Vice President does hereby certify that the extract set forth on the reverse side hereof is a true copy of Article V, Section 8, of the By-Laws of said Companies, and is now in force.

IN WITNESS WHEREOF, the said Vice-President has hereunto subscribed his/her names and affixed the Corporate Seals of the said **ZURICH AMERICAN INSURANCE COMPANY, COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and FIDELITY AND DEPOSIT COMPANY OF MARYLAND**, this 6th day of February, A.D. 2019.



**ATTEST:
ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND**

By: *Robert D. Murray*
Vice President

By: *Dawn E. Brown*
Secretary

**State of Maryland
County of Baltimore**

On this 6th day of February, A.D. 2019, before the subscriber, a Notary Public of the State of Maryland, duly commissioned and qualified, **Robert D. Murray, Vice President and Dawn E. Brown, Secretary** of the Companies, to me personally known to be the individuals and officers described in and who executed the preceding instrument, and acknowledged the execution of same, and being by me duly sworn, deposeth and saith, that he/she is the said officer of the Company aforesaid, and that the seals affixed to the preceding instrument are the Corporate Seals of said Companies, and that the said Corporate Seals and the signature as such officer were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporations.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my Official Seal the day and year first above written.



Constance A. Dunn

Constance A. Dunn, Notary Public
My Commission Expires: July 9, 2019

EXTRACT FROM BY-LAWS OF THE COMPANIES

"Article V, Section 8, Attorneys-in-Fact. The Chief Executive Officer, the President, or any Executive Vice President or Vice President may, by written instrument under the attested corporate seal, appoint attorneys-in-fact with authority to execute bonds, policies, recognizances, stipulations, undertakings, or other like instruments on behalf of the Company, and may authorize any officer or any such attorney-in-fact to affix the corporate seal thereto; and may with or without cause modify or revoke any such appointment or authority at any time."

CERTIFICATE

I, the undersigned, Vice President of the ZURICH AMERICAN INSURANCE COMPANY, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, do hereby certify that the foregoing Power of Attorney is still in full force and effect on the date of this certificate; and I do further certify that Article V, Section 8, of the By-Laws of the Companies is still in force.

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the ZURICH AMERICAN INSURANCE COMPANY at a meeting duly called and held on the 15th day of December 1998.

RESOLVED: "That the signature of the President or a Vice President and the attesting signature of a Secretary or an Assistant Secretary and the Seal of the Company may be affixed by facsimile on any Power of Attorney...Any such Power or any certificate thereof bearing such facsimile signature and seal shall be valid and binding on the Company."

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at a meeting duly called and held on the 5th day of May, 1994, and the following resolution of the Board of Directors of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at a meeting duly called and held on the 10th day of May, 1990.

RESOLVED: "That the facsimile or mechanically reproduced seal of the company and facsimile or mechanically reproduced signature of any Vice-President, Secretary, or Assistant Secretary of the Company, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power of attorney issued by the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seals of the said Companies, this 13th day of January, 2021.



Michael C. Fay, Vice President

TO REPORT A CLAIM WITH REGARD TO A SURETY BOND, PLEASE SUBMIT A COMPLETE DESCRIPTION OF THE CLAIM INCLUDING THE PRINCIPAL ON THE BOND, THE BOND NUMBER, AND YOUR CONTACT INFORMATION TO:

Zurich Surety Claims
1299 Zurich Way
Schaumburg, IL 60196-1056
www.reportsfclaims@zurichna.com
800-626-4577

Section 00460

NON-COLLUSION AFFIDAVIT

STATE OF: Kentucky)

COUNTY OF: Campbell) SS

Brad Miller , being first duly sworn, deposes

and says that he/she is the Vice President of
(sole owner, a partner, president, secretary, etc.)

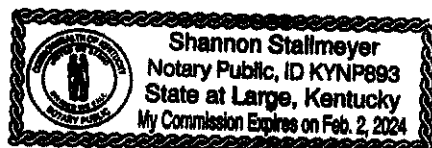
Building Crafts, Inc. , the party making the foregoing bid; that such bid is genuine and not collusive or sham; that said bidder is not financially interested in, or otherwise affiliated in a business way with any other bidder on the same contract; that said bidder has not colluded, conspired, connived, or agreed, directly or indirectly, with any bidder or person, to put in a sham bid, or that such other person shall refrain from bidding, and has not in any manner directly or indirectly sought by agreement or collusion, or communication or conference, with any person, to fix the price or affidavit of any other bidder, or that of any other bidder, or to secure any advantage against Owner, or any person or persons interested in the proposed Contract; and that all statements contained in said bid are true; and further, that such bidder has not, directly or indirectly submitted this bid, or the contents thereof, or divulged information of data relative thereto to any association or to any member or agent thereof.



AFFIANT

Sworn to and subscribed before me, a Notary Public in and for the above named

State and County, this 13th day of January , 20 21 .




NOTARY PUBLIC Shannon Stallmeyer

End of Section



Bid Description: Fort Thomas Treatment Plant Basin Improvements – Phase 2
(Phase 2 of WX21117210)

REQUIRED NOTARIZED AFFIDAVIT FOR BIDDERS, OFFERORS AND CONTRACTORS CLAIMING KENTUCKY RESIDENT BIDDER STATUS

FOR BIDS AND CONTRACTS IN GENERAL:

The bidder or offeror hereby swears and affirms under penalty of perjury that, in accordance with KRS 45A.494(2), the entity bidding is an individual, partnership, association, corporation, or other business entity that, on the date the contract was first advertised or announced as available for bidding:

1. Is authorized to transact business in the Commonwealth of Kentucky; AND
2. Has for one year prior to and through the date this contract was first advertised or announced as available for bidding:
 - a. Filed Kentucky corporate income taxes;
 - b. Made payments to the Kentucky unemployment insurance fund established in KRS 341.490; and
 - c. Maintained a Kentucky workers' compensation policy in effect.

The undersigned acknowledges that the District reserves the right to request documentation supporting a bidder's claim of resident bidder status. Failure to provide such documentation upon request shall result in disqualification of the bidder or contract termination.



Signature

Brad Miller

Printed Name

Vice President

Title (if signing on behalf of an entity)


1/13/21

Date

State of Kentucky)
)ss.
County of Campbell)

Subscribed and sworn to before me by Brad Miller, as the
Vice President, of Building Crafts, Inc., this 13th day of
January, 2021.




Notary-at-Large Shannon Stallmeyer
My comm. exp.: 2/2/24



BUILDING CRAFTS, INC.
Contractors | Engineers

2 Rosewood Drive
P. O. Box 286
Wilders, KY 41076

Phone: (859) 781-9500
Fax: (859) 781-9505

www.buildingcrafts.com

MINUTES OF A MEETING OF THE BOARD OF DIRECTORS

A meeting of the Board of Directors of Building Crafts, Inc., a Corporation organized under the laws of the state of Kentucky, was held at the principal office of the Corporation in the City of Wilder, Kentucky on the seventh day of October, 2016 at 4:00 p.m.

The following Directors, constituting a quorum, were present:

A. Martin Zalla

John Zalla

A. Martin Zalla, Chairman, called the meeting to order and Darryl Geiman, Secretary of the Board, kept the minutes thereof.

The Chairman stated that the meeting has been called for the purpose of passing a resolution authorizing persons to sign contracts and related documents of behalf of Building Crafts, Inc.

Upon a motion made and seconded, it was unanimously resolved that A. Martin Zalla, Brad Miller, Darryl Geiman, John Zalla, Jeff Soe and Todd Bailik be authorized to sign contracts and related documents of behalf of Building Crafts, Inc.


There being no further business to come before the meeting, on motion duly made, seconded and carried, the meeting was adjourned.

CERTIFICATION

The undersigned hereby certifies that he is duly elected and qualified Secretary of Building Crafts, Inc., and that the above is a true and correct copy of the minutes in the City and State of Wilder, Kentucky on the seventh day of October, 2016.

October 7, 2016

Date


Secretary Darryl Geiman



BUILDING CRAFTS, INC.
Contractors | Engineers

2 Rosewood Drive
Wilder, KY 41076

Phone: (859) 781-9500
Fax: (859) 781-9505

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Current contracts:

Kentucky

Project Name: Highland Heights & Silver Grove EQ Tank & Wet Weather PS Facilities
Owner: Sanitation District No. 1
Address: 3956 Blangey Road
Newport, KY 41076
Engineer/Architect: Wade Trim
Dollar amount of contract: \$8,243,000
Completion Schedule: November 2021, 12% Complete
Contact Person: Lydia Watkins
(859) 578-7450

Ohio

Mill Creek WWTP Dewatering Polymer System Improvement
MSD of Greater Cincinnati
1600 Gest Street
Cincinnati, Ohio 45204
Black & Veatch
\$4,339,000
August 2020, 95% Complete
Sara Cramer
(513) 244-1313

RAR WTP Membrane Softening Addition
Warren County Water & Sewer Department
6193 Striker Road
Maineville, OH 45039
AECOM
\$22,063,000
November 2022, 0%
Chris Brausch
(513) 695-1377

Lower Little Miami WWTP Improvements
Warren County Water & Sewer Department
2086 US 22
Maineville, OH 45039
Burgess & Niple
\$2,350,000
June 2021, 0%
Chris Brausch
(513) 695-1377

Highland Heights And Silver Grove EQ Tank & Wet Weather PS Facilities
Sanitation District No. 1
3956 Blangey Road
Newport, KY 41076
Wade Trim
\$8,243,000
November 2021, 12%



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Lydia Watkins
(859) 578-7450

Muddy Creek at Westbourne
MSD of Greater Cincinnati
5723 Muddy Creek Road
Cincinnati, Ohio 45233
Hazen & Sawyer
\$3,300,000
August 2020, 95% Complete
Tony Klimek
(513) 244-1373

Lakengren WWTP
Lakengren Water Authority
24 Lakengren Drive
Eaton, Ohio 45230
Mote & Associates
\$6,321,000
March 2021, 70%
Mike Bruns
(137) 548-7511

Mill Creek WWTP NPW
1600 Gest Street
MSD of Greater Cincinnati
Burgess & Niple/Black & Veatch
\$4,828,000
March 2021, 80% Complete
Sara Cramer
(513) 244-1313

West Union Township WWTP
Village of West Union
6875 SR-247
West Union, Ohio 45693
CT Consultants
\$8,164,000
July 2021, 25% Completed
Kent Bryan
(419) 733-4115

Olentangy WTP Improvements
Del-Co Water Company
6658 Olentangy River Road
Delaware, OH 43015
Hazen & Sawyer
\$15,218,000
September 2020, 99% Complete
Scot Pearson
(614) 396-8840

Trickling Filter Rehab



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1802 Spaulding Road
Dayton, Ohio 45432
Hazen & Sawyer
\$4,225,002
November 2020, 75% Complete
Galen Mahoney
(937) 781-2692

Iowa

Farm Credit Service of America Addition and Remodel (Storm Lake)
Farm Credit Service of America
5015 South 118th Street
Omaha, Nebraska 68137
The Clark Emerson Partners
\$2,223,941

Farm Credit Service of America Addition and Remodel (Mt. Pleasant)
Farm Credit Service of America
5015 South 118th Street
Omaha, Nebraska 68137
The Clark Emerson Partners
\$2,743,421

Farm Credit Service of America Addition and Remodel (Mason City)
Farm Credit Service of America
5015 South 118th Street
Omaha, Nebraska 68137
The Clark Emerson Partners
\$3,586,123

Farm Credit Service of America Addition and Remodel (Harlan)
Farm Credit Service of America
5015 South 118th Street
Omaha, Nebraska 68137
The Clark Emerson Partners
\$3,087,815

Farm Credit Service of America Addition and Remodel (Oskaloosa)
Farm Credit Service of America
5015 South 118th Street
Omaha, Nebraska 68137
The Clark Emerson Partners
\$4,716,142

DeSoto WWTF Improvements
City of DeSoto, IA
405 Walnut Street
DeSoto, IA 50069
Bartlett & West
\$3,822,462
Mike Shoup
(515) 564-6321

Council Point WTP & Well Field



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Contractors | Engineers

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Council Bluffs, IA
HDR, Omaha
\$8,363,400

Nebraska

WWTP Repairs
City of Plattsmouth, NE
136 N. 5th Street
Plattsmouth, NE 68048
Olmstead & Perry
\$189,854
Jim Olmstead
(402) 399-8552

A2 Influent Pump Improvements
City of Lincoln
555 South 10th Street
Lincoln, NE 68508
\$2,514,000
Steve Crisler
(402) 441-7966

Papio Creek WWTP Digester Cogeneration Project
City of Omaha, NE
1819 Farnam St.
Omaha, NE 68183
HDR, Omaha
\$1,200,000
Bob Riede
(402) 399-1271

Partial list of completed projects:

Kentucky

Project Name:

Owner :

Architect/Engineer :

Dollar amount of contract :

Completed :

Contact Person :

Memorial Parkway Treatment Plant Clearwell Rehab
Northern Kentucky Water District
2055 Memorial Parkway
Fort Thomas, KY 41075
JMT Engineers
\$682,000
June 2020
Kendall Bates
(513) 699-8587

Tyson – Claryville WWTP
The Hillshire Brands Co.
1099 Bob Huber Drive
Claryville, Kentucky 41001
Not Applicable
\$3,468,997
June 2019
Norman Malkusak
(630) 991-5706



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Water System Improvements – Contract No. 2 – New Water
Treatment Plant and Raw Water Intake
City of Williamstown, Kentucky
400 North Main Street
Williamstown, Kentucky 41097
\$12,150,504
December 2018
Rick Skinner
(859) 824-6351

Richwood Pump Station Improvements
Sanitation District No. 1 of Northern Kentucky
1045 Eaton Drive
Fort Wright, Kentucky 41017
Strand Associates
\$2,163,000
Bob Wilson
(859) 578-7450

Taylor Mill Water Treatment Plant Electrical and Basin Improvements
Northern Kentucky Water District
2835 Crescent Springs Pike
Erlanger, Kentucky 41018
Arcadis, Inc.
\$3,468,997
July 2015

Ohio River Pump Station No. 2 Structural Repairs
Northern Kentucky Water District
2835 Crescent Springs Pike
Erlanger, Kentucky 41018
Wade Trim
\$1,433,069
February 2018

Arcadia Pump Station
Sanitation District No. 1 of Northern Kentucky
1045 Eaton Drive
Fort Wright, Kentucky 41017
Viox & Viox
\$1,465,000
May 2014

Dry Creek WWTP – Headworks, Hydraulics and Odor Control
Improvements
Sanitation District No. 1 of Northern Kentucky
1045 Eaton Drive
Fort Wright, Kentucky 41017
Hazen and Sawyer
\$14,995,559
December 2013



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Advanced Treatment Facilities at the Fort Thomas
Treatment Plant
Northern Kentucky Water District
2835 Crescent Springs Road
Erlanger, Kentucky 41018
CH2M Hill Company
\$23,823,000
November 2012

The Narrows Road Diversion Pump Station Project
Sanitation District No. 1 of Northern Kentucky
1045 Eaton Drive
Fort Wright, Kentucky 41017
\$8,185,581
November 2012

Raw Water Pump Station Slope Stabilization
City of Versailles, Kentucky
196 South Main Street
Versailles, Kentucky 40383
GRW Engineers, Inc.
\$1,298,641
June 2012

Standby Maintenance and Emergency Services
Sanitation District No. 1 of Northern Kentucky
1045 Eaton Drive
Fort Wright, Kentucky 41017
Not applicable
\$4,230,095
December 2011

Extended Aeration Sludge Treatment System Replacement
Kenton County Airport Board
2939 Terminal Drive, 2nd Floor
Hebron, Kentucky 41048
Not applicable
\$74,711
December 2011

Wastewater Pretreatment Upgrade
Tyson Foods, Inc.
P.O. Box 2020
Springdale, Arkansas 72765
Not applicable
\$193,000
October 2011

Ohio County Water Treatment Plant
Ohio County Water District
124 East Washington Street
Hartford, Kentucky 42347
Tetra Tech, Inc.
\$7,627,685



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July 2011

Dry Creek Wastewater Treatment Plant Final Clarifier Modifications
Sanitation District No. 1 of Northern Kentucky
1045 Eaton Drive
Fort Wright, Kentucky 41017
Hazen & Sawyer, P.C.
\$2,933,339
July 2011

Disinfection and Chemical Feed Improvements (Frankfort Water
Treatment Plant)
Frankfort Electric and Water Plant Board
317 West 2nd Street
Frankfort, Kentucky 40601
GRW Engineers, Inc.
\$5,670,000
October 2010

City of Walton, Kentucky Wastewater Treatment Plant No. 1
Expansion
City of Walton
40 North Main Street
Walton, Kentucky 41094
\$4,450,974
November 2009

Pretreatment Building Improvements at the Fort Thomas Treatment
Plant
Northern Kentucky Water District
2835 Crescent Springs Road
Erlanger, Kentucky 41018
HDR/Quest Engineers, Inc.
\$2,731,115
September 2009

Standby Maintenance and Emergency Services
Sanitation District No. 1 of Northern Kentucky
1045 Eaton Drive
Fort Wright, Kentucky 41017
Not applicable
\$16,000,000
August 2009

Riley Road Pump Station
Sanitation District No. 1 of Northern Kentucky
1045 Eaton Drive
Fort Wright, Kentucky 41017
Malcolm Pirnie
\$4,909,999
November 2008

Falmouth Kentucky Wastewater Treatment Plant
City of Falmouth

Water and Wastewater Treatment Experts



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230 Main Street
Falmouth, Kentucky 41040
GRW Engineers, Inc.
\$4,746,598
November 2008

Alex-Licking Pump Station
Sanitation District No. 1 of Northern Kentucky
1045 Eaton Drive
Fort Wright, Kentucky 41017
Malcolm Pirnie
\$1,430,000
November 2008

Pond Creek Pump Station
Sanitation District No. 1 of Northern Kentucky
1045 Eaton Drive
Fort Wright, Kentucky 41017
Malcolm Pirnie
\$3,360,000
October 2008

Memorial Parkway Water Treatment Plant Improvements
Northern Kentucky Water District
2835 Crescent Springs Road
Erlanger, Kentucky 41018
HDR/Quest Engineers, Inc.
\$5,899,484
September 2008

Licking River Traveling Screen
Northern Kentucky Water District
2835 Crescent Springs Road
Erlanger, Kentucky 41018
Not applicable
\$163,361
November 2007

Burlington Kentucky Pump Station
Sanitation District No. 1 of Northern Kentucky
1045 Eaton Drive
Fort Wright, Kentucky 41017
Malcolm Pirnie
\$3,296,741
September 2007

Ohio

Waynesville Regional WWTP Improvements
Warren County Water & Sewer Department
444 North State Route 42
Waynesville, OH 45068
Jacobs Engineering
\$2,732,000
June 2020



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Wiilder, KY 41076

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Fax: (859) 781-9505

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Chris Brausch
(513) 695-1377

Taylor Creek UV
MSD of Greater Cincinnati
6975 East Main River Road
Clevs, Ohio 45002
Black & Veatch
\$1,293,000
March 2020
Maria Donisi
(513) 244-1375

Specialized Methods Standby Maintenance Contract
Metropolitan Sewer District of Greater Cincinnati
225 West Galbraith Road
Cincinnati, Ohio 452215
\$12,000,000
February 2020
Greg Howard
(513) 352-4221

Upper Mill Creek WRF/Lesourdsville WRF UV & Aeration Impr.
Butler County Water and Sewer District
315 High Street
Hamilton, OH 45011
Hazen & Sawyer
\$4,687,003
December 2019
Brian Custer
(513) 887-5552

Mason Ohio Aeration Mixer Project
3200 Mason- Morrow- Millgrove Road
Mason, Ohio 45040
Strand
\$691,500
December 2019
Shawn Hollon
(513) 229-8570

Kensington Booster Station Improvements
City of Middletown, OH
One City Centre Plaza
Middletown, Ohio 45042
Jacobs/CH2M
\$1,488,000
September 2019
Gary Long
(614) 519-3027

Polk Run UV & Post Aeration
MSD of Greater Cincinnati
9744 East Kemper Road

Water and Wastewater Treatment Experts



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Phone: (859) 781-9500
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Loveland, Ohio 45140
Brown & Caldwell
\$5,199,000
September 2019
Tony Yee
(513) 244-5180

London East Water Treatment Plant
City of London, Ohio
6 East 2nd Street
London, Ohio 43140
CH2M Hill
\$6,147,291
September 2019
Gary Long
(614) 519-3027

City of Miamisburg Water Treatment Facility Softening Improvements
City of Miamisburg, Ohio
10 North First Street
Miamisburg, Ohio 45342
Arcadis, Inc.
\$10,973,003
September 2019
Steve Morrison
(937) 847-6532

Mill Creek Incinerator Project
MSD of Greater Cincinnati
1600 Gest Street
Cincinnati, Ohio 45204
Not applicable
\$631,500
September 2019
Scott Muring
(513) 244-5131

Arcanum WWTP
Village of Arcanum, OH
104 West South Street
Arcanum, OH 45304
Mote & Associates
\$6,907,862
July 2019
Mike Bruns
(937) 548-7511

Nine Mile WWTP Blower Upgrade
Clermont Co. Water Resources Dept.
4400 Haskell Lane
Batavia, OH 45103
\$429,261
January 2018



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Wilder, KY 41076

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Middletown WWTP Influent Valve Replacement
City of Middletown, OH
One City Centre Plaza
Middletown, OH 45042
\$407,900
February 2018

Wastewater Treatment Plant Improvements Contract 1-2012
City of Athens, Ohio
8 East Washington Street
Athens, Ohio 45701
Strand Associates, Inc.
\$14,979,039
November 2015
Jessica Adine
(740) 593-7636

PUB Water Treatment Plant Surge Protection Improvements
Clermont County Board of Commissioners
101 East Main Street
Batavia, Ohio 45103
Hazen and Sawyer
\$1,127,500
July 2015

Winton Woods Aerial Sewer Replacement
Metropolitan Sewer District of Greater Cincinnati
1600 Gest Street
Cincinnati, Ohio 45204
Burgess & Niple, Ltd.
\$3,982,860
April 2015

Muddy Creek WWTP Skimming/Sludge Removal System Replacement
Metropolitan Sewer District of Greater Cincinnati
1600 Gest Street
Cincinnati, Ohio 45204
Jacobs
\$2,878,059
April 2014

Mill Creek WWTP Secondary Treatment
Upgrade/Rehab, Contract 72
Metropolitan Sewer District of Greater Cincinnati
1600 Gest Street
Cincinnati, Ohio 45204
Jordon, Jones, & Goulding
\$25,465,565
October 2013

Lower Little Miami Wastewater Treatment Plant (Expansion)
Warren County Board of Commissioners
406 Justice Drive
Lebanon, Ohio 45036



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\$19,768,142
January 2012

Wastewater Treatment Plant (Upgrade/Improvement) – Phase I
Village of Williamsburg
107 West Main Street
Williamsburg, Ohio 45176
Burgess & Niple, Ltd.
\$1,109,901
August 2010

Sycamore Creek Wastewater Treatment Plant Upgrade Phase 3 & 4
Metropolitan Sewer District of Greater Cincinnati
1600 Gest Street
Cincinnati, Ohio 45204
BBS a CH2M Hill Company
\$6,963,932
September 2010

Dry Fork Road Sanitary Sewer Improvements – Phase 1
City of Harrison
300 George Street
Harrison, Ohio 45030
Arcadis, Inc.
\$980,000
March 2010

Middletown Wastewater Treatment Plant Sludge Processing and Biosolids
Improvements Project
City of Middletown
One Donham Plaza
Middletown, Ohio 45042
CDM
\$13,329,766
August 2009

Taylor Creek Wastewater Treatment Plant Pump Station Improvements
Metropolitan Sewer District of Greater Cincinnati
1600 Gest Street
Cincinnati, Ohio 45204
ENTRANS
\$3,383,888
August 2009

Polk Run Odor Control and Influent Screen Replacement Project
Metropolitan Sewer District of Greater Cincinnati
1600 Gest Street
Cincinnati, Ohio 45204
CH2M Hill Company
\$402,250
September 2009

Fort Scott Wastewater Treatment Plant
Meyer Builders

Water and Wastewater Treatment Experts



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6581 Harrison Avenue
Cincinnati, Ohio 45247
BBS Corporation
\$2,856,122
December, 2007

O'Bannon Creek WWTP
Clermont County Sewer District
4386 Haskell Lane
Batavia, Ohio 45103
Burgess and Niple
\$2,382,768
July 2007

Milford, Ohio Wastewater Treatment Plant
City of Milford
745 Center Street
Milford, Ohio 45150
Quest Engineers, Inc.
\$2,884,643
July 2007

Warren County Ohio North Wellfield Expansion
Warren County Board of Commissioners
406 Justice Drive
Lebanon, Ohio 45036
Tetra Tech, Inc.
\$1,508,229
June 2007

Mill Creek Centrifuge
Metropolitan Sewer District of Greater Cincinnati
1600 Gest Street
Cincinnati, Ohio 45204
Black & Veach
\$6,414,507

Mill Creek Screen Replacement
Metropolitan Sewer District of Greater Cincinnati
1600 Gest Street
Cincinnati, Ohio 45204
BBS
\$7,311,134

Polk Run Water Treatment Plant
Metropolitan Sewer District of Greater Cincinnati
1600 Gest Street
Cincinnati, Ohio 45204
BBS
\$7,311,134

Indiana

Wastewater Treatment Plant Improvements
City of Elwood, Indiana



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1505 South B Street
Elwood, Indiana 46036
Triad Associates, Inc.
\$5,208,000
January 2016
Josh Ginder/Glen Murry
(765) 552-9844

Wastewater Treatment Plant Improvements
Farbest Foods, Inc.
4689 South 400 West
Huntingburg, Indiana 47542
Hazen and Sawyer, P.C.
\$5,300,000
September 2011

Tennessee

Wastewater Pretreatment Facility
Vi-Jon, Inc.
8515 Page Avenue
Saint Louis, Missouri 63114
Brown and Caldwell
\$4,414,000
June 2012

Stones River Water Treatment Plant
City of Murfreesboro
111 West Vine Street
Murfreesboro, Tennessee 37130
Smith Seckman Reid, Inc.
\$36,811,118
July 2011

Morgan County Correctional Complex Wastewater Treatment Plant
State of Tennessee Department of Corrections
320 Sixth Avenue North
Nashville, Tennessee 37243
Barber McMurry and Ross/Fowler
\$1,146,730
January, 2007

Iowa

Farm Credit Service of America Addition and Remodel (Decorah)
Farm Credit Service of America
5015 South 118th Street
Omaha, Nebraska 68137
The Clark Enersen Partners
\$2,914,609
July 2016
Steve Bodnar
(402) 348-3274

Farm Credit Service of America Addition and Remodel (Cedar Rapids)
Farm Credit Service of America



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5015 South 118th Street
Omaha, Nebraska 68137
The Clark Enersen Partners
\$2,546,215
July 2016
Steve Bodnar
(402) 348-3274

Farm Credit Service of America Addition and Remodel (Carrol)
Farm Credit Service of America
5015 South 118th Street
Omaha, Nebraska 68137
The Clark Enersen Partners
\$2,755,326
July 2016
Steve Bodnar
(402) 348-3274

Filter Rehabilitation
Rathbun Regional Water
16166 Highway J29
Centerville, Iowa 52544
Not Applicable
\$1,091,500
November 2016
Dave Aeshliman
(641) 895-9114

Farm Credit Service of America Addition and Remodel (Perry)
Farm Credit Service of America
5015 South 118th Street
Omaha, Nebraska 68137
The Clark Enersen Partners
\$233,442
January 2016
Steve Bodnar
(402) 348-3274

Tyson Pet Foods Wastewater Treatment Facility
Tyson Pet Foods
812 3rd Street Northwest
Independence, Iowa 50644
Bolton and Menk
\$1,817,000
July 2015
Gordon Slothower

East Water Treatment Plant Chemical Feed Rehabilitation, Contract No. 1 - Site
Work and Concrete
Rathbun Regional Water Association, Inc.
16166 Highway J29
Centerville, Iowa 52544
McClure Engineering Company
\$883,100

Water and Wastewater Treatment Experts



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Contractors | Engineers

2 Rosewood Drive
Wilder, KY 41076

Phone: (859) 781-9500
Fax: (859) 781-9505

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February 2015

Cedar Rapids Water Pollution Control Facility Flood Wall Protection
Project, Phase 1 – Pump Station and Sewer Modifications

City of Cedar Rapids, Iowa

101 First Street Southeast

Cedar Rapids, Iowa 52401

HDR Engineering, Inc.

\$10,121,121

August 2014

Don Berger

(319) 286-5951

LMU Generator Installation

Lenox Municipal Utilities & Communications

205 South Main Street

Lenox, Iowa 50851

JEO Consulting

\$307,000

January 2016

John Borland

(641) 333-2550

Oakland Municipal Water Treatment Plant improvements

City of Oakland, Iowa

101 North Main

Oakland, Iowa 51560

Snyder & Associates, Inc.

\$2,267,000

December 2014

Asset Renewal Project Phase 3

City of Sioux City, Iowa

405 6th Street

Sioux City, Iowa 51101

CDM Smith

\$5,338,842

May 2014

WRA Mud Creek Interceptor Phase 19, Segment 1

City of Des Moines, Iowa

400 Robert D. Ray Drive

Des Moines, Iowa 50309

Veenstra & Kimm, Inc.

\$4,699,992

October, 2013

New, Partially Constructed Water Treatment Plant

Rathbun Regional Water Association

16166 Highway J29

Centerville, Iowa 52544

McClure Engineering Company

\$8,088,880

August 2013

Water and Wastewater Treatment Experts



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Water System Improvements Contract 'C'
Rathbun Regional Water Association
16166 Highway J29
Centerville, Iowa 52544
McClure Engineering Company
\$4,532,000
September 2012

Lake Rathbun Caisson-Type Intake Structure
Rathbun Regional Water Association
16166 Highway J29
Centerville, Iowa 52544
McClure Engineering Company
\$2,119,991
July 2011

Kansas

Hansen WTP Horizontal Collector Well No. 1
Water District No. 1
10747 Renner Boulevard
Lenexa, Kansas 66219
Black & Veatch
\$4,419,000
May 2018

Mississippi

Koch Foods, Inc.
Koch Foods of Mississippi
4688 Highway 80 East
Morton, Mississippi 39117
Clearwater Consultants, Inc.
\$408,385
May 2007

Missouri

Wastewater Treatment System Expansion
Tyson Foods, Inc.
P.O. Box 2020
Springdale, Arkansas 72765
Not applicable
\$843,000
September 2011

Nebraska

Missouri River WWTP Solids Processing Building
City of Omaha
1819 Farnam Street, Suite 600
Omaha, Nebraska 68186
HDR, Inc.
\$4,663,000
June 2017

Utica Nebraska Water Treatment Plant Improvements

Water and Wastewater Treatment Experts



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Village of Utica
466 First Street
Utica, Nebraska 68456
Olsson Associates
\$607,000
May 2016
Beck Sandman

Wellfield and Water Treatment Plant Improvements
City of Falls City
2307 Barda Street
Falls City, Nebraska 68154
Kirkham Michael
January 2017
Alan Romine
(402) 245-2851

Solids Handling Improvements - Theresa Street Wastewater Treatment
Facility Construction
City of Lincoln, Nebraska
555 South 10th Street
Lincoln, Nebraska 68508
HDR Engineering, Inc.
\$3,669,669

WPCF Raw Pumps 4 and 5 Replacement
Beatrice Board of Public Works
400 Ella Street
Beatrice, NE 68310
Olsson Associates
\$252,600
February 2016
Dean Kelch
(402) 228-5221

New York

CSX Selkirk
1 Bell Crossing Road
Selkirk, New York 12158
Arcadis, Inc.
\$697,431
November 2019
Mike Mendoza
(904)-710-7347

North Carolina

Pond Creek Wastewater Treatment Plant Upgrade
Town of Beech Mountain
403 Beech Mountain Parkway
Beech Mountain, North Carolina 28604
Davis-Martin-Powell and Associates
\$1,876,547
November 2007



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South Dakota

Clear Well and High Service Pump Addition
Dakota Dunes CID
P.O. Box 1997
Dakota Dunes, South Dakota 57049
HDR, Inc.
\$1,292,292
May 2016
Jeff Dooley
(605) 232-4211

Texas

Republic Camelot Landfill
580 Huffines Boulevard
Lewisville, Texas 75057
CEC
\$226,870
October 2019
Adam Mehevec
(512)-225-8103

Dean Foods, Dallas Texas
3144 South Haskill Avenue
Dallas, Texas 75223
Dennis Group
\$2,577,396
January 2020
Terrell Woods
(571)-269-1886

Wastewater Pretreatment Plat BAAT Addition
Dean Foods (Southwest Ice Cream Specialties)
1220 North Tennessee
McKinney, Texas 75609
Brown and Caldwell
\$1,677,000
March 2012

Virginia

CSX Bryan Yard
2298 Tomlyn Street
Richmond, Virginia 23230
Arcadis, Inc.
\$990,843
July 2019

7/23/2020, btc



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UNIT #	DESCRIPTION	SERIAL #	DATE OF TOOL PURCHASE
600	LINKBELT RTC 8030	D315-3878	1995
601	LINKBELT RTC 8030	D316-4672	1996
602	LINKBELT CRANE LS108B	9LG4726	1976
603	LINKBELT CRANE LS318	21G4-5380	1974
605	LINKBELT LS 118	1VH3-127	1983
606	GROVE HYD. CRANE RT65S	40120	1986
607	GROVE HYD. CRANE RT65S	42735	1979
608	GROVE HYD. CRANE RT60S	40405	1977
611	J/D 455GTC CRAWLER LOADER	794687	1994
612	CAT 977 LOADER	14X1393	1979
613	CAT 977 LOADER	14X1394	1979
614	CAT 963LGP	21Z05332	1994
615	JD 544J RUBBER TIRE LOADER	597748	2005
616	CAT IT38 LOADER	7BS00532	1997
617	CAT 963LGP LOADER	21Z04107	1991
618	CAT 977 LOADER	14X962	1978
620	J/D 410D BACKHOE	782101	1992
621	J/D 410D BACKHOE	786621	1994
622	JD 410D BACKHOE (4WD)	793114	1993
623	JD 410E BACKHOE (4WD)	TO410EX874474	1999
624	J/D 410D BACKHOE (4WD)	T0410DG798218	1996
625	CAT 235D BACKHOE	8TJ00200	1992
626	CAT 325BL TRACKHOE	2JR00588	1996
627	CAT 312 TRACKHOE	6GK01772	1996
630	CAT 312 TRACKHOE	9GR00442	1998
631	J/D 650 DOZER	820878	1994
632	J/D 450H DOZER	045HX900278	2001
633	J/D 410D BACKHOE (4WD)	783444	1994
634	CAT 330 TRACKHOE	ZRR00605	2001
635	CAT D6D	4X8078	1980
636	J/D 410D BACKHOE	790530	1993
637	JD 410D HOE(4WD)	887264	1993
638	J/D 544E RUBBER TIRE LOADER	536477	1992
639	CAT 325BL TRACKHOE	2JR01258	1997
640	JD 410E 4WD EXTENDAHOE	887288	2000
641	JD 455G LOADER	885239	2000

643	JOY AIRTRACK MS4E	32400	1977
644	IHI 80 EXCAVATOR	WK001309	2007
645	J/D 120 HOE	F120CX034705	2004
646	J/D FORKLIFT 482C	81823	1996
647	VOLVO EC 140	11673	2005
648	J/D FORKLIFT 482C	767975	1990
649	J/D FORKLIFT 480C	720694	1986
661	IHI 80 EXCAVATOR	WK000505	2005
662	IHI 80 EXCAVATOR	WK000191	2003
663	1996 JD 410D HOE(4WD)	T0410DG821067	1996
664	1996 JD 410D HOE(4WD)	T0410DG819156	1996
665	1990 JD 650G DOZER	759885	1990
666	1996 JD 410D HOE(4WD)	T0410DG814312	1996
667	2000 HAMM COMPACTOR H1605	40306	2000
668	1996 JD 410D HOE(4WD)	824765	1996
669	LINKBELT LS338	21G7-747G	1977
670	IHI 80 EXCAVATOR	WK001279	2007
671	DYNAPAC ROLLER CA150	73320468	2004
672	IHI 80 EXCAVATOR	WK001144	2006
673	VOLVO ECR88 TRACKHOE	11806	2006
674	VOLVO ECR88 TRACKHOE	J000025427-3	2006
675	VOLVO EC140BLC TRACKHOE	11480	2006
680	2004 REDI 20 TON EQUIP TRAILER	41020615	2004
681	JD 650 DOZER	127876	2006
683	VOLVO L20B RUBBER TIRE LOADER	L20BV1701443	2006
684	A.P.E. VIBRATORY DRIVER w/POWER UNIT	940415	
685	REMCO BUSH BOG HARROW (MODEL MR-10)	RC98-026	1998
686	ICE 42S WITH LEADS	255	7/1/99
687	VOLVO EC290	C12538	2005
688	CAT 345BL TRACKHOE	45S705	1998
689	CAT 325BL TRACKHOE	2JR03027	1998
690	LINKBELT CRANE LS318	21G3-377B	1973
691	LINKBELT RTC 8050	E115-3492	1995
692	LINKBELT HSP 8050	5315-4295	1995
695	LINKBELT HSP 50 TON	53H70621	1987
696	GROVE RT59S 18 TON	22110	1972
697	LINKBELT HSP 50 TON	5310-0346	1990
698	CAT 345 BLII TRACKHOE	AGS01665	2003
699	VOLVE 210 BLC	15239	2005
800	AIR COMPRESSOR SULLAIR 900	119048	1996
802	GOWWIN 4" DIESEL PUMP	0437083143	
803	GOODWIN DIESEL PUMP	T04039D488414	
805	SKYJACK 3219 LIFT	237283	



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807	SKYJACK 3219	239173	
809	GENIE Z34 ELEC. KNUCKLE	Z34N-2931	2000
810	JLG N40 LIFT	0300054538	2000
811	GENIE S45 LIFT	S45-6268	2002
812	8351 GENIE LIFT (4WD)	Z60-000313	1994
813	GENIE S-65 LIFT	1189	1996
815	BOBCAT S-250	526012527	2004
816	BOBCAT S-250	521315044	
817	S-250 BOBCAT	521314575	2003
818	T-200 BOBCAT	518917654	
819	S-250 BOBCAT	526012403	
820	S-250 BOBCAT	526012525	2004
822	T-300 BOBCAT	A5GU20132	
823	T-300 BOBCAT	525415774	
824	T-300 BOBCAT	532011974	2006
825	WACKER RT REMOTE VIB ROLLER	5581604	2005
826	MULTIQUIP MOD.DCA-25KW GEN	1044526	2000
827	WACKER RT82-CS TRENCH ROLLER	5626412	2005
828	MAGNUM MODEL MMG25 GEN.	1401011	2014
830	BRODERSON IC-80-2E CRANE	269677	1996
835	T-300 BOBCAT	525414085	2005
836	T-300 BOBCAT	A5U36064	2010
837	T-300 BOBCAT	A5U35163	2009
838	T-300 BOBCAT	A5GU35677	2010
850	SKYJACK 3226 LIFT	Z75441	2005
851	SKYJACK 3226 LIFT	Z77028	2006
852	SKYJACK 3226 LIFT	Z75438	2005
853	SKYJACK 3226 LIFT	Z75434	2005
854	SKYJACK 3219	244597	2004
860	JLG-G9-43A-LULL	60005465	2000
900	INLAND BOAT WORKS PUSH BOAT	822400	1999



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1922 Ironwood Avenue
Red Oak, Iowa 51566

Phone: (712) 623-4032
Fax: (515) 724-7017

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Construction Experience of Key Individuals:

A. Martin Zalla Jr., P.E.	Chairman	57 years
John W. Zalla	President/CEO	31 years
Darryl Geiman, P.E.	Vice President, Secretary, Treasurer	21 years
Brad Miller	Vice President	30 years
Todd Bailik	Principal Engineer	25 years
Jeff Soe	Project Manager	38 years
John Ivan	Project Manager	31 years
Chad Nickolisen	Project Manager	23 years
Shane Paxton	Project Manager	21 years
Steve James	Project Manager	19 years
Rob Birkenhauer	Project Manager	11 years
Mike Schoborg	Superintendent	37 years
Donnie Ellison	Superintendent	33 years
David Kremer	Superintendent	33 years
Terry Vance	Superintendent	33 years
Ed Wallen	Superintendent	31 years
Jim Jones	Superintendent	29 years
Rich Parr	Superintendent	28 years
Robert Mackey	Superintendent	29 years
Tim Marks	Superintendent	27 years
Eric Davis	Superintendent	25 years
Aaron Allgeier	Superintendent	10 years
Tim Dunlevy	Safety Director	23 years
Roger Hrabik	Estimator	38 years

Approximate Number of Employees: 120

7/22/2020, btc

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

Board Resolution

**Northern Kentucky Water District
Board of Commissioners
Regular Meeting
January 21, 2021**

A regular meeting of the Board of Commissioners of the Northern Kentucky Water District was held on January 21, 2021 via video teleconference, as permitted by KRS 61.826, due to the COVID-19 pandemic restrictions and in compliance with recommendations from federal, state, and local governmental authorities. All Commissioners were present, except for Commissioner Patricia Sommerkamp. Also present were Ron Lovan, Lindsey Rechten, Amy Kramer, Tom Edge, Kim Clemons, Alex Mattingly, Jason Miller, Jody Lange, Jonathan Moor, Adam Smith, Barry Miller, and Stacey Kampsen.

Commissioner Wagner called the meeting to order at 12:06 p.m., and Commissioner Wagner led the pledge of allegiance.

The Board welcomed Tom Edge as the new General Counsel & Manager of Legal, Compliance, and Regulatory Affairs and thanked Alex Mattingly, the departing General Counsel & Manager of Legal, Compliance, and Regulatory Affairs for his service to the District.

The Commissioners reviewed correspondence received and articles published since the last regular Board meeting on November 19, 2020.

On motion of Commissioner Lange, seconded by Commissioner Koester, the Board unanimously approved the minutes for the regular Board meeting held on November 19, 2020.

The Board was provided a copy of the District's check registers, which included the check number, check date, payee, check amount and description of the reason for each payment, detailing the District's expenditures for the period November 1, 2020 through December 31, 2020. On motion of Commissioner Cunningham, seconded by Commissioner Lange, and after discussion, the Board unanimously approved the expenditures of the District for November and December 2020.

On motion of Commissioner Cunningham, seconded by Commissioner Koester, the Board, by unanimous vote, accepted the bid of \$464,475.00 and awarded a contract to Jack Gemmer & Sons, Inc., for new water service line installation and authorized staff to execute the contract documents.

Engineer Kyle Ryan provided a short presentation on the Fort Thomas Treatment Plant Phase 2 Basin Improvement project. On motion of Commissioner Lange, seconded by Commissioner Koester, the Board, by unanimous vote, accepted the base bid of \$5,584,000.00 and awarded a contract to Building Crafts, Inc. for the Fort Thomas Treatment Plant Phase 2 Basin Improvements with a total project budget of \$6,000,000.00 and authorized staff to execute the contract documents.

On motion of Commissioner Lange, seconded by Commissioner Koester, the Board, by unanimous vote, accepted the bid of \$28,830.00 and awarded a contract to Wessel Lawncare & Landscaping for lawncare services at the water towers and pump station grounds and also accepted the bid of \$77,911.89 and awarded a contract to A&A Lawncare and Landscaping for lawncare

services at the treatment plants and Central Facility and authorized staff to execute the contract documents for both.

On motion of Commissioner Macke, seconded by Commissioner Lange, the Board, by unanimous vote, accepted the bids of \$3.07 per square foot and awarded a contract to Florence Winwater Works Co. and Core & Main for ¾-inch copper pipping and also accepted the bid of \$4.05 per square foot and awarded a contract to Florence Winwater Works Co. for 1-inch copper pipping and authorized staff to execute the contract documents.

The Board considered the election of officers of the Board of Commissioners. On motion of Commissioner Cunningham, seconded by Commissioner Lange, the Board unanimously elected Commissioner Wagner as the Chair of the Board, Commissioner Koester as Vice Chair, Commissioner Fred Macke as Secretary, and Commissioner Jody Lange as Treasurer, effective February 1, 2021.

The Board reviewed the District’s financial reports and Department reports.

Vice President of Finance and Support Services Lindsey Rehtin updated the Board on revenues and expenses and provided an update on the meter reading project and 2021 Bond Anticipation Note to be considered later this year. Ms. Rehtin also advised the Board that the 2020 audit is currently in progress.

Human Resource Manager Kim Clemons provided the Board with an updated the Board on the 2020 Performance Evaluation Results.

Vice President of Engineering, Distribution, and Production Amy Kramer updated the Board on the Fort Thomas Treatment Plant reservoir sediment removal and highlighted the change orders applicable to three projects since the last meeting.

On motion of Commissioner Cunningham, seconded by Commissioner Koester, the Board unanimously agreed to and authorized and directed that Chairman Dough Wagner negotiate and execute changes to Mr. Lovan’s Employment Agreement as may be mutually agreed upon.

Other matters of a general nature were discussed.

On a motion by Commissioner Cunningham, seconded by Commissioner Lange, the meeting was adjourned at 2:01 p.m.

CHAIRMAN

SECRETARY

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

PROJECT FINANCE INFORMATION

Customers Added and Revenue Effect

Debt Issuance and Source of Debt

Additional Costs for Operating and Maintenance

USoA Plant Account

Depreciation Cost and Debt Service After Construction

Northern Kentucky Water District

Customers Added and Revenue Effect: There will be zero new customers added and no revenue effect as a result of the Fort Thomas Treatment Plant Basin Improvements – Phase 2 project.

Debt Issuance and Source of Debt: This project will be paid from the District’s Five-Year Capital Budget, PSC No. 243 “FTTP Sedimentation Basins and Chemical Improvements” with a budget of \$6,000,000 which includes construction cost, engineering, and contingencies. A summary of the project costs is provided below:

○ Design Engineering	\$ 201,868
○ Construction Engineering	\$ 10,000
○ Contractor’s Bid	\$ 5,584,000
○ Misc. & Contingencies	\$ <u>204,132</u>
Total Project Cost	\$ 6,000,000

The project will be funded using \$3,935,000 from State Revolving Fund Loan and \$2,065,000 from a future Bond Anticipation Note.

USoA Accounts: The anticipated amounts for the project cost of \$1,075,000 will fall under the following Uniform System of Accounts Codes:

Code 304 “Structures and Improvements”	\$2,255,698
Code 320 “Water Treatment Equipment”	\$3,744,302

Additional Costs and O&M: Additional annual operating and maintenance costs incurred for the project are as follows:

Power	\$ 0
Labor	\$ 0
Maintenance	<u>\$112,000 (2% of construction)</u>
	\$112,000

Depreciation and Debt Service: Annual depreciation and debt service after construction are as follows:

Depreciation: \$60,151.95/year over 37.5 years for Code 304 “Structures and Improvements” and \$124,810.07/year over 30 years for Code 320 “Water Treatment Equipment”

Annual Debt Service: \$234,884.97 over 20 years for 1.75% State Revolving Fund Loan and \$105,770.21 over 25 years for 2% conventional loan.

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

SCHEDULE OF MORTGAGES, BONDS, NOTES, AND
OTHER INDEBTEDNESS

Northern Kentucky Water District		
Bonds & Notes		
11/30/2020		
Bonds		
USDA 2000		\$0
Series 2003C		\$0
Series 2004A		\$0
Series 2006		\$0
Series 2009		\$0
Series 2011		\$0
Series 2012		\$33,675,000
Series 2013A		\$21,685,000
Series 2013B		\$12,840,000
Series 2014A		\$1,706,500
Series 2014B		\$4,650,000
Series 2016		\$33,155,000
Series 2019		\$17,310,000
Series 2020		\$22,325,000
		\$147,346,500
KIA Notes Currently Servicing		
F08-07		\$2,592,667
F9-02		\$16,661,797
F13-012		\$4,523,000
F-14-015		\$3,244,297
F-15-011		\$3,234,401
B-15-003		\$1,230,717
F16-027		\$1,304,928
Total KIA		\$32,791,807
Other Notes		
Deferred Note Kenton County		\$100,000

NORTHERN KENTUCKY
WATER DISTRICT

Project

Fort Thomas Treatment Plant Basin
Improvements – Phase 2,
Campbell County, Kentucky

184-4006

CURRENT BALANCE SHEET AND
INCOME STATEMENT

**NORTHERN KENTUCKY WATER DISTRICT
STATEMENT OF NET POSITION
NOVEMBER 30, 2020**

ASSETS AND DEFERRED OUTFLOWS OF RESOURCES

Current Assets

Cash and Cash Equivalents	\$ 37,463,043
Investments	4,381,307
Accounts Receivable	
Customers, Net	6,079,625
Unbilled Customers	6,500,000
Others	55,545
Assessments Receivable	155,813
Inventory Supplies for New Installation and Maintenance, at Cost	1,727,317
Prepaid Items	1,151,170
Restricted Assets - Cash and Cash Equivalents	
Bond Proceeds Fund	150,848
Debt Service Account	2,209,076
Improvement, Repair & Replacement	<u>291,495</u>
Total Current Assets	<u>60,165,239</u>

Noncurrent Assets

Restricted Assets - Cash and Cash Equivalents	
Bond Proceeds Fund	711,486
Debt Service Account	18,510,282
Improvement, Repair and Replacement	732,700
Customer Deposits Fund	878,045
Restricted Assets - Investments	
Debt Service Reserve Account	19,083,189
Miscellaneous Deferred Charges	<u>4,303,753</u>
Capital Assets	
Land, System, Buildings and Equipment	508,687,471
Construction in Progress	<u>16,511,406</u>
Total Capital Assets	525,198,877
Less Accumulated Depreciation	<u>184,519,894</u>
Total Capital Assets, Net of Accumulated Depreciation	<u>340,678,983</u>
Total Noncurrent Assets	<u>384,898,438</u>
Total Assets	<u>445,063,676</u>

Deferred Outflows of Resources

Deferred Outflows Related to Pension	4,558,221
Deferred Outflows Related to OPEB	2,110,885
Deferred Loss on Refundings	<u>3,728,435</u>
Total Deferred Outflows of Resources	<u>10,397,541</u>
Total Assets and Deferred Outflows of Resources	\$ <u>455,461,217</u>

**NORTHERN KENTUCKY WATER DISTRICT
STATEMENT OF NET POSITION
NOVEMBER 30, 2020**

LIABILITIES, DEFERRED INFLOWS OF RESOURCES, AND NET POSITION

Liabilities and Deferred Inflows of Resources

Current Liabilities

Bonded Indebtedness	\$ 12,245,628
Notes Payable	1,705,186
Accounts Payable	578,710
Accrued Payroll and Taxes	457,039
Other Accrued Liabilities	156,593
Liabilities Payable-Restricted Assets	
Accrued Interest Payable	2,209,076
Accounts Payable	442,343
	<hr/>
Total Current Liabilities	17,794,575

Long-Term Liabilities (Net of Current Portion)

Liabilities Payable-Restricted Assets	
Accounts Payable	142,457
Customer Deposits	878,045
Compensated Absences	1,257,041
Arbitrage Liability	322,268
Bond Indebtedness	149,233,577
Notes Payable	31,186,622
Net Pension Liability	23,269,110
Net Unfunded OPEB Liability	5,563,369
	<hr/>
Total Long-Term Liabilities	211,852,489
	<hr/>
Total Liabilities	229,647,065

Deferred Inflows of Resources

Deferred Inflows Related to Pension	726,617
Deferred Inflows Related to OPEB	2,058,313
	<hr/>
Total Deferred Inflows of Resources	2,784,930

Total Liabilities and Deferred Inflows of Resources	<hr/> <hr/> 232,431,995
---	-------------------------

Net Position

Net Investment in Capital Assets	150,036,405
Restricted For	
Debt Service Funds	37,593,471
Capital Improvement Projects	1,301,728
Unrestricted	34,097,618
	<hr/>
Total Net Position	223,029,222

Total Liabilities, Deferred Inflows of Resources, and Net Position	<hr/> <hr/> <hr/> \$ 455,461,217
---	----------------------------------

**NORTHERN KENTUCKY WATER DISTRICT
STATEMENT OF REVENUES, EXPENSES AND CHANGES IN NET POSITION
12 MONTH PERIOD ENDED NOVEMBER 30, 2020**

Operating Revenues	
Water Sales	\$ 59,025,217
Forfeited Discounts	323,989
Rents From Property	557,983
Other Water Revenues	<u>254,523</u>
 Total Operating Revenues	 <u>60,161,712</u>
Operating Expenses	
Operating and Maintenance Expense	28,650,343
Depreciation Expense	<u>12,275,138</u>
 Total Operating Expenses	 <u>40,925,481</u>
 Net Operating Income	 <u>19,236,231</u>
Non-Operating Income (Expense)	
Investment Income	785,929
Miscellaneous Non-Operating Income/(Expense)	107,695
Loss on Abandonment of Mains	(670,860)
Gain/(Loss) on Disposal of Fixed Assets	104,561
Interest on Long Term Debt and Customer Deposits	(6,609,108)
Pension Expense	(2,476,972)
Other Post Employment Benefit Expense	(97,596)
Arbitrage Expense	(178,770)
Amortization of Debt Premiums and Defeasance Costs	839,173
Bond Issuance Costs	<u>(226,605)</u>
 Total Non-Operating Income (Expenses)	 <u>(8,422,553)</u>
 Change in Net Position Before Capital Contributions	 10,813,678
 Capital Contributions	 <u>1,695,839</u>
 Change in Net Position	 12,509,517
 Net Position - Beginning of Year	 <u>210,519,705</u>
 Net Position - End of Year	 <u>\$ 223,029,222</u>