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 AND NECESSITY AND APPROVAL OF FINANCING FOR TAYLOR MILL TREATMENT PLANT EMERGENCY GENERATOR	)))))	**CASE NO. 2023-00132**

APPLICATION

Northern Kentucky Water District ("NKWD"), by and through counsel, petitions the Commission for an order authorizing for a Certificate of Public Convenience and Necessity for construction of an Emergency Generator at NKWD's Taylor Mill Treatment Plant **before the bids expire on July 5, 2023** pursuant to KRS 278.020 and approval of financing pursuant to KRS 278.300. In support of this Application, NKWD states as follows:

GENERAL INFORMATION

1. NKWD states pursuant to **807 KAR 5:001(14)** that its office address is 2835 Crescent Springs Rd., Erlanger, Kentucky 41018-0640. Its principal officers are listed in its current Annual Report, which is filed with the Commission as are its prior years Reports.

2. Pursuant to **807 KAR 5:001(14)**, NKWD states it is a non-profit water district organized under Chapter 74 and has no separate articles of incorporation; its web page is www.nkywater.org. Its contact officers and employees are:

Stacey Kampsen Vice President of Finance and Support Services 2835 Crescent Spring Road P.O. Box 18640 Erlanger, KY 41018 Phone: (859) 578 9898 Fax: (859) 578-3668	Tom Edge General Counsel and Manager of Legal, Compliance, and Regulatory Affairs 2835 Crescent Spring Road P.O. Box 18640 Erlanger, Kentucky 41018 Phone: (859) 578 5457

Email: skampsen@nkywater.org	Fax: (859) 578-3668 Email: tedge@nkywater.org

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

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

CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

5. NKWD proposes constructing new facilities as described in Exhibit A. A motion for Confidentiality for the plans and drawings, a portion of Exhibit A-6 has been submitted with this Application.

6. The proposed construction project identified in Exhibit A is scheduled to begin construction upon PSC approval and beginning in August 2023 and completed in September 2025. Board approval of the final bids for the project is included in Exhibit C. The bids were opened April 6, 2023 and are subject to acceptance for 90 days. **The bids will expire July 5, 2023.**

7. This project was recommended as part of the Asset Management Program, updated in 2011, an excerpt of which is attached as Exhibit A-3.

8. 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-6.

9. NKWD has received approvals from the DOW for the Plans and Specifications and funding for these improvements. See Exhibit B.

10. A copy of the Bid Tabulation for this project, along with the Engineer's Recommendation of Award and minutes of NKWD's Board of Commissioner's meeting approving the award are contained

in Exhibit C-1 through C-3.

11. The project finance information including: (i) customers added and revenue effect; (ii) debt issuance and source of debt; (iii) USoA Accounts; (iv) additional costs for operating and maintenance; and (v) depreciation costs and debt service after construction is contained in Exhibit D.

12. Information on NKWD's Mortgages, Bonds, Notes and Other Indebtedness is included in Exhibit E along with Assistance Agreement, and notification to the state local debt officer. NKWD is seeking approval to use a total $4,065,000.00 from KIA Loan F20-044 to partially finance the project. See Exhibit E-2.

13. NKWD's Financial Statements are included as Exhibit F and an Affidavit for this Application is included as Exhibit G.

14. No rate adjustment is being proposed as part of this Application.

15. The following information is provided pursuant to **807 KAR 5:001(15)(2)**:

a. Specifications and descriptions are in Exhibit A. The construction is in the public interest and is required to allow NKWD to continue to provide adequate service to its customers. Facts relied on to justify the public need are included in the project descriptions in Exhibit A-1.

b. No new franchises are required. Copies of permits from the proper public authority for the proposed construction are in Exhibit B.

c. A full description of the proposed location and route of the proposed construction including a description of the manner of the construction and related information is in Exhibit A. The project will not compete against any other public utility in the area.

d. A Project Map is included as Exhibit A-2.

e. The project will be funded using $4,065,000 from State Revolving Fund Loan F20-044, $1,000,000 from Cleaner Water Program Grant 21CWW105, and $2,785,000

from a future Bond Anticipation Note which includes construction cost, engineering, and contingencies. A summary of the project costs is provided below:

Engineering	$165,563.00
Contractor's Bid	$6,937,500.00
Misc. & Contingencies	$746,937.00
TOTAL PROJECT COST:	$7,850,000.00

The Commission approved the $8,000,000 State Revolving Fund Loan F20-044 in Case #2022-00319 and the draw for this project is $4,065,000.00, at an interest rate of 1.50 percent and an additional loan servicing fee of 0.25 percent, for a term of twenty years as more particularly described in Exhibit E-2. Although the project costs are more expensive due to the additional SRF Loan requirements, the District expects to see overall savings as current market interest rates are significantly higher than the SRF Loan interest rate. Project financial information is outlined Exhibit D.

16. Pursuant to **807 KAR 5:001(12)(1)**, Financial operations for the twelve-month period not less than 90 days prior is attached hereto in Exhibit F.

17. The following information is provided pursuant to **807 KAR 5:001(12)(2)**:

a. No stock is authorized.

b. 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 Exhibit F.

18. Pursuant to **KRS 322.340**, Engineering plans, specifications, drawings, plats and reports for the proposed construction or extension prepared by a registered engineer are signed, sealed and dated by an engineer registered in Kentucky are included as Exhibit A.

FINANCING

19. In addition to the issuance of a Certificate of Public Convenience and Necessity, to the extent that the Commission will permit, NKWD seek Commission authorization to use the remaining proceeds of State Revolving Loan F20-044 for the construction of this project. NKWD will not expend any of the remaining loan proceeds until it has obtained a CPCN for this project and Commission authorization for such use of the loan proceeds as required by Case No. 2022-00319.

20. NKWD desires to finance $4,065,000 of the total project costs through a State Revolving Loan F20-044. See Exhibit E-2 for the Assistance Agreement. The remaining $3,785,000 will be funded through a $1,000,000 Cleaner Water Program Grant 21CWW105, and a future Bond Anticipation Note.

21. The following information is provided as required by **807 KAR 5:001(18)(1)**:

a. The information required by **807 KAR 5:001(14)** is contained within this Petition generally and within paragraphs 1-4 specifically as if fully rewritten herein;

b. A general description of the property is contained in the NKWD Annual Report filed with the Public Service Commission and is incorporated herein. The Annual Report and attached financial information in Exhibit F are the latest available from NKWD.

No stock or bonds are to be issued as part of this case. NKWD desires to draw $4,065,000 for this project from the previously authorized Stated Revolving Loan F20-044 at an interest rate of 1.50 percent and an additional loan servicing fee of 0.25 percent, for a term of twenty years as more particularly described in Exhibit E-2. Project financial information is included as Exhibit D.

c. The proceeds of the SRF Loan are to construct the project described in Exhibit A.

d. A detailed description of property to be acquired, constructed, improved or extended is included in Exhibit A and Exhibit B.

e. There is no refunding or refinancing proposed herein.

f. The notice to the state debt officer required by 807 KAR 5:001(18)(1)(g) is attached as Exhibit E-4.

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

a. Financial Exhibits, pursuant to **807 KAR 5:001(12)**, are included as Exhibit F.

b. There are no trust deeds. All notes, mortgages and other forms of indebtedness are included as Exhibit E.

c. Maps and plans of property constructed or acquired are listed in Exhibit A.

23. Pursuant to **KRS 278.300**, this Application is made under oath through an Affidavit located in Exhibit G.

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

RESPECTFULLY SUBMITTED:

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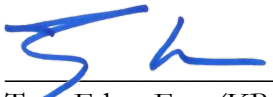
Email: tedge@nkywater.org
Counsel for Northern Kentucky Water District

CERTIFICATE OF SERVICE

In accordance with 807 KAR 5:001, Section 8, I certify that this document was submitted electronically to the Public Service Commission on April 26, 2023 and that there are currently no parties that the Public Service Commission has excused from participation by electronic means in this proceeding.



Tom Edge, Esq. (KBA #95534)

EXHIBIT LIST

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EXHIBIT A

ENGINEERING REPORTS AND INFORMATION

EXHIBIT A-1

PROJECT DESCRIPTION

Proposed Taylor Mill Treatment Plant Emergency Generator
(Phase 1 of WX21117210)
City of Taylor Mill
Kenton County, Kentucky
184-4013

PROJECT DESCRIPTION

The Taylor Mill Treatment Plant was built in the early 1950s and can treat up to ten (10) million gallons of water per day. Additionally, this plant houses a critical pump station, which transmits water from both the Fort Thomas and Taylor Mill Treatment Plants to about 60% of Kenton County.

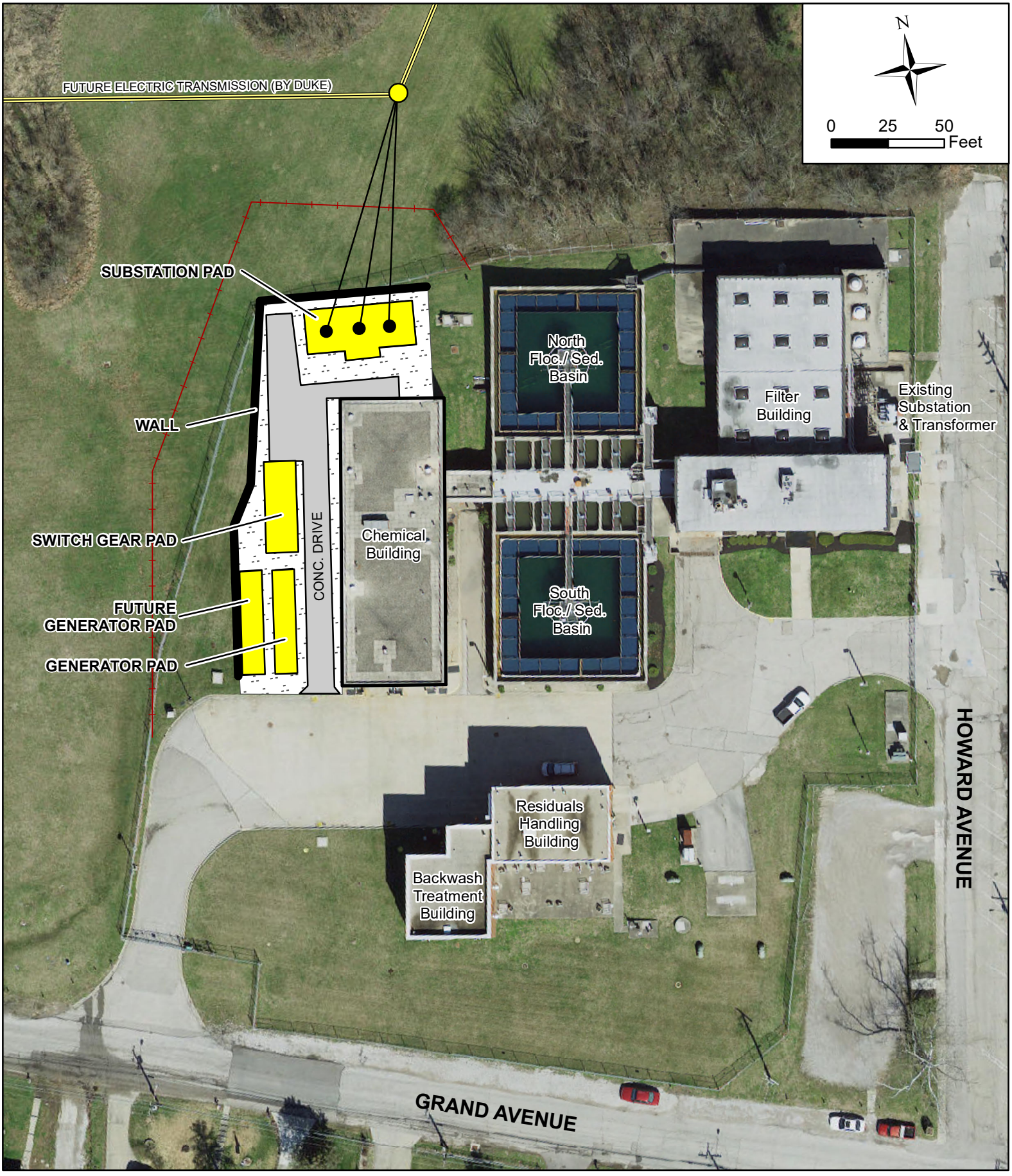
The pump station and most of the plant are fed from a Duke Energy transmission line. This electrical service enters through a District-owned substation and transformer on the east side of the building. In the event of extended power outage or substation/transformer failure, the District would lose the ability to supply water to a majority of Kenton County.

The Taylor Mill Treatment Plant Emergency Generator project will include the installation of a new 7.5 MVA, 69KV x 2400V substation, 2000 KW, 2400V standby diesel generator, 2400V switchgear in a walk-in enclosure, 500 KVA, 2400V x 480/277V pad mounted transformer, and associated structures, cabling, terminations, etc. The generator to be installed will be capable of powering the existing plant and one of the larger pumps or two of the smaller pumps. The standby power system can be expanded in the future to run more pumps and supply backup power to an advanced treatment facility if these improvements materialize. The new equipment will be located adjacent to and west of the existing Chemical Building.

Bids for this project were opened on April 6, 2023 and are subject to acceptance for 90 days.

EXHIBIT A-2

PROJECT MAP



TAYLOR MILL TREATMENT PLANT
EMERGENCY GENERATOR

Northern Kentucky Water District

EXHIBIT A-3

2008 ASSET MANAGEMENT PROGRAM EXCERPTS

Northern Kentucky Water District

IV. Identified Needs and Improvements

4775-011

GRW, Inc.

MALCOLM PIRNIE

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 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	Distribution System R&R 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.
Yearly	Coordinated Main Replacement 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.
Yearly	Mains to Unserved Areas 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.
Yearly	Annual General Facility R&R – Plants, Tanks, and Pump Stations 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.
09-01	FTTP – Advanced Treatment Project 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.
09-02	TMTP – Advanced Treatment Project 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.

Advanced Treatment portion of this project has been deferred. Will be constructing generator only.

Table 4-11.
5-Year CIP Project Description

Designation	Description
09-03	MPTP – Advanced Treatment Project 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.
09-04	FTTP Filter Renovations 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.
09-05	LRPS Structural Improvements, Roof Replacement, Sluice Gates, Actuators, and VFD 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.
09-06	TMTP Valves and Actuators This project will replace aging valves and actuators in the pump station at the Taylor Mill Treatment plant.
09-07	Dudley 1040 – Pump Replacement 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.

Table 4-11.
5-Year CIP Project Description

Designation	Description
09-08	Washington Trace from Twelve Mile to Hwy 1996 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.
09-09	US 27 from East Alexandria Pike to Main Street 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.
09-14	Dolwick 1080/1040 Interconnect This project involves consructing a new 12-inch water main along Dolwich 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.
09-15	42-inch Transmission from FTTP to Moock Road The proposed project involves constructing a new 42-inch water main along U.S. 27 and Moock Road from the FTTP to the Moock 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 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.

Table 4-11.
5-Year CIP Project Description

Designation	Description
09-16	Siry to Flatwoods (Subdistrict F) 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	Dudley Discharge Redundancy – Phases 1, 2, and 3 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	Stonehouse Rd (Twelve Mile Road) from KY 10 to KY 1566 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	Senour Avenue West of Clover Ridge 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	Replace PLCs at TMTP 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	FTTP Filter Building Improvements This project will repair the walls, windows, and coatings that are failing due to condensation in the filter bays at the FTTP.
11-07	IT Improvements – Year 1 This project includes implementation of improvents to the WAN, conversion to GeoDatabase, inventory control, and IT Tracking system.

Table 4-11.
5-Year CIP Project Description

Designation	Description
12-01	Rossford Tank 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.
12-02	MPTP Reservoir Pump Station Suction Piping Replacement 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.
12-03	Carothers Road Pump Station Generator 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.
12-04	FTTP Residuals Handling Improvements 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 recyled 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.
12-06	Burns Rd. Between Persimmon Grove & Flatwoods 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.
12-07	KY 1280 Between US 27 & Burns Rd. 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.

Table 4-11.
5-Year CIP Project Description

Designation	Description
12-08	Madison Ave. Parallel 24-inch Main Between Dudley & Hands Pike 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	Orphanage Rd. Parallel 24-inch Main Between Redwood & Valley Plaza 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	Hands Pike Between KY16 & Edwin 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	KY 16 Between Hands Pike & Klette Rd 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	Highland Avenue 12-inch from Kyles Lane to new reg pit near Hanser pit 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	KY 16 from I-275 to TM Swim Club upgrade 16-inch with KDOT project 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	KY 16 from TM Swim Club to TM Standpipe upgrade 16-inch with KDOT project 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	IT Improvements - Year 2 This project includes implementation of improvents to the WAN, conversion to GeoDatabase, inventory control, IT Tracking system, and intergration with software systems.
13-01	FTTP Backwash Tank Replacement 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	Dudley - Install Isolation Valves 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	Taylor Mill PS Pump Replacement (proposed 1, 5, 6 and 2 or 3) 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	LRPS New Generator & Walkbridge Upgrade 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	Improvements to FTTP Flocculation/Sedimentation Basins 2 & 3 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	Low Gap Rd. Between Tollgate Rd & 8-inch Dead End 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.
13-08	Interconnect 1080 & 1017 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.
13-12	US 27 24-inch from Sunset to Martha Lane Collins 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.
13-13	Independence Rd. Between KY17 & 12-inch Pipe 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.
13-14	IT Improvements - Year 3 This project includes implementation of improvents to the WAN, IT Tracking system, and intergration with software systems.
14-01	Laboratory Generator 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.

Table 4-11.
5-Year CIP Project Description

Designation	Description
14-02	TMTP Sludge Pumps, Conveyors & Press 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.
14-03	ORPS2 Replacement Design and Construction 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.
14-05	36-inch Licking River Crossing 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.
14-09	Vineyard (Gunkel Rd.) Between Eight Mile & Fender Rd. 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 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.
14-10	IT Improvements - Year 4 This project includes implementation of improvents to the WAN, IT Tracking system, and intergration with software systems.

Table 4-11.
5-Year CIP Project Description

Designation	Description
15-04	Bromley Pump Replacement and Misc. Improvements 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.
15-05	Upgrade SCADA/Instrumentation/Security Equipment at Plants and PS 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.
15-07	IT Improvements - Year 5 This project includes implementation of improvents to the WAN, IT Tracking system, and intergration with software systems.
16-05	Hands Pike Pumps and Misc Improvements 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).
16-06	Horsebranch Road 24-inch from 36-inch to Thomas More Parkway This project involves construction of a approximately 1,800 feet of 24-inch main along Horsebranch Road to Thomas More Parkway.
17-01	Raw water line to FTTP South Reservoir 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.
17-02	MPTP Residuals Handling Improvements 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.

Table 4-11.
5-Year CIP Project Description

Designation	Description
17-04	SR17 From Hands Pike to Apple Drive 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	Replace Bellevue Tank 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	New KY17 PS To Replace Richardson Rd. PS 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	1.0 MG Elevated Storage Tank East of Independence 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	Replace Dayton Tank 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	US 27 Pump Station VFDs 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	SR17 to Stephens Rd cross country 16-inch to New Tank in Independence 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	24-inch on US 27 Between FTTP and Martha Layne Collins replace 16-inch 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	1.0 MG Elevated Storage Tank – Southern Campbell County 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	New Pump Station near the existing Ripple Creek PS 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	24-inch along US 27 from Martha Layne Collins to Ripple Creek PS 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	16-inch along AA Highway from Hwy 547 & California Cross Rd. 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	36-inch Redundancy from 42-inch at Moock Rd to 36-inch Licking River Crossing This project consists of constructing 6,300 feet of 36-inch main along Moock Road and across the Licking River into Covington.
19-10	Replace Lumley Tank 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	Electrical Upgrades at FTTP 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	Retire TM Standpipe Build Elevated 1040 Tank 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 be 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	Pump Station Improvements at Dudley 1040 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	Replacement Ida Spence Tank (or retire and serve from 1040) 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	Chemical Feed Systems Upgrades at TMTP 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	Filter Valves and Actuators at FTTP 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	Pump Station Improvements at Carothers The pumps, motors, and motor control centers and electrical systems should be replaced.
22-01	20-inch Gravity Discharge from MPTP 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	Pump Station Improvements at Bristow Road 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	Chemical Feed Systems Upgrades at FTTP 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	Pump Station Improvements at Dudley 1080 It is recommended the pumps, motors, and motor control centers be replaced along with upgrades to the mechanical, electrical, and lighting systems.
24-01	Pump Station Improvements at Latonia It is recommended the pumps, motors, and motor control centers be replaced along with upgrades to the mechanical, electrical, and lighting systems.
25-01	Pump Station Improvements at Waterworks Road 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	MPTP Expand to 20 MGD 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	Pump Station Improvements and Electrical Improvements at TMTP 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	20-inch to Connect 11th Street in Newport to 12th Street in Covington This project consists of extending one of the gravity lines from MPTP down 11th Street in Newport to supply a new pump station near the Licking River and then connecting back into the main at 12th and Wheeler in Covington. The addition of 5,700 feet of 20-inch is needed.
27-06	12-inch Parallel Main Btwn Vulcan and Lytle 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	New pump station from Newport to Covington 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	24-inch Parallel Main Persimmon Grove from AA Hwy to Jerry Wright 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	16-inch Main Jerry Wright, Lickert, Old SR 4 to Claryville Tank 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	MPTP add second gravity thickener This project involves the addition of a second gravity thickener and pumps to process increased production capacity and reservoir solids at MPTP.
29-02	ORPS2 Addition of One 10 MGD Pump 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	20-inch Percival Rd from 24-inch in Banklick/Walton Nicholson to New Tank 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	1 MG Tank in Southern Kenton County near Walton Based on demand projections and a storage gap analysis, additional storage will be needed in southern Kenton County sometime by 2030. This project consists if 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	Chemical Feed Systems Upgrades at MPTP 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	Pump Station Improvements at US 27 It is recommended the pumps, motors, and motor control centers be replaced along with upgrades to the mechanical, electrical, and lighting systems.
30-07	Replace Kenton Lands Tank 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.

Advanced Treatment portion of this project has been deferred. Will be constructing generator only.

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 Moock 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	$343,00

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 Roaday 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 Moock 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	$250,00
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

EXHIBIT A-4

ENGINEER'S OPINION OF PROBABLE TOTAL CONSTRUCTION COST

Magna ENGINEERS
Electrical • Mechanical • Instrumentation

CONSTRUCTION COST ESTIMATE			
Project:	Taylor Mill WTP Standby Power		
Owner:	Northern KY Water District		
Project No.:	026-19-001		
Date:	11-Apr-23	Dwg. No.:	N/A
Estimator:	TMH	Type:	Final

Description	Number of Units	Units of Measure	Unit Cost	Total Cost
TOTALS				
Site	1	EA	$334,162.40	$334,162
Structural	1	EA	$410,124.00	$410,124
Electrical	1	EA	$4,156,152.00	$4,156,152
SUBTOTAL				$4,900,438
GC MARKUP @ 15%				$735,066
			TOTAL	$5,635,504

Magna ENGINEERS
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CONSTRUCTION COST ESTIMATE

Project:	Taylor Mill WTP Standby Power		
Owner:	Northern KY Water District		
Project No.:	026-19-001		
Date:	11-Apr-23	Dwg. No.:	N/A
Estimator:	TMH	Type:	Final

Description	Number of Units	Units of Measure	Unit Cost	Total Cost	Total Cost +30%
SITE					
Erosion Control & BMP	1	LOT	$20,750.00	$20,750	$26,975
Demolition	1	LOT	$25,000.00	$25,000	$32,500
DGA paving surface	122	Tons	$30.00	$3,660	$4,758
DGA Base	162	Tons	$30.00	$4,860	$6,318
Replace curb & gutter	72	LF	$25.00	$1,800	$2,340
Asphalt patch	20	SY	$100.00	$2,000	$2,600
Concrete sidewalk repair	13	CY	$700.00	$9,100	$11,830
Railing Imbed and Rail	56	LF	$125.00	$7,000	$9,100
DGA Leveling pad	41	Tons	$30.00	$1,230	$1,599
Railing and post footing	182	LF	$135.00	$24,570	$31,941
Manhole rings	1	EA	$1,200.00	$1,200	$1,560
New manholes	2	EA	$12,000.00	$24,000	$31,200
Rock stone backfill utilities	120	TN	$50.00	$6,000	$7,800
Pump around at tie-in	1	LS	$5,250.00	$5,250	$6,825
Deep line route relocation	155	LF	$165.00	$25,575	$33,248
Gasline relocation	1	EA	$3,000.00	$3,000	$3,900
Replace topsoil	112	CY	$35.00	$3,920	$5,096
84" Fencing	608	LF	$45.00	$27,360	$35,568
84" Gate	1	LS	$5,200.00	$5,200	$6,760
Seed and straw	1	AC	$3,500.00	$3,500	$4,550
Straw Mat	1,209	SY	$5.00	$6,045	$7,859
6" Subdrain FD	185	LF	$13.00	$2,405	$3,127
Pipe Cradle/Saddle	1	EA	$3,500.00	$3,500	$4,550
8" HDPE	42	LF	$25.00	$1,050	$1,365
Catch Basin 2' x 2'	1	EA	$1,250.00	$1,250	$1,625
Intercept 2' x 3'	1	EA	$3,750.00	$3,750	$4,875
Expansion Joints	391	LF	$5.00	$1,955	$2,542
Steel Bollards	7	EA	$1,250.00	$8,750	$11,375
SUBTOTAL					$303,784
CONTINGENCY 10%					$30,378
			TOTAL		$334,162

Magna ENGINEERS
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CONSTRUCTION COST ESTIMATE

Project:	Taylor Mill WTP Standby Power		
Owner:	Northern KY Water District		
Project No.:	026-19-001		
Date:	11-Apr-23	Dwg. No.:	N/A
Estimator:	TMH	Type:	Final

Description	Number of Units	Units of Measure	Unit Cost	Total Cost	Total Cost +30%
STRUCTURAL					
Generator Pad					
Strip Footing	33	CY	$500.00	$16,500	$21,450
Foundation Wall	36	CY	$750.00	$27,000	$35,100
Mat Slab	50	CY	$550.00	$27,500	$35,750
Stair and Platform	1	EA	$6,000.00	$6,000	$7,800
Switchgear Pad					
Mat Slab	40	CY	$550.00	$22,000	$28,600
Substation Pad					
Mat Slab	155	CY	$550.00	$85,250	$110,825
Retaining Wall					
Strip Footing	106	CY	$550.00	$58,300	$75,790
Wall	59	CY	$750.00	$44,250	$57,525
SUBTOTAL					$372,840
CONTINGENCY 10%					$37,284
			TOTAL		$410,124

Magna ENGINEERS
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CONSTRUCTION COST ESTIMATE

Project:	Taylor Mill WTP Standby Power		
Owner:	Northern KY Water District		
Project No.:	026-19-001		
Date:	11-Apr-23	Dwg. No.:	N/A
Estimator:	TMH	Type:	KIA Submittal

Description	Number of Units	Units of Measure	Unit Cost	Total Cost	Total Cost +30%
ELECTRICAL					
Duke Energy Charges	1	LOT	$150,000.00	$150,000	$195,000
7.5 MVA Transformer	1	EA	$250,000.00	$250,000	$325,000
Primary Take-Off Structure	1	EA	$35,000.00	$35,000	$45,500
69 KV Arrestors	3	EA	$5,000.00	$15,000	$19,500
69 KV Insulators	3	EA	$1,000.00	$3,000	$3,900
69 KV Gang Operated switch	1	EA	$30,000.00	$30,000	$39,000
69 KV Fused Switch	1	EA	$40,000.00	$40,000	$52,000
2000 KW Generator Package	1	EA	$900,000.00	$900,000	$1,170,000
2400V Switchgear and House	1	EA	$900,000.00	$900,000	$1,170,000
2400V Ductbank, 200A	120	LF	$70.00	$8,400	$10,920
2400V Ductbank, 2000A	120	LF	$500.00	$60,000	$78,000
2400V 1600A (UG or OH)	650	LF	$420.00	$273,000	$354,900
2400V Ductbank, 600A	50	LF	$150.00	$7,500	$9,750
Substation Grounding	1	Lot	$10,000.00	$10,000	$13,000
Control Wiring & Conduit	650	LF	$30.00	$19,500	$25,350
HVAC Modifications	1	Lot	$50,000.00	$50,000	$65,000
Remote I/O panel	1	EA	$30,000.00	$30,000	$39,000
500 KVA transformer	1	EA	$30,000.00	$30,000	$39,000
Duke Coordination	1	EA	$5,000.00	$5,000	$6,500
Switchovers and Outages	1	EA	$10,000.00	$10,000	$13,000
Power System Study	1	EA	$30,000.00	$30,000	$39,000
Demolition	1	EA	$50,000.00	$50,000	$65,000
SUBTOTAL					$3,778,320
CONTINGENCY 10%					$377,832
			TOTAL		$4,156,152

EXHIBIT A-5

SPECIFICATIONS AND PLANS PREPARED AND DIGITALLY SIGNED BY A P.E.

SPECIFICATIONS

FOR

NORTHERN KENTUCKY WATER DISTRICT

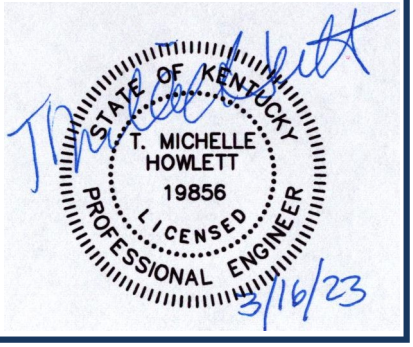
Taylor Mill Treatment Plant Emergency Generator Phase 1 of WX21117210

2835 Crescent Spring Road
Erlanger, Kentucky 41018-0640

March 2023

Compiled by:

Magna Engineers
861 Corporate Drive, Suite 210
Lexington, Kentucky 40503
859.309.2990



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

FOR

NORTHERN KENTUCKY WATER DISTRICT

Taylor Mill Treatment Plant Emergency Generator Phase 1 of WX21117210 City of Taylor Mill, Kenton County, Kentucky

March 2023

GOVERNING BODY

COMMISSIONERS:

JOSEPH J. KOESTER – CHAIR
FRED MACKE, JR – VICE CHAIR
JODY R. LANGE, CPA, CGMA - SECRETARY
DOUG WAGNER - TREASURER
CLYDE CUNNINGHAM - COMMISSIONER
NICHOLAS E. WINNIKE - COMMISSIONER

LINDSEY RECHTIN, PRESIDENT/CEO

COMPILED BY:
Magna Engineers
861 Corporate Drive, Suite 210
Lexington, Kentucky 40503
859.309.2990

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INVITATION TO BID

Date: March 17, 2023

PROJECT**:** **Taylor Mill Treatment Plant Emergency Generator – Phase 1 of WX21117210 City of Taylor Mill, Kenton County, Kentucky**

SEALED BIDS WILL BE RECEIVED ONLINE VIA THE QUESTCDN SOFTWARE FOR:

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

UNTIL: Date: April 6, 2023
Time: 2:00 pm (Local Time)

At said place and time, and promptly thereafter, all Bids that have been duly received will be opened. Entities on the registered list of plan holders will be sent a link to attend the virtual bid opening. The public may access the virtual bid opening by emailing Cassandra Zoda at czoda@nkywater.org to get the meeting number and password.

The proposed Work is generally described as follows: The project includes a new 7.5 MVA, 69KV x 2400V substation, 2000 KW, 2400V standby diesel generator, 2400V switchgear in a walk-in enclosure, 500 KVA, 2400V x 480/277V pad mounted transformer, and associated structures, cabling, terminations, etc. The project includes site grading, relocation of underground utilities, equipment pads, fencing, and platforms and railings. The project shall be completed within 760 calendar days. Liquidated damages shall be assessed at $500 per calendar day.

To view the bid documents, go to Northern Kentucky Water District (nkywater.org/procurement) in the section labeled “Current Procurement Items” at the top of the page and click the link to be redirected to the Quest CDN Electronic Bid Online Interface.

This bid is listed as Quest eBid Doc **#8423783**

The project documents may be downloaded by registering with Quest CDN online at www.questcdn.com or by calling 952-233-1632. After registration is complete, an On-Line Bid ID code must be created by clicking on “My Account”, then the “User Info” tab. A prospective bidder will create this code in the designated field per requirements noted. To be considered a Plan-holder, a bidder must complete registration and download the Proposal Documents in digital form for a $22.00 charge. There will be a charge of $42.00 to submit a bid. Plan-holders will receive addenda and other proposal document updates via Quest CDN. Prospective bidders must be on the plan holders list through Quest CDN for a bid to be accepted.

On requests 72 hours in advance, Owner will provide each Bidder access to the site to conduct such investigations and tests as each Bidder deems necessary for submission of a Bid. Arrangements for site visits shall be made by contacting Cassandra Zoda at czoda@nkywater.org or by phone at (859) 578-5455.

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.

Bids will be received on a unit price and/or 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.

This project may be funded with funds provided by the Kentucky Drinking Water State Revolving Fund (SRF) with federal funds provided by the Environmental Protection Agency. Alternate bid items are included to allow for SRF funding. If an alternate bid is selected to enable SRF funding, SRF requirements (including American Iron and Steel and Davis Bacon) and provisions must be met by the Bidder and all subcontractors. If an alternate bid is selected by NKWD to enable SRF funding, SRF requires federal prevailing wage rates to be paid to all employees of the Bidder and all employees of any subcontractor.

For the SRF alternate bid items, Bidders must comply with Title VI of the Civil Rights Act of 1964, the Anti-Kickback Act, and the Contract Work Hours Standard Act.

For the SRF alternate bid items, 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.

For the SRF alternate bid items, all Bidders, Contractors and Subcontractors will comply with 41 CFR 60-4, in regard to affirmative action, to insure equal opportunity to females and minorities and will apply the time tables and goals set forth in 41 CFR 60-4.

For the SRF alternate bid items, Bidders will make positive efforts to use small, minority, women owned and disadvantaged businesses.

For the SRF alternate bid items, the procurement will be subject to DOW Procurement Guidance including the Davis- Bacon Act.

For the SRF alternate bid items, the Successful Bidder and all Subcontractors will be required to conform to the labor standards set forth in the Contract Documents.

Evaluation of Bids and the awarding of a final contract are subject to the reciprocal preference for Kentucky resident bidders pursuant to KRS 45A490 to 45A.494 and (KAR 200 5:400)

For the SRF alternate bid items, all bidders must comply with OSHA (P.L. 91-596) and the Contract Work Hours and Safety Standards Act (P.L 91-54).

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 on this project.

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.

End of Section

Section 00 21 13

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.

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 on record in the advertised "Invitation to Bid". There shall be no substitution of bidders without proper registration with the Issuing Office 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 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 addendums will be issued through the Owner's QUESTCDN electronic bidding site. You must download the bid documents to be a plan holder and receive any addenda. It is the sole responsibility of the Bidder to review all addendums twenty-four (24) hours prior to bid. 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.

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 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. SUBMITTING AN ONLINE BID. Proceed to the QuestCDN website at www.questcdn.com. You will be asked to sign into your account or create a free QUESTCDN account by clicking the 'join' link. Contact QUESTCDN at 952-233-1632 or

info@questcdn.com for assistance in membership registration, downloading the project and vbid online bid submittal.

The QUESTCDN eBid Doc number for this project is: #8423783

To access the bid form, click the online bidding button at the top of bid advertisement. The on-line bid button will be available when the project is published and open for bidding. There is a fee of $30.00 to submit your bid.

12. PREPARATION OF BID. Bid price shall be indicated for each lump sum bid item and/or unit price item listed therein.

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.

13. BASIS OF BID. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Bid schedule. The total of all estimated prices will be determined as the sum of the products of the estimated quantity of each item and the unit price Bid for the item. The final quantities and Contract Price will be determined in accordance with paragraph 11.03 of the General Conditions and as amended in the Supplemental Conditions.

Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

14. SUBMITTAL OF BID. Due to the Covid-19 situation, the Northern Kentucky Water District (NKWD) has implemented changes that will impact the bidding of projects, goods, and services. The lobby is closed to the public at the District’s Erlanger office. Additionally, the District will not be hosting group meetings or gatherings, including public bid openings. All bid openings will be conducted by NKWD staff only at the date and time indicated in the Invitation to Bid. The general public will not be permitted to attend the bid openings as has traditionally occurred in the past. Bid results will be available on the NKWD website through the Quest CDN Online Interface. These changes will remain in place until further notice.

The bid shall be accompanied by:

1. Bid Disclosure Form (Section 00 41 13)

2. Certification Regarding Debarment, Suspension and Other Responsibility Matters (EPA Form 5700-49). (Section 00 73 02 – Attachment No. 9)

3. Certification Regarding Lobbying, Certification for Contracts, Grants, Loans and Cooperative Agreements. (Section 00 73 02 – Attachment No. 10)

4. Statement of Bidder’s Qualifications (Section 00 41 20 – Attachment No. 1)

5. Bidder’s Experience Record (Section 00 41 20 – Attachment No. 2)

6. Proposed Subcontractors (Section 00 41 20 – Attachment No. 3)

7. Bid Security (Section 00 41 30)

8. Non-Collusion Affidavit (Section 00 41 33)

9. Required Notarized Affidavit for Bidders, Offerors, and Contractors Claiming Kentucky Resident Bidder Status (Section 00 47 00)

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. Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids. Paper, oral, telephone, facsimile, or telegraph Bids are invalid and will not receive consideration.

15. MODIFICATION AND WITHDRAWAL OF BIDS. A Bid may be modified or withdrawn via the Quest CDN electronic bid service only. If within 72 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid.

16. OPENING OF BIDS. Bids will be opened at the time and place indicated in the advertisement or Invitation to Bid. 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.

17. BIDS TO REMAIN SUBJECT TO ACCEPTANCE. All Bids will remain subject to acceptance for 60 days after the bids are due. Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

18. AWARD OF CONTRACT. 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 Project to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate with Bidders to such an extent as may be 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 other information or data as may be requested in the Bidder Disclosure Form.

b. The qualifications of the Bidder.

c. If the Bidder has adequate personnel, plant, and equipment to perform the services properly and expeditiously.

e. Bidder's financial status to meet all obligations and incidentals to the services.

f. Whether the Bidder has appropriate technical expertise and experience.

g. Bidder's performance record.

h. The amount of the bid and the best bid

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 services in accordance with the Contract Documents.

19. 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.

20. 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.

21. DRINKING WATER STATE REVOLVING FUND LOAN. A portion of the funding for this project may come 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 DEBAREMENT, 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. (CERIFICATION REGARDING LOBBYING) address 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 District's formal request. 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 the District's formal request to do so. 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, 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 District's formal request include:

A. Disadvantage Enterprise Participation Policy (Attachment 11-Section 00 73 02.
B. List of DBE Bidders of Subcontractors (Attachment 11-Section 00 73 02).

End of Section

Section 00 41 13

BID DISCLOSURE FORM

PROJECT IDENTIFICATION: **Taylor Mill Treatment Plant Emergency Generator – Phase 1 of WX21117210**
City of Taylor Mill,
Kenton County, Kentucky

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 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.

   b. 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.

   c. 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.

d. 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.

e. 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.

f. 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.

g. 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.

h. 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.

I. **[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:

_____

_____

_____

j. 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 the Work for unit prices computed in accordance with paragraph 11.03.B of the General Conditions. Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities provided, determined as provided in the Contract Documents.

7. Bidder agrees that the Work will be substantially complete within 730 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 760 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 _____, 2023.

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

_____

_____

_____

_____

Email: _____

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 _____

The following is to be posted on the District's QUESTCDN electronic bidding site:

Taylor Mill Treatment Plant Emergency Generator
Phase 1 of WX21117210

Note: Bidder agrees to perform all the following work described in the specifications and shown on the plans, for the following prices:

Base Bid Item Description (Non-SRF Scenario)	Unit	Quantity	Unit Price	Non-SRF Cost
Item 1 - General Construction of Taylor Mill Treatment Plant Emergency Generator	Lump Sum	1		
Item 2 - Allowance for Duke Energy Charges	Lump Sum	1	$189,500	$189,500
Item 3 - Allowance for Aggregate Pier Ground Improvements	Lump Sum	1	$200,000	$200,000
			Total Non-SRF Base Bid =	

Alternate 1 Bid Item Description (SRF Scenario)	Unit	Quantity	Unit Price	SRF Cost
Item 1 - General Construction of Taylor Mill Treatment Plant Emergency Generator (SRF Funding Scenario)	Lump Sum	1		
Item 2 - Allowance for Duke Energy Charges	Lump Sum	1	$189,500	$189,500
Item 3 - Allowance for Aggregate Pier Ground Improvements	Lump Sum	1	$200,000	$200,000
			Total SRF Alternate 1 Bid =	

Bid Form Instructions: The unit price schedule above includes columns to price bids for both a non-SRF (Base Bid) and SRF funding scenario (Alternate 1). ***Bidders must provide both a Base Bid (Non-SRF Scenario) and Alternate 1 Bid (SRF Scenario). Numbers must be entered in every box in both columns even if the numbers are the same for the non-SRF and SRF scenarios.***

BASE BID AND ALTERNATE 1 BID MANUFACTURERS

Bids shall be based on the basis of design manufacturer listed in Table 1 for major equipment. Award will be based the amount of the bid and the best bid above (either Base or Alternate 1 Bid). Consideration will be given to alternate manufacturers, and if accepted, the lump sum bid amount will be adjusted upon award of Contract.

TABLE NO. 1
BASE AND ALTERNATE BID MANUFACTURERS

ALTERNATIVE EQUIPMENT INFORMATION				
Equipment Item	Base Bid & Alternate 1 Bid Equipment Manufacturer	Alternate Bid Equipment Manufacturer	Lump Sum Deduction	
1. Medium Voltage Paralleling Switchgear	Russelectric		1.a	Non-SRF
			1.b	SRF
2. Standby Power Generation System - Fixed	Kohler Caterpillar*		2.a	Non-SRF
			2.b	SRF
3. Electric Room Air Conditioning System	Mitsubishi		3.a	Non-SRF
			3.b	SRF

*Kohler is the basis of design for dimensions, weights, etc. If Caterpillar is bid, Contractor shall make any required adjustments to accommodate.

Section 00 41 20

SUPPLEMENTS TO BID FORM

1. FORMS TO BE SUBMITTED WITH BID

   A. Bid Disclosure Form (Section 00 41 13)
   B. Certification Regarding Debarment, Suspension and Other Responsibility Matters - EPA Form 5700-49 (Attachment No. 9 – Section 00 73 02)
   C. Certification Regarding Lobbying (Attachment No. 10 – Section 00 73 02)
   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 00 41 30)
   H. Non-Collusion Affidavit (Specification Section 00 41 33)
   I. Required Notarized Affidavit for Bidders, Offerors, and Contractors Claiming Kentucky Resident Bidder Status (Specification Section 00 47 00)

2. FORMS TO BE SUBMITTED WITHIN 7 DAYS OF DISTRICT'S FORMAL REQUEST
   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 the District's formal request to do so. 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 District's formal request include:

A. Disadvantage Enterprise Participation Policy (Attachment 11 – Section 00 73 02)
B. List of DBE Bidders of Subcontracts (Attachment 11 – Section 00 73 02)

Attachment Number 1

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 therin are true and correct.

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

_____
(NOTARY PUBLIC)

My commission expires _____

Attachment Number 2

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 #				

Attachment Number 3

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. Aggregate Piers	
2. Earthwork / Walls	
3. Electrical	
4. HVAC	
5. Restoration / Seeding & Strawing	
6. Other:	
7. Other:	

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)	_____(Seal)
Bidder's Name and Corporate Seal	Surety s Name and Corporate Seal
By _____	By _____
Signature and Title	Signature and Title (Attach Power of Attorney)
Attest _____	Attest _____
Signature and Title	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 Noti e 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 00 41 33

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

Bid Description: [Taylor Mill Treatment Plant Emergency Generator (Phase 1 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 Printed Name

_____ _____
Title (if signing on behalf of an entity) Date

State of _____)
)ss.
County of _____)

Subscribed and sworn to before me by _____, as the _____, of _____, this _____ day of _____, 2023.

_____
Notary-at-Large
My comm. exp.:_____

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

Section 00 52 13

AGREEMENT
Taylor Mill Treatment Plant Emergency Generator
(Phase 1 of WX21117210)
184-4013

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: Construction of a new 7.5 MVA, 69KV x 2400V substation, 2000 KW, 2400V standby diesel generator, 2400V switchgear in a walk-in enclosure, 500 KVA, 2400V x 480/277V pad mounted transformer, and associated structures, cabling, terminations, etc. The project includes site grading, relocation of underground utilities, equipment pads, fencing, and platforms and railings.

Article 2. ENGINEER.

The Project has been designed by **Magna Engineers**, 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 **730** 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 **760** 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 sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in the Contractor's Bid, attached hereto as an exhibit, for the total amount of:

_____ _____

(words) **(figures)**

As provided in paragraph 11.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made as provided in paragraph 9.08 of the General Conditions and as modified by the Supplementary Conditions. Unit Prices have been computed as provided in paragraph 11.03 of the General Conditions.

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 a cover sheet and sheets numbered **C-00** through **I-01** inclusive, with each sheet bearing the following general title;
   Taylor Mill Treatment Plant Emergency Generator
   Phase 1 of WX21117210
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. CONTRACT CORRECTION PERIOD

Notwithstanding the reference to "one year after the date of Substantial Completion" at the beginning of paragraph 13.07.A of the General Conditions, the Contractor's Correction Period with respect to the obligations set forth in paragraph 13.07.A of the General Conditions shall be twenty-four (24) months after the issuance of "Certificate of Substantial Completion" for all machinery, piping, materials, equipment, fittings, roadway pavement work, general restoration, shoulder & ditch restoration furnished under the Contract Documents. The correction period referenced in paragraph 13.07.C of the General Conditions shall be twenty-four (24) months for all machinery, piping, materials, equipment, fittings and all roadway pavement work.

Article 9. 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 10. 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 11. 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 Water Quality

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 be 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)

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 pthereto

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:

Code Sub-Code

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.

COMPANIES AFFORDING COVERAGE

INSURED:

COMPANY LETTER A	
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,
	[X] COMMERCIAL GENERAL LIABILITY				PRODUCTS-COMP/OPS AGGREGATE	$1,000,
	[X] OCCURRENCE	(Completed Operations & Products Liability remains			PERSONAL & ADVERTISING INJURY	$1,000,
	[X] BLANKET CONTRACTUAL	in force for 2 years after final payment)			EACH OCCURRENCE	$1,000,
	[ ] _____					
	AUTOMOBILE LIABILITY					
	[X] ANY AUTO				COMBINED SINGLE LIMIT EACH OCCURRENCE Bodily Injury & Property Damage	$1,000,
	[X] HIRED AUTOS					
	[X] NON-OWNED AUTOS					
	EXCESS LIABILITY				EACH OCCURRENCE	$4,000,
	[X] UMBRELLA FORM	(Follows Form of the Primary)			AGGREGATE	$4,000,
	WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY				STATUTORY	
					EACH ACCIDENT	$1,000,
		(Includes US Longshoremen and Harbor Workers Act and Maritime Coverage Where Applicable and All States Endorsement)			DISEASE-POLICY LIMIT	$1,000,
					DISEASE-EACH EMPLOYEE	$1,000,
	OTHER				EACH OCCURRENCE	
	[ ] _____				AGGREGATE	

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS:

1. 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.)
2. Blanket Coverage for XCU Hazards (General Liability & Excess Liability).
3. Waiver of Subrogation Against Certificate Holder(s), Their Officers, Directors, Partners, Employees, & Agents (all policies).
4. Contractual Coverage covers liability assumed in the Indemnification Clause of the Contract between Certificate Holder and Insured (General Liability & Excess Liability).
5. General and Products/Completed Operations aggregates apply for each Certificate Holder contract(s) or amendments (General Liability & Excess Liability).
6. Contractual Liability Limitation Endorsement CG2139 or its equivalent is not included in either General or Excess Liability policies.
7. 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	COMPANY
Code Sub-Code	
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	Nature of Interest
1	X Additional Named Insured
2	SIGNATURE OF AUTHORIZED AGENT OF THE COMPANY

120296

Northern Kentucky Water District

Section 00 63 13
NOTICE OF AWARD

To: Contractor
Street
City, State, Zip Code

Description of Work: The project includes a new 7.5 MVA, 69KV x 2400V substation, 2000 KW, 2400V standby diesel generator, 2400V switchgear in a walk-in enclosure, 500 KVA, 2400V x 480/277V pad mounted transformer, and associated structures, cabling, terminations, etc. The project includes site grading, relocation of underground utilities, equipment pads, fencing, and platforms and railings.

The Owner represented by the undersigned has considered the Bid submitted by you on _____ , 2023 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 Dollars and Cents ($), 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 _____, 20___.

Owner
Northern Kentucky Water District

By:_____
Amy Kramer, V.P. of Engineering,
Production & Water Quality

ACCEPTANCE OF NOTICE

Receipt of the above Notice of
Award is hereby acknowledged this

_____day of _____,20___.

By: _____

_____ Title

Section 00 63 14
NOTICE TO PROCEED

To: Contractor

Street

City, State, Zip

Project Description: The project includes a new 7.5 MVA, 69KV x 2400V substation, 2000 KW, 2400V standby diesel generator, 2400V switchgear in a walk-in enclosure, 500 KVA, 2400V x 480/277V pad mounted transformer, and associated structures, cabling, terminations, etc. The project includes site grading, relocation of underground utilities, equipment pads, fencing, and platforms and railings.

You are hereby notified to commence WORK in accordance with the agreement dated _____ on or before _____. The Work will need to be substantially completed within 730 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 760 calendar days after the date when the Contract Times commence to run. The date of substantial completion of the WORK is _____ and the date of final completion of all WORK is therefore _____.

OWNER

Northern Kentucky Water District

By: _____

Amy Kramer, V.P. of Engineering, Production & Water Quality

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged this the _____ day of

_____.

By: _____

_____
Title

2835 Crescent Springs Road P.O. Box 18640 Erlanger, KY 41018
(859) 578-9898 Fax (859) 578-5456

Section 00 70 00

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

ACEC
American Council of Engineering Companies

The Associated General Contractors of America
Skill Responsibility Integrity

ASCE American Society of Civil Engineers

PE National Society of Professional Engineers
Professional Engineers in Private Practice

AMERICAN COUNCIL OF ENGINEERING COMPANIES

_____

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

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A Practice Division of the
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Endorsed by

CSI

CONSTRUCTION SPECIFICATIONS INSTITUTE

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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.

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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.

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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.

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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

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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:*

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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.

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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

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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:*

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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

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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

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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

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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.

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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.

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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

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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.

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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.

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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,

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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

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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.

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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.

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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.

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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.

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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.

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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.

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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

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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

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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

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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.

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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

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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.

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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

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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;

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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.

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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

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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.

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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

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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.

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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

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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,

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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

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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.

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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.

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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:

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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, expediters, 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

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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.

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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.

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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.

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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.

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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,

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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.

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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.

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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

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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:

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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.

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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:

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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

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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.

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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);

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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

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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

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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.

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Section 00 73 01

SUPPLEMENTARY CONDITIONS

SCOPE. These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (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.

SC-1. DEFINITIONS AND TERMINOLOGY.

SC-1.01. DEFINED TERMS. The terms used in these Supplementary Conditions which are defined in the Standard General Conditions of the Construction Contract (C-700, 2007 Edition) have the meanings assigned to them in the General Conditions.

Amend the terms as follows:

3. Application for Payment: Strike out the word “Engineer” and insert the word “Owner” in its place.

9. Change Order: Strike out the words “recommended by Engineer”.

12. Contract Documents: In the first sentence, strike out the word “Engineer’s” and insert the word “Owner’s” in its place.

14. Contract Times: Strike out the words “as evidenced by Engineer’s written recommendation of final payment”.

15. Contractor: Delete the term “Contractor” and substitute therefore the terms “Contractor or Prime Contractor.”

17. Drawings: Add the following sentence to the definition: “Drawings may also be described as Plans.”

20. Field Order: Strike out the word “Engineer” and insert the word “Owner” in its place.

22. Hazardous Environmental Conditions: Delete the words “ or Radioactive Material” and substitute therefore the words “Radioactive Material or other pollutants or contaminants”.

44. Substantial Completion: Strike out the word “Engineer” and insert the word “Owner” in its place. Add the following to the first sentence: "and a Certificate of Substantial Completion has been completed."

51. Work Change Directive: In the first sentence strike out the words “and recommended by Engineer”.

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

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 a complete project, general trades, or complete project less a part of the project."

"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."

SC-102. TERMINOLOGY. Add the following paragraphs G, H, and I.

"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.

SC-2. PRELIMINARY MATTERS.

SC-2.02. Copies of Documents. Delete the second sentence of paragraph 2.02.A and insert the following new sentence 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 construction of the project 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-2.05. Before Starting Construction. Amend paragraphs 2.05.A and 2.05.B by striking out the word "Engineer" in all locations where it appears in the paragraphs and inserting the word "Owner" in its place.

SC-2.06. Preconstruction Conference. 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, 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.B, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

SC-2.07. Initial Acceptance of Schedules. Amend paragraph 2.07.A, including paragraphs 2.07.A.1, 2.07.A.2, and 2.07.A.3, by striking out the word "Engineer" in all locations where it appears in the paragraph and inserting the word "Owner" in its place.

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

SC-3.01. Intent. Amend paragraph 3.01.C by striking out the word “Engineer” and inserting the word “Owner” in its place.

SC-3.03. Reporting and Resolving Discrepancies. Amend paragraph 3.03.A by striking out the word “Engineer” and inserting the word “Owner” in its place.

SC-3.04. Amending and Supplementing Contract Documents. Amend paragraph 3.04.B by striking out the word “Engineer” and inserting the word “Owner” in its place.

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

SC-4.02. Subsurface and Physical Conditions. Add the following new paragraph**(s)** immediately after paragraph 4.02.B:

C. In the preparation of Drawings and Specifications, Engineer or Engineer’s Consultants relied upon the following reports of explorations and tests of subsurface conditions at the Site:

a. Reports prepared by VECTOR Engineers, Inc. These reports shall be considered technical data upon which Contractor may rely on and shall be considered part of these project specifications.

Test holes have been made on the site of the Work. The locations of test holes are indicated on the Drawings.

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."

Delete paragraph 4.03.B in its entirety and insert the following new paragraph in its place:

B. *Owner's Review*. After receipt of written notice as required by paragraph 4.03.A, Owner will promptly review the pertinent condition, determine the necessity if obtaining additional explorations or tests with respect thereto, and advise Contractor in writing of Owner's findings and conclusions.

SC-4.04. Underground Facilities.

Add the following immediately after paragraph 4.04.A.2.

"4.04.A.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 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.

"4.04.A.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.

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

"4.04.A.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.

"4.04.A.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."

Amend the first sentence of paragraph 4.04.B.1 by striking out the words “and Engineer”.

Amend the second sentence of paragraph 4.04.B.2 by striking out the word “Engineer” and inserting the word “Owner” in its place.

Amend the first sentence of paragraph 4.04.B.2 by striking out the word “Engineer” and inserting the word “Owner” in its place.

Add the following new paragraph immediately after paragraph 4.04.B:

Generally, service connections are not indicated on the Drawings. Contractor shall be responsible for discovery of existing underground installations, in advance of excavating or trenching, by contacting all local utilities and by prospecting.

SC-4.06 Hazardous Environmental Conditions at Site.

Delete paragraph 4.06.A. in it 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 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 project 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 project 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. 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. without permission of Owner. However, emergency work may be done without prior permission.

D. Night Work may be undertaken 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 Work at night.

SC-6.03. Services, Materials, and Equipment. Amend the second sentence of paragraph 6.03.B by striking out the word “Engineer” and inserting the word “Owner” in its place.

SC-6.04. Progress Schedule. Amend the first sentence of paragraph 6.04.A.1 by striking out the word “Engineer” and inserting the word “Owner” in its place.

SC-6.05. Substitutes and “Or-Equals’. Amend paragraph 6.05, including paragraphs 6.05.A, 6.05.A.1, 6.05.A.1.a, 6.05.A.1.b, 6.05.A.2, 6.05.A.2.a, 6.05.A.2.b, 6.05.A.2.c, 6.05.A.2.d, 6.05.B, 6.05.C, 6.05.D, and 6.05.E by striking out the words “Engineer” and “Engineer’s” in all locations where they appear in the paragraph and inserting the words “Owner” and “Owner’s”, respectively, in their place.

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-6.08. Permits. Add the following new paragraph immediately after paragraph 6.08.A:

B. Owner will obtain and pay for the following permits: Road & Highway Encroachment Permits, Kentucky Division of Water, and Stream Crossing Permits (including a Section 404 permit from the Corps of Engineers if applicable).

SC-6.09. Laws and Regulations. Add the following new paragraph immediately after paragraph 6.09.C:

D. Employment requirements shall be as specified herein and in the attachments at the end of the Supplementary Conditions.

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 any applicable exemptions.

SC-6.12. Record Documents. Amend the second sentence of paragraph 6.12.A by striking out the word “Engineer” and inserting the word “Owner” in its place.

Amend the third sentence of paragraph 6.12.A by striking out the words “Engineer for”.

SC-6.16. Emergencies. Amend paragraph 6.16 by striking out the word “Engineer” in all locations where it appears in the paragraph and inserting the word “Owner” in its place.

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 tits sole discretion, prior to the project pre-construction meeting.

SC-6.17. Shop Drawings and Samples. Amend paragraph 6.17, including paragraphs 6.17.A, 6.17.B, 6.17.C, 6.17.D, 6.17.D.1, 6.17.D.1.a, 6.17.D.1.b, 6.17.D.1.c, 6.17.D.1.d, 6.17.D.2, 6.17.D.3, 6.17.E.1, 6.17.E.2, 6.17.E.3, and 6.17.F.1 by striking out the words "Engineer" and "Engineer's" in all locations where they appear in the paragraph and inserting the words "Owner" and "Owner's", respectively, in their place.

SC-6.19. Contractor's General Warranty and Guarantee. Amend paragraph 6.19.C.1 by adding the words "or Owner" at the end of the paragraph.

Amend paragraph 6.19.C.2 by striking out the words "recommendation by Engineer or".

Amend paragraph 6.19.C.3 by striking out the words "by Engineer".

Amend paragraph 6.19.C.6 by striking out the word "Engineer" and inserting the word "Owner" in its place.

Delete paragraph 6.19.C.7 and substitute the following new paragraph therefore:

7. any correction of defective Work by Owner; or

Add the following new paragraph immediately after paragraph 6.19.C.7:

8. any expiration of a correction period.

SC-7. OTHER WORK.

SC-7.01. Related Work at Site. Amend paragraphs 7.01.B and 7.01.C by striking out the word "Engineer" in all locations where it appears in the paragraphs and inserting the word "Owner" in its place.

SC-8. OWNER'S RESPONSIBILITIES.

SC-8.01. Communications to Contractor. Amend paragraph A by striking out "through Engineer".

SC-8.02. Replacement of Engineer. Delete paragraph 8.02 in its entirety.

SC-9. ENGINEER'S STATUS DURING CONSTRUCTION.

SC-9.01. Owner's Representative. Delete paragraph 9.01 in its entirety.

SC-9.02. Visits to Site. Amend paragraphs 9.02.A and 9.02.B by striking out the words "Engineer" and "Engineer's" in all locations where they appear in the paragraph and inserting the words "Owner" and "Owners", respectively, in their place. Add following new paragraph:

B. 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-9.04. Clarifications and Interpretations. Amend paragraph 9.04 by striking out the word "Engineer" in all locations where it appears in the paragraph and inserting the word "Owner" in its place.

SC-9.05. Authorizing Variations in Work. Amend paragraph 9.05 by striking out the word "Engineer" in all locations where it appears in the paragraph and inserting the word "Owner" in its place.

SC-9.06. Rejecting Defective Work. Amend paragraph 9.06 by striking out the word "Engineer" in all locations where it appears in the paragraph and inserting the word "Owner" in its place.

SC-9.07. Shop Drawings, Change Orders and Payments. Delete paragraph 9.07 in its entirety.

SC-9.08. Determinations for Unit Price Work. Delete paragraph 9.08 in its entirety.

SC-9.09. Decisions on Requirements of Contract Documents and Acceptability of Work. Delete paragraph 9.09 in its entirety.

SC-9.10. Limitations on Engineer's Authority and Responsibilities. Delete paragraph 9.10.D in its entirety.

SC-10. CHANGES IN THE WORK.

SC-10.03. Execution of Change Orders. Amend paragraph 10.03.A by striking out the words "recommended by Engineer".

Amend paragraph 10.03.A.3 by striking out the word "Engineer" and inserting the word "Owner" in its place.

SC-10.05. Claims and Disputes. Amend paragraph 10.05 by deleting paragraphs 10.05.A, 10.05.B, 10.05.B.1, 10.05.B.2, and 10.05.C in their entirety and inserting the following new paragraphs in their place:

A. *Notice*. Written notice stating the general nature of each Claim, dispute, or other matter shall be delivered by Contractor to Owner no later than 30 days after the start of the event giving rise thereto. Notice of the amount of extent of the Claim, dispute, or other matter with supporting data shall be delivered to Owner within 60 days after the start of such event, unless the Owner allows, in writing, additional time for Contractor to submit additional or more accurate data in support of such Claim, dispute, or other matter. 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 Time shall be prepared in accordance with the provisions of paragraph 12.02.B. Each Claim shall be accompanied by Contractor's written statement that the adjustment claimed is the entire adjustment to which Contractor believes it is entitled as a result of said event.

B. *Owner's Decisions*. Owner will render a formal decision in writing within 30 days after receipt of the last submittal of Contractor.

C. If Owner does not render a formal decision in writing within the time stated in paragraph 10.05.B, a decision denying the Claim in its entirety shall be deemed to have been issued 31 days after receipt of the last submittal of Contractor, unless Owner notifies Contractor in writing that a formal decision is pending and will be rendered within a specified number of days or by a specified date.

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

SC-11.01. Cost of the Work. Amend the second sentence of paragraph 11.01.A.3 by striking out the words "with the advice of Engineer".

Amend paragraph 11.01.D by striking out the word "Engineer" and inserting the word "Owner" in its place.

SC-11.02. Cash Allowances. Amend paragraph 11.02.A by striking out the words "and Engineer".

Amend paragraph 11.02.B by striking out the words "as recommended by Engineer".

SC-11.9. Unit Price Work. Add the following new paragraph immediately after paragraph 11.9.3.3

11.9.4. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment by Change Order if the variation in the actual quantity of an item of Unit Price Work performed by Contractor differs by more than 25 percent from the estimated quantity of that item indicated in the Bid.

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. Remove 12.03.A in its entirety and insert in its place the following:

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. This extension shall be Contractor's sole and exclusive remedy for such delay. 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, reasonably documented / unavoidable supply chain issues, or acts of God.

Remove 12.03.C in its entirety and insert in its place the following:

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, reasonably documented / unavoidable supply chain issues, 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.

Amend paragraph 12.03.E by striking out the word "or Supplier" in the second sentence and by adding the following after the last sentence "Owner will consider time extension for unavoidable delays caused by a Supplier."

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 whenever it is in preparation or progress. Contractor shall provide proper facilities for such access and inspection.

SC-13.03. Tests and Inspections. Amend paragraph 13.03.A by striking out the word "Engineer" and inserting the word "Owner" in its place.

Amend paragraph 13.03.C by striking out the word "Engineer" and inserting the word "Owner" in its place.

Amend paragraph 13.03.E by striking out the word "Engineer" in both locations where it appears in the paragraph and inserting the word "Owner" in its place.

Amend paragraph 13.03.F by striking out the word "Engineer" in both locations where it appears in the paragraph and inserting the word "Owner" in its place.

SC-13.04. Uncovering Work. Amend paragraph 13.04.A by striking out the words "Engineer" and "Engineer's" in all locations where they appear in the paragraph and inserting the words "Owner" and "Owner's", respectively, in their place.

Delete paragraph 13.04.B in its entirety and insert the following new paragraph in its place:

B. If Owner considers it necessary or advisable that covered Work be observed by Engineer or Owner's representatives, or inspected or tested by others, Contractor, at Owner's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Owner may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such 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, however, such 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 Milestones), 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.

SC-13.06. Correction or Removal of Defective Work. Amend paragraph 13.06.A by inserting the words "or Owner" following the word "Engineer".

SC-13.07. Correction Period. Add the following new paragraph after paragraph 13.07.E:

F. 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.

All machinery, piping, materials, equipment, fittings, and restoration of every kind furnished under this Contract by the Contractor shall be free from defects of manufacture and/or workmanship. The Contractor agrees to replace materials, workmanship, and restoration, which includes all roadway pavement work, shoulder and ditch restoration and repairs, which are found to be defective within twenty four (24) months after issuance of the "Certificate of Substantial Completion". In cases where such defects shall be caused by forces beyond the Contractor's control, as judged by the Owner, the replacements will not have to be made by the Contractor.

SC-13.08. Acceptance of Defective Work. Delete paragraph 13.08.A in its entirety and insert the following new paragraph in its place:

A. If, instead of requiring correction or removal and replacement of defective Work, Owner, prior to making final payment, 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 and the diminished value of the Work to the extent not other wise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Owner making 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 the Work so accepted. If the acceptance occurs after making final payment, an appropriate amount will be paid by Contractor to Owner.

SC-13.09. Owner May Correct Defective Work. Amend paragraph 13.09.A by striking out the word "Engineer" in all locations where it appears in the paragraph and inserting the word "Owner" in its place.

SC-14. PAYMENTS TO CONTRACTOR AND COMPLETION.

SC-14.01. Schedule of Values. Amend paragraph 14.01.A by striking out the word "Engineer" and inserting the word "Owner" in its place.

SC-14.02. Progress Payments. Amend paragraph 14.02.A by striking out the word "Engineer" and inserting the word "Owner" in its place.

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 Contract Documents or reasonably required by Owner.

Delete paragraphs 14.02.B and 14.02.C in their entirety and insert the following new paragraphs in their place:

B. *Review of Applications*

1. Owner will, within 10 days after receipt of each Application for Payment, either begin processing the Application for Payment to Contractor or return the Application to Contractor indicating in writing Owner's reasons for refusing payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Owner's review of Contractor's Application for Payment will consider whether the following have been achieved:

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, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.08, and to any other qualifications as reasonably applied by Owner); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as Owner or Engineer has observed the Work.

3. By processing and making such payment Owner 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; or

b. that 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 Owner's review of Contractor's Work for the purposes of processing payments nor Owner's making any such payments, including final payment, will impose responsibility on Owner:

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 performance of the Work.

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. Owner may refuse to process or make the whole or any part of any payment if, in Owner's opinion, the criteria referred to in paragraph 14.02.B.2 has not been met. Owner may also refuse to process or make any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment previously made, to such extent as may be necessary in Owner'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 Written Amendment or Change Orders;

c. Owner has been required to correct defective Work or complete Work in accordance with paragraph 13.09; or

d. Owner has actual knowledge of the occurrence of any of the events enumerated in paragraph 15.02.A.

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, 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.

Amend paragraph 14.02.D.1 by striking out the words "recommended by Engineer" and inserting the words "requested by Contractor" in their place.

Delete paragraph 14.02.D.2 in its entirety and insert the following new paragraph in its place:

2. If Owner refuses to make payment of the full amount requested by Contractor, Owner must give Contractor immediate written notice 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 corrects to Owner's satisfaction the reasons for such action.

SC-14.04. Substantial Completion. Delete paragraph 14.04.A in its entirety and insert the following new paragraph in its place:

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Owner issue a certificate of Substantial Completion.

B. Promptly thereafter, Owner and Contractor shall make an inspection of the Work to determine the status of completion. If Owner does not consider the Work substantially complete, Owner will notify Contractor in writing giving the reasons therefor.

C. If Owner considers the Work substantially complete, Owner will within 14 days after the inspection of the Work execute and deliver to Contractor a statement of Substantial Completion.

D. At the time of delivery of the certificate of Substantial Completion, Owner will deliver to Contractor a statement 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 subsequently agree otherwise in writing, Owner's aforesaid statement will be binding on Owner and Contractor until final payment.

Add the following new paragraphs following paragraph 14.04.A:

To be considered substantially complete, the following portions of the Work must be operational and ready for Owner's continuous use as intended: Water main is tested and placed into service, services are connected to the new main if applicable to the project, and rough restoration is complete.

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: final restoration such as seeding and sodding.

SC-14.05. Partial Utilization. Amend paragraph 14.05.A by striking out the word "Engineer".

SC-14.06. Final Inspection. Delete paragraph 14.06.A in its entirety and insert the following new paragraph in its place:

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Owner and Contractor shall promptly make a final inspection of the Work.

Owner 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.

SC-14.07. Final Application for Payment. Amend paragraph 14.07.A.1 by striking out the word "Engineer" and inserting the word "Owner" in its place.

Add the following new sentence immediately after the last sentence of paragraph 14.07.A.2.b.:

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.

Delete paragraph 14.07.B in its entirety and insert the following new paragraph in its place:

B. *Review of Application and Acceptance*. If, on the basis of Owner's observation of the Work during construction and final inspection, and Owner's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Owner is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Owner will process the final Application for Payment. Otherwise, Owner will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to process final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

Amend paragraph 14.07.C by striking out the words "recommended by Engineer" and inserting the words "requested by Contractor" in their place.

SC-14.08. Final Completion Delayed. Delete paragraph 14.08.A in its entirety and insert the following new paragraph in its place:

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, Owner shall, upon receipt of Contractor's final Application for Payment, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 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 Owner 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.

SC-15. SUSPENSION OF WORK AND TERMINATION.

SC-15.01. Owner May Suspend Work. Amend paragraph 15.01.A by striking out the words "and Engineer".

SC-15.02. Owner May Terminate for Cause. Amend paragraph 15.02.B by deleting the fourth sentence of the paragraph, in its entirety, which begins: "Such Claims, costs, losses, and damages incurred…".

SC-15.04. Contractor May Stop Work or Terminate. Delete paragraph 15.04.A and 15.04.B in their entirety and insert the following new paragraph in its place:

A. If, through no act or fault of Contractor, the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or Owner fails to act on any Application for Payment within 30 days after it is submitted, or 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 provided Owner does 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 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, stop the Work until payment is made of all such amounts dues 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.

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.

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 required 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: **Taylor Mill Treatment Plant Emergency Generator**

Project Number: **Phase 1 of WX 21117210**

This section applies to Alternate 1 only which utilizes SRF Funding

The attached instructions and regulations as listed below shall be incorporated into the Specifications and comprise Special Conditions.

	Attachment No.
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.

Attachment Number 3

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).

Attachment Number 4

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, of 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.

Attachment Number 6

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.

Attachment Number 7

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.

Attachment Number 10

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.

Attachment Number 11

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

BIDDER'S LIST FORM

OWNER: _____ **LOAN NO:** _____

PROJECT TITLE: _____ **BID DATE:** _____

Instructions:

1. Per 40 CFR §33.501(b), this list must include all firms that were solicited for participation, bid on, or quoted for a prime contract or subcontract under EPA assisted projects, includes both DBE's and non DBE's.
2. SRF loan participants must keep the Bidder's List until the project period for the identified loan has ended and no funds are remaining.
3. This list must be submitted to DOW in the ATA Package. Contract Award Approval cannot be given until this form has been received by DOW.
4. The following information must be obtained from all prime and subcontractors. Please complete the form below:

ENTITY'S NAME	MAILING ADDRESS	CONTACT PERSON	PHONE#	E-MAIL ADDRESS	M/WBE?

Attachment Number 12

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.

Attachment Number 13

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 by 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 by 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.

Attachment Number 15

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

Section 00 83 13

EMPLOYMENT REQUIREMENTS AND WAGE RATES
This section applies to Alternate 1 only which utilizes SRF Funding

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://sam.gov/search/?index=dbra&sort=-modifiedDate&page=1&pageSize=25&sfm%5Bstatus%5D%5Bis_active%5D=true&sfm%5BsimpleSearch%5D%5BkeywordRadio%5D=ALL
Use the pull-down menus to enter:

- State = "Kentucky"
- County = "Kenton"
- DBA: Construction Type = "Heavy"

to find the Davis Bacon Wages.

"General Decision Number: KY20230073 02/24/2023

Superseded General Decision Number: KY20220073

State: Kentucky

Construction Type: Heavy

County: Kenton County in Kentucky.

HEAVY CONSTRUCTION PROJECTS (including sewer/water construction).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $16.20 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 2023.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $12.15 per hour (or the

		applicable wage rate listed	
		on this wage determination,	
		if it is higher) for all	
		hours spent performing on	
		that contract in 2023.	

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/06/2023
1	02/24/2023

ASBE0008-007 03/01/2022

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR	$ 32.30	20.19

ELEC0369-008 06/01/2022

	Rates	Fringes
ELECTRICIAN	$ 34.60	19.57

ENGI0018-016 05/01/2019

	Rates	Fringes
POWER EQUIPMENT OPERATOR (Backhoe/Excavator/Trackhoe)	$ 37.39	14.95

ENGI0181-016 07/01/2021

	Rates	Fringes
POWER EQUIPMENT OPERATOR GROUP 1	$ 35.99	17.85

OPERATING ENGINEER CLASSIFICATIONS

GROUP 1 - Crane; Forklift

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.

Employees assigned to work below ground level are to be paid 10% above basic wage rate. This does not apply to open cut work.

ENGI0181-019 07/01/2021

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
GROUP 1	$ 34.80	17.85
GROUP 2	$ 31.94	17.85
GROUP 3	$ 32.39	17.85
GROUP 4	$ 31.62	17.85

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 06/01/2022

	Rates	Fringes
IRONWORKER (STRUCTURAL AND REINFORCING)	$ 32.37	22.30

IRON0070-011 06/01/2022

	Rates	Fringes
IRONWORKER, ORNAMENTAL	$ 31.79	24.30

LABO0189-016 07/01/2022

	Rates	Fringes
LABORER		
Concrete Worker & Grade Checker	$ 23.76	17.12
Tamper(Hand Held/Walk Behind)	$ 24.01	17.12

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* LABO0265-005 05/01/2022

	Rates	Fringes
LABORER		
Concrete Saw (Hand Held/Walk Behind) & Pipelayer	$ 34.69	17.35
Flagger & Landscape	$ 34.52	17.35

SUKY2011-029 06/25/2014

	Rates	Fringes
CARPENTER (Form Work Only)	$ 24.80	8.76
LABORER: Common or General	$ 25.27	8.34
LABORER: Concrete Finishing	$ 25.75	8.60
OPERATOR: Bulldozer	$ 28.04	13.00
OPERATOR: Loader	$ 29.37	10.13
OPERATOR: Mechanic	$ 28.60	11.83
OPERATOR: Oiler	$ 24.34	13.00
OPERATOR: Trencher	$ 26.27	12.37
TRUCK DRIVER: Dump Truck	$ 19.00	4.78

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 https://www.dol.gov/agencies/whd/government-contracts.

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 National Office because National Office has 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 DECISIO"

Section 01 11 13

Statement of Work

The proposed Work is generally described as follows: The project includes a new 7.5 MVA, 69KV x 2400V substation, 2000 KW, 2400V standby diesel generator, 2400V switchgear in a walk-in enclosure, 500 KVA, 2400V x 480/277V pad mounted transformer, and associated structures, cabling, terminations, etc. The project includes site grading, relocation of underground utilities, equipment pads, fencing, and platforms and railings.

End of Section

SECTION 01 21 00
ALLOWANCES

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall include in the lump sum bid allowances for work to be performed by Duke Energy for the relocation of the primary metered substation, and for work associated with the gas line relocation as well as work associated with the Aggregate Pier Ground Improvements.

Item	Amount
Duke Energy Electrical Charges	$187,500.00
Duke Energy Gas Line Relocation Charges	$ 2,000.00
Aggregate Pier Ground Improvements	$ 200,000.00

B. The work to be performed by Duke for the new electrical substation is as follows:
   1. Remove existing 80' Class 2 wood pole K55-534
   2. Vegetation/tree clearing for new route
   3. Install one new LDS poles (extended length pole doe to eroding bank)
   4. Two new extended anchor easements
   5. One new LDS pole outside new substation. If anchor easements cannot be obtained, re-route and a third pole may be required.
   6. Install new 477 ACSD conductors from new K55-534 pole to substation dead-end structure.
   7. Install insulators in old feed across creek at or near pole K55-533.
   8. Remove existing feed from existing pole K55-518 into plant.

C. The work to be performed by Duke for the gas line relocation is detailed on Drawing C-03.

D. The work to be performed as part of the Aggregate Pier Ground Improvements is described under specification section 09 24 11.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The Contractor shall coordinate with Duke Energy for construction related activities. Contractors costs associated with the construction coordination are not included in allowance but shall be included in the lump sum bid. The allowance includes only direct reimbursements to Duke Energy.

END OF SECTION

SECTION 01 22 13
BASIS OF MEASUREMENT AND PAYMENT - LUMP SUM

PART 1 - GENERAL

1.01 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. All excavation required of the work shall be done as part of the total price for the complete project. All excavation shall be unclassified.

1.02 PAY ITEMS

A. The items listed hereinbefore refer to and are the same items listed in the Bid and constitute all of the pay items in this Contract. Any other items of Work listed in the Specifications or shown on the Drawings shall be considered incidental to the above items.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

Section 01 31 13

PROJECT REQUIREMENTS

1. GENERAL DESCRIPTION OF WORK. The Work to be performed under these Contract Documents is generally described as follows: Furnishing all materials, equipment, supplies, labor and transportation, including fuel, power, water, (except any materials, equipment, utility, or service, if any, specified herein to be furnished by the District), and performing all work required in the scope of work in the Contract, in strict accordance with the specifications, schedules, and drawings, all of which are made a part hereof and including such detail drawings as may be furnished by the District from time to time during the prosecution of the work in explanation of said drawings.

2. COORDINATION. Contractor shall plan, schedule, and coordinate its operations in a manner which will facilitate the simultaneous progress of the work included under other contracts outside the scope of these Contract Documents if applicable.

3. MATERIALS TO BE FURNISHED BY OWNER. There will be no Owner furnished materials for this project.

4. RESPONSIBILITY FOR MATERIALS AND EQUIPMENT.

4.01. Items Furnished by Owner. There will be no items furnished by the Owner for this project.

4.02. Items Furnished by Contractor. Contractor shall be fully responsible for all materials and equipment which it has furnished.

5. OFFSITE STORAGE. Offsite storage arrangement shall be approved by Owner for all materials and equipment not incorporated into the Work but included in Applications for Payment. Such offsite storage arrangement shall be presented in writing and shall afford adequate and satisfactory security and protection. Offsite storage facilities shall be accessible to Owner.

6. SUBSTITUTES AND "OR-EQUAL" ITEMS. Provisions for evaluation of substitutes and "or-equal" items of materials and equipment are covered in Paragraph 6.05 of the General Conditions. Requests for review of equivalency will not be accepted by Owner from anyone except Contractor, and such requests will not be considered until after the Contract has been awarded.

7. PREPARATION FOR SHIPMENT. All materials shall be suitably packaged to facilitate handling and protect against damage during transit and storage. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of Owner.

Each item, package, or bundle of material shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.

8. SALVAGE OF MATERIALS AND EQUIPMENT. Existing materials and equipment removed, and not reused as a part of the Work, shall become Contractor's property.

Contractor shall carefully remove, in a manner to prevent damage, all materials and equipment specified or indicated to be salvaged and reused or to remain the property of Owner. Contractor shall store and protect salvaged items specified or indicated to be reused in the Work.

Salvaged items not to be reused in the Work, but to remain Owner's property, shall be delivered by Contractor in good condition to Owner's storage yard.

Any items damaged in removal, storage, or handling through carelessness or improper procedures shall be replaced by Contractor in kind or with new items.

Contractor may furnish and install new items instead of those specified or indicated to be salvaged and reused, in which case such removed items will become Contractor's property.

Existing materials and equipment removed by Contractor shall not be reused in the Work except where so specified or indicated.

Existing equipment to be removed may contain hazardous materials. See Division 26 for further requirements.

9. EASEMENTS AND RIGHTS-OF-WAY. The easements and rights-of-way for the pipelines will be provided by Owner. Contractor shall confine its construction operations within the limits indicated on the Drawings. Contractor shall use due care in placing construction tools, equipment, excavated materials, and pipeline materials and supplies in order to avoid damage to property and interference with traffic.

9.01. On Private Property. Easements across private property are indicated on the Drawings. Contractor shall set stakes to mark the boundaries of construction easements across private property. The stakes shall be protected and maintained until completion of construction and cleanup.

Contractor shall not enter any private property outside the designated construction easement boundaries without written permission from the owner of the property.

Whenever the easement is occupied by crops which will be damaged by construction operations, Contractor shall notify the owner sufficiently in advance so that the crops may be removed before excavation or trenching is started. Contractor shall be responsible for all damage to crops outside the easement and shall make satisfactory settlement for the damage directly with the owner.

Where the line crosses fields which are leveled for irrigation or terraced, Contractor shall relevel irrigated fields and replace all terraces to their original or better condition, and to the satisfaction of the owner.

9.02. Work Within Highway and Railroad Rights-of-Way. Permits shall be obtained by Owner. All Work performed and all operations of Contractor, its employees, or Subcontractors within the limits of railroad and highway rights-of-way shall be in conformity with the requirements and be under the control (through Owner) of the railroad or highway authority owning, or having jurisdiction over and control of, the right-of-way in each case.

10. OPERATION OF EXISTING FACILITIES. The existing plant facilities must be kept in continuous operation throughout the construction period. No interruption will be permitted which adversely affects the degree of service provided. Provided permission is obtained from Owner in advance, portions of the existing facilities may be taken out of service for short periods corresponding with periods of minimum service demands. This may facilitate work at night or weekends which is considered incidental to the project. See Section 015100, Work Sequence, for specific requirements.

Contractor shall provide temporary facilities and make temporary modifications as necessary to keep the existing facilities in operation during the construction period.

11. NOTICES TO OWNERS AND AUTHORITIES. Contractor shall, as provided in the General Conditions, notify owners of adjacent property and utilities when prosecution of the Work may affect them.

When it is necessary to temporarily deny access to property, or when any utility service connection must be interrupted, Contractor shall give notices sufficiently in advance to enable the affected persons to provide for their needs. Notices shall conform to any applicable local ordinance and, whether delivered orally or in writing, shall include appropriate information concerning the interruption and instructions on how to limit inconvenience caused thereby.

Utilities and other concerned agencies shall be notified at least 24 hours prior to cutting or closing streets or other traffic areas or excavating near underground utilities or pole lines.

12. LINES AND GRADES. All Work shall be done to the lines, grades, and elevations indicated on the Drawings.

Basic horizontal and vertical control points will be established or designated by Owner to be used as datums for the Work. All additional survey, layout, and measurement work shall be performed by Contractor as a part of the Work.

Contractor shall provide an experienced instrument person, competent assistants, and such instruments, tools, stakes, and other materials required to complete the survey, layout, and measurement work. In addition, Contractor shall furnish, without charge, competent persons and such tools, stakes, and other materials as Owner may require

in establishing or designating control points, or in checking survey, layout, and measurement work performed by Contractor.

Contractor shall keep Owner informed, a reasonable time in advance, of the times and places at which it wishes to do Work, so that horizontal and vertical control points may be established and any checking deemed necessary by Owner may be done with minimum inconvenience to Owner and minimum delay to Contractor.

Contractor shall remove and reconstruct work which is improperly located.

13. CONNECTIONS TO EXISTING FACILITIES. Unless otherwise specified or indicated, Contractor shall make all necessary connections to existing facilities, including structures, drain lines, and utilities such as water, sewer, gas, telephone, and electric. In each case, Contractor shall receive permission from Owner or the owning utility prior to undertaking connections. Contractor shall protect facilities against deleterious substances and damage.

Connections to existing facilities which are in service shall be thoroughly planned in advance, and all required equipment, materials, and labor shall be on hand at the time of undertaking the connections. Work shall proceed continuously (around the clock) if necessary to complete connections in the minimum time. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

14. UNFAVORABLE CONSTRUCTION CONDITIONS. During unfavorable weather, wet ground, or other unsuitable construction conditions, Contractor shall confine its operations to work which will not be affected adversely by such conditions. No portion of the Work shall be constructed under conditions which would affect adversely the quality or efficiency thereof, unless special means or precautions are taken by Contractor to perform the Work in a proper and satisfactory manner.

15. CUTTING AND PATCHING. As provided in General Conditions, Contractor shall perform all cutting and patching required for the Work and as may be necessary in connection with uncovering Work for inspection or for the correction of defective Work.

Contractor shall perform all cutting and patching required for and in connection with the Work, including but not limited to the following:

Removal of improperly timed Work.
Removal of samples of installed materials for testing.
Alteration of existing facilities.
Installation of new Work in existing facilities.

Contractor shall provide all shoring, bracing, supports, and protective devices necessary to safeguard all Work and existing facilities during cutting and patching operations. Contractor shall not undertake any cutting or demolition which may affect the structural stability of the Work or existing facilities without Owner's concurrence.

Materials shall be cut and removed to the extent indicated on the Drawings or as required to complete the Work. Materials shall be removed in a careful manner, with no damage to adjacent facilities or materials. Materials which are not salvable shall be removed from the site by Contractor.

All Work and existing facilities affected by cutting operations shall be restored with new materials, or with salvaged materials acceptable to Owner, to obtain a finished installation with the strength, appearance, and functional capacity required. If necessary, entire surfaces shall be patched and refinished.

16. ASBESTOS REMOVAL. If, during the progress of the Work, suspected asbestos-containing products are identified, Contractor shall stop work in the affected area and engage an asbestos removal Subcontractor to verify the materials and, if necessary, encapsulate, enclose, or remove and dispose of all asbestos in accordance with current regulations of the Environmental Protection Agency and the U. S. Department of Labor - Occupational Safety and Health Administration, the state asbestos regulating agency, and any local government agency. Payment for such work will be made by Change Order.

16.01. Subcontractor's Qualifications. The Subcontractor for asbestos removal shall be regularly engaged in this type of activity and shall be familiar with the regulations which govern this work. The Subcontractor shall demonstrate to the satisfaction of Owner that it has successfully completed at least three asbestos removal projects, that it has the necessary staff and equipment to perform the work, and that it has an approved site for disposal of the asbestos. The Subcontractor shall carry insurance as specified in the Supplementary Conditions.

16.02. Removal Methods. The asbestos removal Subcontractor shall submit a work plan of its proposed removal procedure to Owner before beginning work and shall certify that the methods are in full compliance with the governing regulations. The work plan shall cover all aspects of the removal, including health and safety of employees and building occupants, hygiene facilities, employee certification, clearance criteria, transportation and disposal, enclosure techniques, and other techniques appropriate for the proposed work.

17. CLEANING UP. Contractor shall keep the premises free at all times from accumulations of waste materials and rubbish. Contractor shall provide adequate trash receptacles about the site and shall promptly empty the containers when filled.

Construction materials, such as concrete forms and scaffolding, shall be neatly stacked by Contractor when not in use. Contractor shall promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids, and cleaning solutions from surfaces to prevent marring or other damage.

Volatile wastes shall be properly stored in covered metal containers and removed daily.

Wastes shall not be buried or burned on the site or disposed of into storm drains, sanitary sewers, streams, or waterways. All wastes shall be removed from the site and disposed of in a manner complying with local ordinances and anti-pollution laws.

Adequate cleanup will be a condition for processing of progress payment applications.

18. APPLICABLE CODES. References in the Contract Documents to local codes mean the following:

Kentucky Building Code
National Electric Code

Other standard codes which apply to the Work are designated in the Specifications.

19. PRECONSTRUCTION CONFERENCE. Prior to the commencement of Work at the site, a pre-construction conference will be held at a mutually agreed time and place. The conference shall be attended by:

Contractor and its superintendent.
Principal Subcontractors.
Representatives of principal Suppliers and manufacturers as appropriate.
Representatives of Owner.
Government representatives as appropriate.
Others as requested by Contractor or Owner.

Unless previously submitted to Owner, Contractor shall bring to the conference a preliminary schedule for each of the following:
Progress.
Procurement.
Values for progress payment purposes.
Shop Drawings and other submittals.

The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The agenda will include:
Contractor's preliminary schedules.
Transmittal, review, and distribution of Contractor's submittals.
Processing Applications for Payment.
Maintaining record documents.
Critical Work sequencing.
Field decisions and Change Orders.
Use of premises, office and storage areas, security, housekeeping, and Owner's needs.
Contractor's assignments for safety and first aid.

Owner will preside at the conference and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

20. PROGRESS MEETINGS. Contractor shall schedule and hold regular progress meetings at least monthly and at other times as requested by Owner or required by progress of the Work. Contractor, Owner, and all Subcontractors active on the site shall be represented at each meeting. Contractor may at its discretion request

attendance by representatives of its Suppliers, manufacturers, and other Subcontractors.

Contractor shall preside at the meetings. Meeting minutes will be prepared and distributed by Contractor. The purpose of the meetings will be to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop.

End of Section

Section 01 32 00

SUBMITTALS

1. PROGRESS SCHEDULE. After the preconstruction conference and before Work is started, Contractor shall submit to Engineer for review a schedule of the proposed construction operations. Owner shall cooperate with Contractor in arrangements for continuity of service and operation of valves and other control facilities. The progress schedule shall indicate the sequence of the Work, the time of starting and completion of each part, and the time for making connections to existing piping, structures, or facilities.

2. PROGRESS REPORTS. A progress report shall be furnished to Engineer with each Application for Payment. If the Work falls behind schedule, Contractor shall submit additional progress reports at such intervals as Engineer may request.

Each progress report shall include sufficient narrative to describe current and anticipated delaying factors, their effect on the progress schedule, and proposed corrective actions. Any Work reported complete, but which is not readily apparent to Engineer, must be substantiated with satisfactory evidence.

3. SURVEY DATA. All field books, notes, and other data developed by Contractor in performing surveys required as part of the Work shall be available to Owner/Engineer for examination throughout the construction period. All such data shall be submitted to Engineer with the other documentation required for final acceptance of the Work.

4. SHOP DRAWINGS AND ENGINEERING DATA.

4.01. General. Shop Drawings and engineering data (submittals) covering all equipment and fabricated and building materials which will become a permanent part of the Work under this Contract shall be submitted to Engineer, at the Engineers' address included in these Specifications. Submittals shall verify compliance with the Contract Documents, and shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and operation of component materials and devices; the external connections, anchorages, and supports required; performance characteristics; and dimensions needed for installation and correlation with other materials and equipment. When an item consists of components from several sources, Contractor shall submit a complete initial submittal including all components.

All submittals, regardless of origin, shall be stamped with the approval of Contractor and identified with the name and number of this Contract, Contractor's name, and references to applicable specification paragraphs and Contract Drawings. Each submittal shall indicate the intended use of the item in the Work. When catalog pages are submitted, applicable items shall be clearly identified and inapplicable data crossed out. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data.

Contractor shall be solely responsible for the completeness of each submission. Contractor's stamp of approval is a representation that Contractor accepts sole responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, and that Contractor has reviewed and coordinated each submittal with the requirements of the Work and the Contract Documents.

All deviations from the Contract Documents shall be identified as deviations on each submittal and shall be tabulated in Contractor's letter of transmittal. Such submittals shall, as pertinent to the deviation, indicate essential details of all changes proposed by Contractor.

One copy of each drawing and necessary data shall be submitted to the Engineer for its record. The Owner/Engineer intends to use this for information only. If requested by Contractor, up to three additional copies may be submitted for review and approval by Owner. Engineer will return marked copies (or one marked reproducible copy) to Contractor. Engineer will not accept submittals from anyone but Contractor. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades.

4.02. Engineer's Review of Submittals. Engineer's review of submittals will cover only general conformity to the Drawings and Specifications, external connections, and dimensions which affect the layout. Engineer's review does not indicate a thorough review of all dimensions, quantities, and details of the material, equipment, device, or item shown. Engineer's review shall not relieve Contractor of Contractor's sole responsibility for errors, omissions, or deviations in the drawings and data, nor of Contractor's sole responsibility for compliance with the Contract Documents.

If Contractor requests a review and response, Engineer's submittal review period shall be 14 consecutive calendar days in length and shall commence on the first calendar day immediately following the date of arrival of the submittal or resubmittal in Engineer's office. The time required to mail the submittal or resubmittal back to Contractor shall not be considered a part of the submittal review period.

When the drawings and data are returned marked "NOT ACCEPTABLE" or "RETURNED FOR CORRECTION", the corrections shall be made as noted thereon and as instructed by Owner and corrected copies (or one corrected reproducible copy) resubmitted.

When the drawings and data are returned marked "EXCEPTIONS NOTED", "NO EXCEPTIONS NOTED", or "RECORD COPY", no additional copies need be furnished unless requested by Engineer at time of review.

4.03. Resubmittal of Drawings and Data. Contractor shall accept full responsibility for the completeness of each resubmittal. Contractor shall verify that all corrected data and additional information previously requested by Owner are provided on the resubmittal.

When corrected copies are resubmitted, Contractor shall in writing direct specific attention to all revisions and shall list separately any revisions made other than those called for by Engineer on previous submissions.

Requirements specified for initial submittals shall also apply to resubmittals. Resubmittals shall bear the number of the first submittal followed by a letter (A, B, etc.) to indicate the sequence of the resubmittal.

Re-submittals shall be made within 30 days of the date of the letter returning the material to be modified or corrected, unless within 14 days Contractor submits an acceptable request for an extension of the stipulated time period, listing the reasons the resubmittal cannot be completed within that time.

Any need for more than one resubmission, or any other delay in obtaining Engineer's review of submittals, will not entitle Contractor to extension of the Contract Times unless delay of the Work is directly caused by a change in the Work authorized by a Change Order.

End of Section

Section 01 40 00

QUALITY CONTROL

1. TESTING SERVICES. All tests to determine compliance with the Contract Documents shall be performed by an independent commercial testing firm acceptable to Owner. The testing firm's laboratory shall be staffed with experienced technicians, properly equipped and fully qualified to perform the tests in accordance with the specified standards.

Testing services provided by Owner are for the sole benefit of Owner; however, test results shall be available to Contractor. Testing necessary to satisfy Contractor's internal quality control procedures shall be the sole responsibility of Contractor.

1.01. Testing Services Furnished by Contractor. Unless otherwise specified, Contractor shall provide all testing services in connection with the following:

Concrete materials and mix designs.
Asphaltic concrete materials and mix designs.
Embedment, fill and backfill materials.
All other tests and engineering data required for Owner's review of materials and equipment proposed to be used in the Work.

Contractor shall obtain Owner's acceptance of the testing firm before having services performed, and shall pay all costs for these testing services.

1.02. Testing Services Furnished by Owner. Unless otherwise specified, Owner shall provide for tests made on the following materials and equipment:

Concrete.
Asphaltic concrete.
Moisture-density and relative density tests on embedment, fill, and backfill materials.
In-place field density tests on embedments, fills, and backfill.
Other materials and equipment at the discretion of Owner.

Testing, including sampling, will be performed by Owner or the testing firm's laboratory personnel, in the general manner indicated in the Specifications. Owner shall determine the exact time, location, and number of tests, including samples.

Arrangements for delivery of samples and test specimens to the testing firm's laboratory will be made by Owner. The testing firm's laboratory shall perform all laboratory tests within a reasonable time consistent with the specified standards and shall furnish a written report of each test.

Contractor shall furnish all sample materials and cooperate in the testing activities, including sampling. Contractor shall interrupt the Work when necessary to allow testing, including sampling, to be performed. Contractor shall have no claim for an increase in Contract Price or Contract Times due to such interruption. When testing activities, including sampling, are performed in the field by Owner or the testing firm's

laboratory personnel, Contractor shall furnish personnel and facilities to assist in the activities.

If testing shows workmanship and/or materials does not meet established requirements, the Contractor shall be responsible for all additional testing cost to ensure compliance.

1.03. Transmittal of Test Reports. Written reports of tests and engineering data furnished by Contractor for Owner's review of materials and equipment proposed to be used in the Work shall be submitted as specified for Shop Drawings.

End of Section

SECTION 01 42 13

ABBREVIATIONS OF TERMS AND ORGANIZATIONS

1. LIST OF ABBREVIATIONS. Reference to standards and organizations in the Specifications shall be by the following abbreviated letter designations:

AA	Aluminum Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AFBMA	Antifriction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APA	American Plywood Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWG	American Wire Gage
AWPA	American Wood-Preservers' Association
AWPB	American Wood Preservers Bureau
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
CDA	Copper Development Association
CISPI	Cast Iron Soil Pipe Institute
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard (U.S. Department of Commerce)
DIPRA	Ductile Iron Pipe Research Association
EEI	Edison Electric Institute
EJCDC	Engineers' Joint Contract Documents Committee
EPA	Environmental Protection Agency
Fed Spec	Federal Specification
FHWA	Federal Highway Administration
FIA	Factory Insurance Association
FM	Factory Mutual
IEEE	Institute of Electrical and Electronics Engineers

IFI	Industrial Fasteners Institute
IRI	Industrial Risk Insurers
MIL	Military Specification
MSS	Manufacturers Standardization Society of Valve and Fitting Industry
NBS	National Bureau of Standards
NCSPA	National Corrugated Steel Pipe Association
NEC	National Electrical Code
NECA	National Electrical Contractors Association
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology
NPC	National Plumbing Code
NPT	National Pipe Thread
NRMCA	National Ready Mixed Concrete Association
NSC	National Safety Council
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PS	Product Standard
SAE	Society of Automotive Engineers
SI	Système International des Unitès (International System of Units)
SPFA	Steel Plate Fabricators Association
SSI	Scaffolding and Shoring Institute
SSPC	Steel Structures Painting Council
UL	Underwriters' Laboratories

End of Section

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 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. 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.

3. Costs of installation and operation: Contractor shall pay all installation, maintenance and removal costs of temporary lighting.

4. Maintenance of temporary lighting service (replacement of bulbs, etc.) shall be the sole responsibility of the General Contractor.

D. 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.

E. 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.

F. 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.

G. 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.

H. 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.

I. 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.

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 01 51 00
WORK SEQUENCE

PART 1 - GENERAL

1.01 WORK INCLUDED

The Contractor shall conform to all miscellaneous requirements as contained in the Contract.

1.02 RELATED REQUIREMENTS

A. Division 0 General Conditions.

B. Section 01 11 13 – Statement of Work.

C. Section 01 31 13 – Project Requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

The Contractor shall comply with the Specifications for type of work to be done.

PART 3 - EXECUTION

3.01 SEQUENCE OF CONSTRUCTION OPERATIONS

A. The Contractor shall submit to the Engineer for review and acceptance a complete schedule (progress chart) of his proposed sequence of construction operations prior to commencement of work. However, the Engineer shall not accept a construction schedule that fails to utilize the entire time allocated for the construction of the Project. The Contractor shall schedule the various construction activities to complete the Project throughout the entire allotted time period. This schedule requirement in no way prevents the Contractor from completing the Project in a shorter time frame than scheduled. The construction schedule along with a cost breakdown schedule shall be submitted and approved by the Owner prior to the submittal of the first partial payment request in accordance with the General Conditions. A revised construction schedule shall be submitted to the Owner with each pay request. This revised schedule must be approved by the Owner prior to payment.

B. Given lead times for generator, switchgear, and transformers, milestone dates for submittal review will apply. The Contractor may assume that review times by the Engineer for the equipment will not exceed 10 working days. No more than two submittals shall be made. If upon review the second submittal, there are

deficiencies which prevent Engineer approval, a meeting shall be scheduled between the Engineer, Contractor, and equipment supplier to resolve any deficiencies. Submittals for the UPS, standby generator, and automatic transfer switch shall be approved no later than 70 days after Notice to Proceed.

C. The detailed sequence of construction shall be determined by the Contractor as required to meet the substantial and final completion dates, and minimize plant outages. Plant-wide outages may not exceed 8 hours. Partial plant outages shall be coordinated in advance and approved by NKWD. A suggested sequence of work is as follows:

1. Perform grading, utility relocations, and construction of retaining wall
2. Upon completion of submittal review, rough-in ductbanks and raceways
3. Modify filter building for installation of new cable tray and conduits
4. Install equipment foundations
5. Install dead-end structure at substation
6. Install switchgear, generator, and substation transformer upon receipt
7. Pull cabling to substation and generator from new switchgear
8. Make connections at substation, generator, and line side of new switchgear
9. Coordinate with Duke Energy for removal of existing secondary service transformer
10. Schedule partial plant outage with NKWD
11. Install 500 KVA transformer and connect new primary and existing secondary feeders
12. Coordinate with Duke Energy for installation of new primary substation feed
13. Perform load bank test of generator (not connected to plant)
14. Energize substation transformer (not connected to plant)
15. Schedule plant outage with NKWD
16. Connect load side of new switchgear to existing main MCC
17. Disconnect existing main service feed
18. Remove existing substation transformer, primary structure, and equipment

D. Any outages must be approved by NKWD and scheduled at least two weeks in advance.

END OF SECTION

SECTION 01 57 13

EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials and equipment required or erecting, maintaining and removing temporary erosion and sedimentation controls as specified herein.

B. Temporary erosion controls include, but are not limited to grassing, mulching, seeding, watering, and reseeding on all disturbed surfaces including waste area surfaces and stockpile and borrow area surfaces; scheduling WORK to minimize erosion and providing interceptor ditches at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits.

C. Temporary sedimentation controls include, but are not limited to, sediment basins, silt dams, silt fences, traps, barriers, staked straw-bale diversions and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits.

D. CONTRACTOR is responsible for providing and maintaining effective temporary erosion and sediment control measures during construction or until final controls become effective.

E. The erosion and sedimentation controls where shown on the DRAWINGS and/or specified herein are intended to provide the required environmental protection. However, should additional controls be directed by the ENGINEER, CONTRACTOR shall furnish, install and maintain additional mulching and straw-bale diversions to control erosion and sedimentation to the satisfaction of the ENGINEER at no additional cost to OWNER.

PART 2 PRODUCTS

A. Erosion control blanket where called for in this Section, on the DRAWINGS, or as determined by the ENGINEER, shall be AMXCO Curlex Blanket as manufactured by American Excelsior Company, Arlington, Texas 76011, or equal.

B. Rip-rap lining where called for in this Section, on the DRAWINGS or as determined by the ENGINEER shall be Class III or Class II lining as shown on the DRAWINGS and as specified in Section 703 of the 1985 edition of the Kentucky Department of Highways “Standard Specifications for Road and Bridge Construction.”

For Class III, no less than 80 percent, by volume, of individual stones shall range in size from 1/4 to 1-1/2 cubic feet. Stones of smaller sizes are permissible for use in filling voids in the upper surface and dressing to the proper slope. In addition to the above

referenced specifications, individual stone dimensions are limited to 4 inches (minimum) and 24 inches (maximum).

For Class II lining, no more than 20 percent of the finished product shall pass through square openings five (5) inches by five (5) inches.

C. Filter fabric for use with rip-rap where called for in this Section, on the DRAWINGS, or as determined by the ENGINEER, shall be Mirafi 700X as manufactured by Celanese Corporation, New York, NY 10036, or equal.

D. Silt fence fabric where called for in this Section, on the DRAWINGS or as determined by the ENGINEER shall be Mirati 100X as manufactured by Celanese Corporation, New York, NY 10036, or equal.

PART 3 EXECUTION

3.1 GENERAL

A. Erosion control practices shall be adequate to prevent erosion of disturbed and/or regraded areas.

B. Earthwork procedures shall be as specified in Section 02200.

C. Silt fences shall be located and staked as shown on the DRAWINGS and/or as designated by the ENGINEER.

3.2 TEMPORARY SEEDING

A. This item shall consist of seeding a temporary cover of grass, or grass and small grain, on areas disturbed on the construction site which will not be redisturbed within a 60-day period. The determination of the area to be temporarily seeded and the time of seeding shall be made by the ENGINEER.

B. The seed mixtures to be used for temporary cover will be governed by the time of year the seeding is accomplished. The mixture of seeding shall be as follows:
   1. Time of Seeding - February 15 to June 1
      Rye 1-1/2 bushels and rye grass 25 pounds per acre; or tall fescue 30 pounds and rye grass 20 pounds per acre.
   2. Time of Seeding - June 2 to August 15
      Tall fescue 30 pounds and rye grass 20 pounds per acre; or, spring oats 2 bushels and rye grass 30 pounds per acre.
   3. Time of Seeding - August 16 to February 14
      Rye 2 bushels and rye grass 20 pounds per acre; or, tall fescue 30 pounds and rye grass 20 pounds per acre.
   4. Lime will not be required for temporary seeding.
   5. Fertilizer at the rate of 400 pounds per acre of 10-10-10 fertilizer, or equivalent, broadcast uniformly on the area to be seeded.

6. All seed shall be broadcast evenly over the area to be seeded and culti-packed or otherwise pressed into the soil. Seed and fertilizer may be mixed together and applied after the seed has been prepared.
7. Mulch for temporary seeding will not be required except on those areas, in the ENGINEER'S opinion, which are too steep to hold the seed without protective cover.

3.3 RIP-RAP LINING

A. Rip-rap lining shall be constructed to the lines and grades and at the location designated on the DRAWINGS.

The filter fabric shall be placed at the locations shown on the DRAWINGS. The surface to receive the fabric shall be prepared to a relatively smooth condition free of obstructions, debris or sharp objects that may puncture the fabric. Construction equipment will not be permitted to operate directly on the fabric.

The fabric shall be placed with long dimension parallel to the channel or embankment centerline and shall be laid smooth and free of tension, stress, folds, wrinkles, or creases. If more than one strip is necessary, the strips shall overlap a minimum of three (3) feet. Transverse laps shall be placed so the upstream strip laps over the downstream strip.

Fastener pins shall be installed through both strips of overlapped fabric at no less than five (5) foot intervals along a line through the midpoint of the lap, and at any other locations as necessary to prevent any slippage of the fabric.

Fabric shall be covered with the rip-rap lining within 14 calendar days after placement of the fabric. Fabric not covered within this time shall be removed and replaced at the CONTRACTOR'S expense if the ENGINEER determines that damage or deterioration is evident.

The fabric shall be protected from damage due to the placement of the channel lining by limiting the height of drop of the material at no greater than three (3) feet or by placing a cushioning layer of sand on top of the fabric before dumping the material, at the CONTRACTOR'S option. The CONTRACTOR shall demonstrate that the placement technique will prevent damage to the fabric.

Placement of channel lining shall begin at the toe of the channel and proceed upstream. The lining shall be placed to conform to the template shown on the DRAWINGS. The lining need not be compacted but shall be placed upgrade in a manner to ensure that the larger rock fragments are uniformly distributed and the smaller rock fragments serve to fill the spaces between the larger rock fragments in such a manner as will result in a well keyed, densely placed, uniform layer of lining of the specified thickness. Hand placing will be required only to the extent necessary to secure the results specified above.

3.4 MAINTENANCE OF CONTROLS AND PERFORMANCE

A. Erosion and sedimentation controls shall be inspected weekly and after significant rain storms. Replace silt fencing which is damaged filter stone which is dislodged, erosion control blanket which is damaged, and make other necessary repairs.

B. Should any of the temporary erosion and sediment control measures employed by the CONTRACTOR fail to produce results consistent with normal and acceptable standards of the industry. The CONTRACTOR shall immediately take whatever steps are necessary to correct the deficiency at his own expense.

C. Remove all temporary erosion and sedimentation controls as final landscaping and grading is performed.

END OF SECTION

SECTION 01 73 29
CUTTING AND PATCHING

PART 1 - GENERAL

1.01 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.

1.02 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.

1.03 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.

1.04 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

2.01 MATERIALS

A. For replacement of work removed, comply with Specifications for type of work to be done.

PART 3 - EXECUTION

3.01 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.

3.02 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.

3.03 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.

3.04 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

SECTION 017405
CLEANING

PART 1 - GENERAL

1.01 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.

1.02 RELATED DOCUMENTS

A. Cutting and Patching: Section 017329.

B. Project Closeout: Section 017700.

C. Cleaning for Specific Products of Work: Specification Section for that work.

1.03 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

2.01 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

3.01 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. The Owner’s dumpsters and other trash receptacles may not be used by the Contractor.

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.

3.02 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

SECTION 01 77 00
PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Liquidated Damages: Supplemental General Conditions

B. Cleaning: Section 017405.

C. Project Record Documents: Section 017839.

1.02 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 017405.

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.

1.03 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 a second written notice to Engineer certifying that work is complete.

3. Engineer will reinspect work.

1.04 CLOSEOUT SUBMITTALS

A. Project Record Documents: To requirements of Section 01785.

B. Guarantees, Warranties and Bonds: To requirements of particular technical Specifications and Section 017825.

1.05 INSTRUCTION

A. Instruct Owner's personnel in operation of all systems, mechanical, electrical, and other equipment.

1.06 FINAL APPLICATION FOR PAYMENT

A. Contractor shall submit final applications in accordance with requirements of General Conditions.

1.07 FINAL CERTIFICATE FOR PAYMENT

A. Engineer will issue final certificate in accordance with provisions of general conditions.

B. Should the 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

SECTION 01 78 23
OPERATIONS AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.01 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: Section 01 33 00.

2. Project Closeout: Section 01 77 00.

3. Project Record Documents: Section 01 78 39.

4. Warranties and Bonds: Section 01 78 25.

1.02 FORM OF SUBMITTALS

A. Prepare data in the form of an instructional manual for use by Owner's personnel.

B. Format:

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 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.

C. Binders:

1. Commercial quality, durable and cleanable, 3-hole, 3" or 4" D-ring binders, with oil and moisture resistant hard covers.

2. When multiple binders are used, correlate the data into related consistent grouping.

3. Imprinted on the front cover and side of each binder shall be the name of the Plant, the Contract Number and Volume Number.

4. Binders shall be new and not recycled form a prior data manual.

D. Digital Copy:

Provide a digital copy of the Operation and Maintenance manual in pdf format on USB drive.

1.03 SUBMITTAL SCHEDULE

A. Submit one (1) copy of preliminary draft of proposed formats and outlines of contents prior to operation of equipment.

1. Engineer will review draft and return with comments.

B. Submit one (1) copy of completed data for final review:

1. Prior to the completion of the Contract and before payment in excess of 90% of the total Contract amount is authorized.

C. Provide two (2) hard copies of approved completed O & M Manual in final form ten (10) days prior to final inspection or acceptance to the Owner. Provide one (1) electronic copy pdf format including all information provided in the hard copy.

1.04 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.

1.05 CONTENTS OF MANUAL

A. Each item of equipment shall be placed in a logical sequential order, as listed or ordered in the Contract Documents.

B. Content, for each unit of equipment and system, as appropriate:

1. Detailed description of the operation procedures as applicable.

2. Instructions for all components of the equipment whether manufactured by the supplier or not, including pumps, controllers and other miscellaneous components.

3. 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. Equipment model number.

4. 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.

5. Maintenance Procedures:

a. Routine operations.

b. Guide to "trouble-shooting".

c. Disassembly, repair and reassembly.

d. Alignment, adjusting and checking.

e. Preventative maintenance schedule.

f. Recommended spare parts list and quantities.

g. Equipment parts list.

h. Local service center.

6. Servicing and Lubrication schedule.

a. List of lubricants required.

b. Lubrication procedures.

c. Lubrication schedule.

7. Internal and external wiring and piping diagrams numbered to correspond to the installation.

8. Description of sequence of operation by control supplier.

9. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.

a. Predicted life of parts subject to wear.

10. As-installed control diagrams by controls supplier.

11. Each Contractor's coordination drawings.

a. As-installed color-coded piping diagrams.

12. 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. As-installed color-coded wiring diagrams.

3. Operating procedures:

a. Routine and normal operating instructions.

b. Sequences required.

c. Special operating instructions.

4. Maintenance procedures:

a. Routine operations.

b. Guide to "trouble-shooting".

c. Disassembly, repair and reassembly.

d. Adjustment and checking.

5. Manufacturer's printed operating and maintenance instructions.

6. List of original manufacturer's recommended spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

7. Other data as required under pertinent sections of Specifications.

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

SECTION 01 78 25
WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 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.

1.02 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 01 77 00.

F. Warranties and Bonds required for specific products: As listed herein.

G. Provisions of Warranties and Bonds, Duration: Respective specification sections for particular products.

1.03 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.

1.04 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.

1.05 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.

1.06 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

SECTION 024119
SELECTIVE DEMOLITION

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. Demolition and removal of selected portions of HVAC System.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.6 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.7 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
1. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
2. Disconnect, demolish, and remove plumbing, and HVAC systems, equipment, and components indicated to be removed.

a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.

b. Equipment to Be Removed: Disconnect and cap services and remove equipment.

C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
   2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
   4. Maintain adequate ventilation when using cutting torches.
   5. Dispose of demolished items and materials promptly.

B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition.

3.4 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Division 07 for new roofing requirements.

   1. Remove existing roof membrane, flashings, copings, and roof accessories.
   2. Remove existing roofing system down to substrate.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Removed HVAC equipment and piping will become the property of the contractor.

3.6 SELECTIVE DEMOLITION SCHEDULE

A. Existing Items to Be Removed:

   1. Carrier rooftop condensing unit.

2. Carrier interior blower coil unit including short sections of ductwork.
3. Refrigerant piping between blower coil and condensing unit. Piping cover at roof penetration shall remain for use routing of new refrigerant piping for both new units.
4. Condensate pipe to point of connection of new condensate pipe as indicated on the drawings.
5. Thermostat, control wiring and conduit.
6. Electrical circuitry wiring and conduit to blower coil and condensing units.

END OF SECTION 024119

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS**. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 1, and all related specification sections, apply to this section.

1.2 **DESCRIPTION OF WORK**. Furnish and install cast-in-place concrete in accordance with the drawings and specifications.

A. **This section specifies** cast-in-place concrete, including formwork, reinforcing, mix design, accessories, placement procedures, joints, embedments, finishes, curing, supports for equipment and piping, and grout toppings for tanks.

B. **Other specification sections** may reference this section for other cast-in-place concrete items.

1.3 QUALITY ASSURANCE

A. **Standards**. Comply with the provisions of the following standards:

1. ACI – American Concrete Institute.
2. ASTM – American Society for Testing and Materials.
3. CRSI – Concrete Reinforcing Steel Institute.
4. AASHTO – American Association of State Highway and Transportation Officials.

B. **Concrete Testing Service**. Engage an acceptable laboratory to perform material evaluation tests and to design concrete mixes.

C. **Testing**. Materials and installed work may require testing and retesting at any time during progress of work. Retesting of rejected materials or installed work shall be done at Contractor's expense.

D. **Concrete Conference**. Prior to submittal of design mixes, conduct conference at project site to comply with the following:

1. Review detailed requirements for preparing concrete design mixes.
2. Determine procedures for satisfactory concrete operations including the following:
   a. Placement methods, techniques, equipment, consolidation, and form pressures.
   b. Slump and placement time to maintain slump.
   c. Finish, curing, and water retention.
   d. Thermal Control Plan.
   e. Protection procedures for weather conditions.

3. Review requirements for submittals, status of coordinating work, and availability of materials.

4. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications.

5. Request that representatives of each entity directly concerned with cast-in-place concrete attend conference, including, but not limited to, the following:
   a. Contractor's superintendent.
   b. Laboratory responsible for concrete mix design.
   c. Laboratory responsible for field quality control.
   d. Ready-Mix concrete supplier.
   e. Concrete subcontractor.
   f. Primary admixture manufacturers.
   g. Engineer/Architect and/or Owner's Representative.

1.4 SUBMITTALS. Submit all submittals in accordance with the Division 1 Submittal Requirements and the requirements within this specification section.

A. Submittal Package No. 1 – Shop Drawings and Product Data

1. Product data for materials and items, such as cement, reinforcement, embedded forming accessories, admixtures, patching compounds, waterstops, joint systems, and curing compounds.

2. Framing designs and details for each type of wall and slab bulkhead containing Stay-Form product by Amico. See structural details for minimum requirements.

3. Reinforcement shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI SP-66 (88), "ACI Detailing Manual," showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures, and dowel reinforcement for masonry.

4. Concrete mix designs for each class of concrete to be used on the project including specifics regarding admixtures proposed for each mix design. Include concrete test reports to substantiate trial batch mixes or previous performance of the same mix design.

5. Materials Certificates.
   a. Submit with the concrete mix design.
   b. Signed by manufacturer certifying that each material item complies with or exceeds specified requirements.
   c. Provide certification from admixture manufacturers that chloride content complies with specification requirements.
   d. Construction joint locations which clearly show where construction joints are intended to be placed in walls, slabs, columns, beams, at stairwells, etc.
   e. Box Outs. Proposed locations.

6. Testing Laboratories. Submit the names of the testing laboratories proposed for use to perform the material evaluation tests and also to perform the field quality control testing. An ACI certified technician shall perform all concrete testing.

B. Submittal Package No. 2 – Batch Tickets

1. Submit batch tickets for each load of concrete used on the job.
2. Each ticket shall indicate the design mix, the project name, the date, the time of batching, and the truck number.

C. Submittal Package No. 3 – Test Reports

1. The concrete testing laboratory shall submit two copies of all concrete test reports directly.

1.5 JOB CONDITIONS

A. Coordination. Coordinate installation of joint materials, embedded items, etc., with placement of forms and reinforcing steel to prevent delays, errors, or omissions.

B. Reference Material. Provide a copy of ACI SP-15, Field Reference Manual, in the field office at all times during concrete construction.

C. Climatic Conditions. Perform placement and curing of concrete under various weather conditions in accordance with ACI 301, "Specifications for Structural Concrete for Buildings," ACI 305, "Hot Weather Concreting," and ACI 306, "Cold Weather Concreting," except as modified herein.

1.6 DELIVERY, STORAGE, AND HANDLING. Comply with ACI 304, "Recommended Practice for Measuring, Mixing, and Placing Concrete."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Forms

1. Forms for exposed finish concrete shall be plywood, metal, metal framed plywood faced, or other acceptable panel type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown.
2. Forms for unexposed finish concrete shall be plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
3. Forms for cylindrical columns and supports shall be metal, fiberglass reinforced plastic, or paper or fiber tubes.
   a. When used, provide paper or fiber tubes of laminated plies with water resistant adhesive and wax impregnated exterior for weather and moisture protection.
   b. Provide sufficient wall thickness to resist wet concrete loads without deformation.
4. Form coatings shall be commercial formulation form coating compounds with a maximum volatile organic compound (VOC) of 350 milligrams per liter (mg/l)

that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

5. Form ties shall be factory-fabricated, adjustable length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal.
   a. Provide units that will leave no metal closer than 1-1/2 inches to exposed surface.
   b. Provide ties that, when removed, will leave holes not larger than 1-1/2 inch diameter in concrete surface.
   c. Ties shall have 3/4" to 1" diameter cones on each end.
   d. Through-wall ties that are designed to be entirely removed are not permitted in liquid retaining structures.

B. Reinforcing Materials

1. Reinforcing Bars. ASTM A 615, A 616, including Supplemental Requirement S1.
2. Welded Wire Fabric. ASTM A 185, welded steel wire fabric, provided in flat sheets.
3. Supports for Reinforcement. Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use steel bar supports or precast concrete bar supports complying with CRSI specifications.
   a. For slabs on grade, use steel bar supports with sand plates or horizontal runners or precast concrete bar supports where base material will not support chair legs.
   b. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel (CRSI, Class 2).

C. Concrete Materials

1. Portland Cement. ASTM C 150, Type I/II. Use one brand of cement throughout project.
2. Fly Ash. ASTM C 618, Type C or Type F including supplementary optional physical requirements, except loss on ignition shall not exceed 3 percent.
3. Ground Granulated Blast Furnace Slag. ASTM C989
4. Silica Fume. ASTM C1240, amorphous silica
5. Normal Weight Aggregates. ASTM C 33 and as herein specified.
   a. For exposed concrete, provide aggregates from a single source.
   b. For exterior exposed surfaces, do not use fine or coarse aggregates containing deleterious substances which might cause spalling.
   c. Fine Aggregate. Fine aggregate shall consist of natural sand or manufactured sand.
   d. Coarse Aggregate. Coarse aggregate shall consist of crushed rock, gravel, or crushed gravel.

1) Grading. The coarse aggregate shall conform to requirements for Size #67, unless otherwise approved. For grout topping, the coarse aggregate shall conform to the requirements for Size #8, unless otherwise approved.
2) Deleterious substances shall not exceed the percentages for Class 4S.

6. Water. Potable.

7. Admixtures.
   a. General. Provide admixtures that contain no more than 0.05 percent chloride ions by weight of cement when tested in accordance with AASHTO T260. Certificate from admixture manufacturer will be required prior to mix design approval.
   b. Air-Entraining Admixture.
      1) ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
      2) Available Products. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
         a) Darex II or Daravair, W.R. Grace & Co.
         b) MB-VR or Micro-Air, Master Builders, Inc.
         c) Sika AER, Sika Corp.
         d) AEA-92 or Air Mix 200, Euclid Chemical Co.
   c. Water-Reducing Admixture.
      1) ASTM C 494, Type A.
      2) Available Products. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
         a) Eucon WR-75 or WR-89, Euclid Chemical Co.
         b) WRDA with Hycol, or Daracem-55, W.R. Grace & Co.
         c) Pozzolith 220-N, Pozzolith 322-N, or Polyheed, Master Builders, Inc.
         d) Plastokrete 161, Sika Corp.
   d. High-Range Water-Reducing (HRWR) Admixture (Super Plasticizer).
      1) ASTM C 494, Type F or Type G.
      2) Available Products. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
         a) Eucon 37, Euclid Chemical Co.
         b) Daracem 19, Daracem ML330, or Daracem ML500, W.R. Grace & Co.
         c) Rheobuild, Master Builders, Inc.
         d) Sikament 300, Sika Corp.

   e. Noncorrosive, Nonchloride Accelerating Admixture.
      1) ASTM C 494, Type C or E.
      2) Available Products. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

a) Accelguard 80, Euclid Chemical Co.
b) Polarset, W.R. Grace & Co.
c) Pozzutec 20, Master Builders, Inc.

f. Water-Reducing, Retarding Admixture.
1) ASTM C 494, Type D.
2) Available Products. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
a) Eucon Retarder 75, Euclid Chemical Co.
b) Daratard-17, W.R. Grace & Co.
c) Pozzolith R, Master Builders, Inc.
d) Plastiment, Sika Corporation.

g. Shrinkage Reducing Admixture.
1) ASTM C494, Type S.
2) Available Products. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
a) Masterlife SRA 20, Master Builders, Inc.
b) Eucon SRA, Euclid Chemical Co.
c) Sika Control-75, Sika Corporation.

2.2 ACCESSORIES

A. Reglets. Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217-inch-thick (26-gauge) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

B. Sand Cushion. Clean, manufactured or natural sand conforming to ASTM C 33 or C 144.

C. Sealer/Dustproofer

1. Floor seeler compound for new concrete shall be an acrylic containing not less than 14 percent solids.
2. Available Products. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
a. Super Diamond Clear VOX, Euclid Chemical Company.
b. Dress and Seal WB30, L&M Construction Chemicals, Inc.

D. Absorptive Cover. Burlap cloth made from jute or kenaf, weighing approximately 9 ounces per square yard, complying with AASHTO M 182, Class 2.

E. Moisture-Retaining Cover. One of the following complying with ASTM C 171.

1. Waterproof paper.
2. Polyethylene film.
3. Polyethylene coated burlap.

F. Curing Compound

1. Clear styrene acrylate type, 30 percent solids content minimum.
2. Test data from an independent testing laboratory indicating a maximum moisture loss of 0.55 kilograms (kg) per square meter when applied at a coverage rate of 200 square feet per gallon.
3. Verify compatibility of curing compound with finishes to be used.
4. Available Products. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
   a. Super Diamond Clear VOX, Euclid Chemical Company.
   b. Dress and Seal WB30, L&M Construction Chemicals, Inc.

G. Evaporation-Control Compound

1. Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
2. Available Products. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
   a. Aquafilm, Conspec Marketing and Mfg. Co.
   b. Eucobar, Euclid Chemical Co.
   c. E-Con, L&M Construction Chemicals, Inc.
   d. Confilm, Master Builders, Inc.

H. Bonding Compound

1. Polyvinyl acetate or acrylic base.
2. Available Products. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
   a. Polyvinyl Acetate (Interior Only).
      1) Superior Concrete Bonder, Dayton Superior Corp.
      2) Euco Weld, Euclid Chemical Co.
      3) Weld-Crete, Larsen Products Corp.
      4) Everweld, L&M Construction Chemicals, Inc.
   b. Acrylic or Styrene Butadiene.
      1) SBR Latex, Euclid Chemical Co.
      2) Daraweld C, W.R. Grace & Co.
      3) Acryl-Set, Master Builders, Inc.
      4) Stonlock LB2, Stonhard, Inc.

I. Epoxy Adhesive

1. ASTM C 881, two-component material suitable for use on dry or damp surfaces.
2. Available Products. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
   a. Euco Epoxy System #452 or #620, Euclid Chemical Co.
   b. Epabond, L&M Construction Chemicals, Inc.
   c. Concresive 1001, Master Builders, Inc.
   d. Sikadur 32 Hi-Mod, Sika Corp.

J. Expansion Joint and Isolation Joint Material. Use one of the following unless noted otherwise.

1. Self-expanding cork conforming to ASTM D 1752, Type III.
2. Cellular fiber-asphalt conforming to ASTM D 1751.
3. Neoprene/SBR polymer conforming to ASTM D 1056-67.

2.3 MIXES

A. General

1. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301.
2. If trial batch method used, retain an acceptable independent testing facility for preparing and reporting proposed mix designs.
3. The testing facility shall not be the same as used for field quality control testing.
4. Submit mix designs of each proposed mix for each class of concrete at least 15 days prior to start of work.
5. Do not begin concrete production until proposed mix designs have been reviewed.

B. Design Mixes. Provide normal weight concrete with the following properties, unless otherwise indicated.

1. Class B. 4,000 psi 28-day compressive strength, air-entrained.
   a. W/C ratio: 0.45 maximum
   b. Minimum cementitious material: 564 pounds per cubic yard
   c. Air content: 6% (plus or minus 1%)
   d. Shrinkage compensating admixture
2. Class C. 3,000 psi 28-day compressive strength
   a. W/C ratio: 0.50 maximum
   b. Minimum cementitious material: 470 pounds per cubic yard
   c. Air content: 3% or less (no air entrainment)

C. Fly Ash. Maximum 25 percent of total weight of total cementitious material.

D. Slag. Maximum 50 percent of total weight of cementitious material.

E. Silica Fume. Maximum 10 percent by weight of total cementitious material.

F. Total Combination of Pozzolans. Total of fly ash, slag, and silica fume shall constitute no more than 50 percent of the total weight of the cementitious materials. Total of fly ash and silica fume shall constitute no more than 35 percent of the total weight of the cementitious materials.

G. Slump Limits. Proportion and design mixes to result in concrete slump at point of placement as follows (plus or minus 1”):

1. Concrete without water reducing admixtures: 4 inches.
2. Concrete with mid-range water reducers: 5 inches.

3. Concrete with high-range water reducers (superplasticizer): 7”

H. Chloride Content. The maximum water-soluble chloride ion content, expressed as a percent by weight of cement contributed by all ingredients of the concrete mix shall not exceed 0.10 percent.

I. Lean Concrete Backfill or Controlled Low-Strength Material. The fine aggregates shall be fine enough to stay in suspension in the mixture to the extent required for proper flow. Provide with the following properties, unless otherwise indicated:

1. 1,000 psi, 28-day compressive strength.
   a. Cement, 200 pounds, minimum.
   b. Maximum water to cement ratio shall be 0.9.
   c. Maximum slump shall be 8 inches.
   d. Maximum size of coarse aggregate shall be 3/8 inches (shot/blasted limestone rock is acceptable for use).

J. Adjustment to Concrete and Mixes. Request mix design adjustments when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as approved. Submit laboratory test data for revised mix design and strength results for acceptance before using in work.

K. Admixtures. Use of Admixtures.

1. Use water-reducing admixture for placement and workability in all classes of concrete unless noted otherwise.
2. A noncorrosive nonchloride accelerating admixture may be used in concrete slabs placed at ambient temperatures below 50 degrees Fahrenheit (° F.) when approved.
3. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content as indicated in the design mix.

L. Concrete Mixing

1. Ready Mix Concrete. Comply with requirements of ASTM C 94 and as specified.
   a. When air temperature is between 85° F. and 90° F., mixing and delivery time shall not exceed 75 minutes.
   b. When air temperature is above 90° F., mixing and delivery time shall not exceed 60 minutes unless approved otherwise.

M. Shrinkage Reducing Admixture. SRA shall be added at a minimum dosage of 2.0% of cementitious materials (by weight). Submit shrinkage test results per Section 1.4. It is the responsibility of the concrete supplier to adjust other mix constituents as required to accommodate the shrinkage compensating admixture and keep the mix strength, slump, air content, and set time within required limits.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Tolerances. Unless otherwise specified, tolerances shall be in accordance with ACI 117 and ACI 301.

B. Inspection

1. Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in.
2. Notify other trades to permit installation of their work; cooperate with other trades in setting such work.
3. Verify that all wood, dirt, foreign objects, and all other debris have been removed from inside the formwork.
4. Verify that reinforcing steel is spaced to provide the proper coverage against forms and against earth for slabs on grade.
5. When requested, provide documentation of inspection prior to placing concrete.

C. Site and Weather Conditions. Do not place concrete when site conditions exist such as standing water, extreme heat or cold, etc., unless the proper precautions have been taken to properly place and protect concrete as recommended by ACI and as acceptable. Do not place concrete on frozen ground.

3.2 PREPARATION

A. Forms

1. General. Design, erect, support, brace, and maintain formwork to support vertical and lateral, static and dynamic loads that might be applied until concrete structure can support such loads. Maintain formwork construction tolerances complying with ACI 347.
2. Forms.
   a. Construct forms to sizes, shapes, lines, position, elevation, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures.
   b. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work.
   c. Use selected materials to obtain required finishes.
   d. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.
3. Fabrication of Forms.
   a. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
   b. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
   c. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only.
   d. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.

4. Openings.
    a. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete.
    b. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar.
    c. Locate temporary openings in forms at inconspicuous locations.

5. Exposed Corners and Edges. Chamfer exposed corners and edges using wood, metal, PVC, or rubber chamfer strips to produce uniform smooth lines and tight edge joints.

6. Provisions for Other Trades.
    a. Provide openings in concrete formwork to accommodate work of other trades.
    b. Determine size and location of openings, recesses, and chases from trades providing such items.
    c. Accurately place and securely support items built into forms.

7. Cleaning and Tightening.
    a. Thoroughly clean forms and adjacent surfaces to receive concrete.
    b. Remove wood, sawdust, dirt, or other debris just before concrete is placed.
    c. Retighten forms and bracing before concrete placement as required to prevent mortar leaks and maintain proper alignment.

8. Form Coatings. Coat contact surfaces of forms with an approved, nonresidual, low VOC, form coating compound before reinforcement is placed.
    a. Do not allow excess form coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
    b. Coat steel forms with a nonstaining, rust preventative material. Rust stained steel formwork is not acceptable.
    c. Form coatings for use in water treatment plants shall be nontoxic after 30 days from the date the forms are removed.

B. Reuse of Forms

1. Clean and repair surfaces of all forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces.

2. Apply form coating compound as specified for new formwork.

3. Successive Reuse.
    a. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints.
    b. Align and secure joint to avoid offsets.
    c. Do not use "patched" forms for exposed concrete surfaces except as approved.

3.3 INSTALLATION

A. Placing Reinforcement

1. Comply with CRSI's recommended practice for "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports and as herein specified.
2. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
3. Installation.
   a. Accurately position, support, and secure reinforcement against displacement.
   b. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved.
   c. Place reinforcement to obtain at least minimum coverages for concrete protection as noted in ACI 301.
   d. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations.
   e. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
   f. Install welded wire fabric in lengths as long as practicable.
   g. Lap adjoining pieces at least one full mesh plus 2 inches or 8 inches and lace splices with wire.
   h. Offset laps of adjoining widths to prevent continuous laps in either direction.

B. Joints

1. Construction Joints. Locate and install construction joints where indicated in Structural Drawings.
   a. Provide roughened surface to 1/4-inch minimum amplitude in horizontal construction joints in walls and between walls and footings.
   b. Continue reinforcement across construction joints except as otherwise indicated.
   c. All vertical construction joints in walls and slabs shall be formed using Stay-Form product by Amico. See structural details for minimum requirements.
   d. The maximum length of wall pours shall not exceed 50 feet unless otherwise approved. Locate construction joints in slabs where indicated on the Structural Plans.
   e. Bond fresh concrete to hardened new concrete as follows: Thoroughly clean the surface of the hardened concrete and remove all laitance prior to placing new concrete. Apply specified chemical bonding agent in accordance with the manufacturer’s specifications. Place adjacent concrete, vibrate thoroughly near joint.
2. Isolation Joints in Slabs-on-Ground. Construct isolation joints as indicated in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as shown. Fill joints where noted with sealant specified in Division 7 sections of these specifications.

3. Contraction (Control) Joints in Slabs-on-Ground.
    a. Construct contraction joints in slabs-on-ground to form panels of patterns as shown.
    b. Use saw cuts 1/8 inch wide by 1/4 slab depth or insert premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface unless otherwise indicated.
    c. Tool slab edges round on each side of insert.
    d. After concrete has cured, remove inserts and clean groove of loose debris.
        1) Saw-cut as soon as possible after slab finishing without dislodging aggregate.
        2) If joint pattern not shown, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
        3) Provide joint, filler, and sealant materials where shown.
4. Control Joints in Retaining Wall (non-liquid retaining structures).
    a. Provide control joints at 15 feet on center maximum unless otherwise shown.
    b. Horizontal reinforcing shall pass through joint unless noted otherwise.
    c. Joints need not be provided in retaining wall footings.
5. Expansion Joints. Construct expansion joints where shown in the drawings.

C. Installation of Embedded Items

1. Set and build into the work, anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by other prime Contractors and suppliers of items to be attached thereto.
2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
3. Set edge forms, bulkheads, and intermediate screed strips for slabs to obtain required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting type screeds.

D. Concrete Placement

1. Location. Provide concrete as specified in the table below unless otherwise indicated.

Location	Design Mix
Structural cast-in-place concrete	4,000 psi Class B
Site concrete	4,000 psi Class B
Mud mat	3,000 psi Class C

2. General. Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," and as specified herein.

a. Deposit concrete continuously or in layers not to exceed 18 inches such that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness, or to be resistant to the penetration of a vibrator.
b. If a section cannot be placed continuously, provide construction joints as specified herein.
c. Deposit concrete to avoid segregation at its final location.
d. Maximum concrete free fall shall be 4 feet. For heights greater than 4 feet an elephant trunk or tremie pipe shall be used to extend the discharge point of the concrete to within the 4 foot maximum free fall requirement.

3. Placing Concrete in Forms. Deposit concrete in forms in horizontal layers not deeper than 18 inches and in a manner to avoid inclined construction joints.
   a. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
   b. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
   c. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
   d. Do not use vibrators to transport concrete inside forms.
   e. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine.
   f. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer.
   g. Do not insert vibrators into lower layers of concrete that have begun to set.
   h. At each insertion, limit duration of vibration to time necessary to consolidate concrete around reinforcement and other embedded items without causing segregation of mix.

4. Placing Concrete Slabs. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
   a. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
   b. When epoxy-coated reinforced steel is used, vibrators shall have nonmetallic heads.
   c. Bring slab surfaces to correct level with straightedge and strike off. Use highway straightedge, bull floats, darbies, or other means to obtain a smooth surface which is free of humps or hollows and that conforms to the required flatness and levelness.
   d. Do not disturb slab surfaces prior to beginning finishing operations.
   e. Maintain reinforcing in proper position during concrete placement.

5. Cold Weather Placing. Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   a. When air temperature has fallen to or is expected to fall below 40° F., uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature between 50° F. and 80° F. at point of placement.

b. Do not use frozen materials or materials containing ice or snow.
c. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. All subgrade, forms and reinforcing mats shall be heated to above 40º F during concrete placement.
d. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

6. Hot Weather Placing. When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
   a. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90° F. Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is included in the total amount of mixing water. Use of liquid nitrogen to cool concrete is allowed.
   b. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
   c. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
   d. Use water reducing retarding admixture when required by high temperatures or other adverse placing conditions, when acceptable.
   e. Use evaporation control compound in accordance with manufacturer's recommendations or fogging.

7. Adjusting Concrete Slump at Job Site.
   a. Slump Greater than Specified. Do not use concrete with slump greater than specified.
   b. Slump Less than Specified. If on arrival at the job site, the slump of the concrete is less than specified, add water only if the maximum specified w/c ratio is not exceeded. Sampling, slump and air content measurements shall be taken after addition of water.

E. Lean Concrete Backfill or Controlled Low-Strength Material Placement

1. General. Unless noted otherwise, place lean concrete backfill in over - excavated areas under slabs, in utility trenches within roadways, and as directed.

2. Mixing Equipment. Provide sufficient mixing capacity to permit fill to be placed without interruption.

3. Placing Fill.
   a. Discharge flowable fill from the mixer by any reasonable means into the space to be filled.
   b. Bring up the fill material uniformly to the fill line shown or as directed.
   c. Placing of any material over low strength fill may commence as soon as the surface water is gone or as directed.

F. Finish of Formed Surfaces. Classify inside face of covered basins, clear wells and reservoirs, filters below the media line, open tanks and flumes below water or flow lines, and the outside of structures below finish grade lines as not exposed to view.

1. Finish. Finish formed concrete surfaces in accordance with the schedule below.

Location	Type of Finish
Concrete surfaces not exposed to view or surfaces to be covered with a coating material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or other similar system	Smooth form finish
Concrete exposed to view including surfaces which will be painted	Smooth form finish or grout-cleaned finish

2. Smooth Form Finish. This is an as-cast concrete surface obtained with selected form facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

3. Smooth Rubbed Finish.
   a. Provide smooth-rubbed finish not later than 1 day after form removal.
   b. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced.
   c. Do not apply cement grout other than that created by the rubbing process.

4. Grout-Cleaned Finish.
   a. Mix one part portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout with the consistency of thick paint.
   b. Substitute white portland cement for a part of the gray portland cement in order to produce a color matching the color of the surrounding concrete, as determined by a trial patch.
   c. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout and apply the grout uniformly with brushes or a spray gun.
   d. Immediately after applying the grout, scrub the surface with a cork float or stone to coat the surface and fill all air bubbles and holes.
   e. While the grout is still plastic, remove all excess grout by working the surface with a rubber float, burlap, or other means.
   f. After the surface whitens from drying, rub with clean burlap.
   g. Keep the finish damp for at least 36 hours after final rubbing.

5. Related Unformed Surfaces. At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

G. Slab Finishes

1. Finish. Finish slab surfaces in accordance with the schedule below unless shown otherwise.

Location	Type of Finish
Exterior concrete pads, steps, ramps	Float finish followed by nonslip broom finish

2. Floor Levelness, General. Floor levelness requirements below do not apply to sloped slabs or unshored slabs on metal deck.
3. Scratch Finish.
   a. After placing slabs, plane surface to tolerances for floor flatness (Ff) of 20 and floor levelness (Fl) of 17.
   b. Slope surfaces uniformly to drains where required.
   c. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
4. Float Finish.
   a. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating.
   b. Begin floating, using float blades or float shoes only, when surface water has disappeared, and/or when concrete has stiffened sufficiently to permit operation of power driven floats.
   c. Consolidate surface with power driven floats or by hand floating if area is small or inaccessible to power units.
   d. Check and level surface plane to tolerances of Ff 25 - Fl 20.
   e. Cut down high spots and fill low spots.
   f. Uniformly slope surfaces to drains.
   g. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
5. Trowel Finish.
   a. After floating, begin first trowel finish operation using a power driven trowel.
   b. Begin final troweling when surface produces a ringing sound as trowel is moved over surface.
   c. Consolidate concrete surface by final hand troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of Ff 50 - Fl 35.
   d. Grind smooth surface defects that would telegraph through applied floor covering system.
6. Trowel and Fine Broom Finish. Apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.
7. Nonslip Broom Finish. Immediately after float finishing, slightly roughen concrete surface by brooming with stiff fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer/Architect before application.
8. Rough Finish. The bottom of concrete tanks which are to receive grout topping shall receive a rough finish for maximum adhesion. The surface to receive the

grout topping shall be intentionally roughened to a minimum amplitude of 1/4 inch.

9. Sealer/Dustproofer Finish.
    a. Coat all exposed surfaces and floors within buildings which will be subject to pedestrian or vehicular traffic under normal operation.
    b. Accomplish this by applying a liquid sealer/dustproofer in three applications in accordance with the manufacturer's directions.
    c. Apply the sealer/dustproofer as late as possible and just prior to completion of construction.

H. Miscellaneous Concrete Items

1. Filling In Holes and Openings.
    a. Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place.
    b. Mix, place, and cure concrete as herein specified, to blend with in-place construction.
    c. Provide other miscellaneous concrete filling shown or required to complete work.
2. Equipment Bases and Foundations. Provide machine and equipment bases and foundations as shown. Set anchor rods for machines and equipment complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.4 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas. Repair and patch defective areas and plug form tie holes with cement mortar immediately after removal of forms, when acceptable.

1. Cut out honeycomb, rock pockets, and voids over 1/4 inch in any dimension down to solid concrete but in no case to a depth of less than 1 inch.
    a. Make edges of cuts perpendicular to the concrete surface.
    b. Thoroughly clean, dampen with water, and brush coat the area to be patched with specified bonding compound.
    c. Place patching mortar before bonding compound has dried.
2. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding.
    a. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching.
    b. Compact mortar in place and strike-off slightly higher than surrounding surface.
    c. After shrinkage has occurred, grind surface until flush.

B. Repair of Formed Surfaces. Remove and replace concrete having defective surfaces if defects cannot be repaired satisfactorily. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning.

C. Repair of Unformed Surfaces. Repair or replace supported slabs that fail to meet the specified finish requirements.

1. Correct levelness and flatness, and low and high areas as herein specified.
2. For slabs on grade, remove slab between control joints and replace with concrete slab meeting floor finish and tolerances.
3. For all other unformed surfaces, repair as follows:
   a. Repair surface defects that affect the durability of the concrete. These include crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.
   b. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
   c. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound.
   d. Finish repaired areas to blend into adjacent concrete.
   e. Underlayment compounds may be used when acceptable.
   f. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete.
      1) Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4 inch clearance all around.
      2) Dampen concrete surfaces in contact with patching concrete and apply bonding compound.
      3) Mix patching concrete of same materials to provide concrete of same type or class as original concrete.
      4) Place, compact, and finish to blend with adjacent finished concrete.
      5) Cure in same manner as adjacent concrete.

D. Miscellaneous Repairs. Repair isolated random cracks and single holes not over 1 inch in diameter by dry pack method.

1. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles.
2. Dampen cleaned concrete surfaces and apply bonding compound.

3. Place dry pack mortar before bonding compound has dried.
4. Compact dry pack mixture in place and finish to match adjacent concrete.
5. Keep patched area continuously moist for not less than 72 hours.

E. Approval. Perform structural repairs with prior approval for method and procedure, using specified epoxy adhesive and mortar.

F. Alternative Repair Methods. Repair methods not specified above may be used, subject to acceptance.

3.5 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. General

1. Employ an approved testing laboratory to perform tests and submit test reports.
2. ACI Grade 1 certified technician employed by the testing laboratory shall be present during the placing of all concrete.
3. The concrete testing laboratory shall submit two copies of all test reports directly to the Engineer/Architect.

B. Sampling Fresh Concrete. Sample concrete in accordance with ASTM C 172, except modified for slump to comply with ASTM C 94.

1. Slump. Perform slump tests at the point of truck discharge in accordance with ASTM C 143.
   a. For each class of concrete, perform one test for each compressive strength test and additional tests when concrete consistency seems to have changed.
   b. If the slump is adjusted at the job site, the concrete testing agency shall be responsible for reporting the following.
      1) Method used to adjust slump.
      2) Quantity of each material added.
      3) Resulting slump.
2. Air Content. Perform daily for each class of concrete placed in accordance with ASTM C 173 volumetric method for lightweight concrete; ASTM C 231 pressure method for normal weight concrete; one test for each compressive strength test, one test for the first load of each type of air entrained concrete delivered, and one test for each truck when air content is adjusted until consistent results are obtained.
3. Concrete Temperature. Test hourly when air temperature is 40° F. and below, when 80° F. and above, and each time a set of compressive test specimens is made.
4. Compressive Test Specimen. Perform in accordance with ASTM C 31 and as follows:
   a. Prepare one set of four standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field cured test specimens are

required. The 7-day test specimen shall be field cured. Contractor may also prepare additional field cured test specimens to be used for early form removal.

b. Prepare one set of cylinders for each 100 cy of concrete or fraction thereof, of each concrete class placed in any one day.
c. Perform compressive strength tests in accordance with ASTM C 39. Test one specimen at 7 days, and two specimens at 28 days, and hold one specimen in reserve for later testing if required.
d. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
e. When total quantity of a given class of concrete is less than 50 cy, Engineer may waive strength test if adequate evidence of satisfactory strength is provided.
f. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
g. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 300 psi.

C. Compressive Strength Test Reporting. Report test results in writing to Engineer, Ready-Mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

D. Flatness and Levelness. Conduct random tests for flatness and levelness in accordance with ASTM E 1155 within 24 hours after final finish and as directed. Pay the cost for testing and any retesting after the defects are corrected.

E. Floor Slope. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope within 24 hours after final finish and as directed.

F. Nondestructive Testing. Impact hammer, ultrasonic pulse velocity, or other nondestructive testing device may be permitted if approved, but shall not be used as the sole basis for acceptance or rejection.

G. Additional Tests. The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure.

1. These tests shall be as directed.
2. Testing service shall conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3. Be responsible for all costs associated with such tests.

3.6 DEMONSTRATION

A. General. Prior to final acceptance of concrete work, demonstrate to representatives of the Owner and the Engineer/Architect that there are no mechanical defects or damaged areas and that concrete exposed to view is acceptable as to function and appearance.

1. Walls and Other Formed Surfaces. Representatives of the Owner, Contractor, and Engineer/Architect shall review concrete work to verify that tie holes and air voids have been patched, seams have been ground smooth, all surface defects have been repaired, and all rubbed or rubbed and painted surfaces are acceptable in appearance.
2. Floors.
   a. Representatives of the Owner, Contractor, and Engineer/ Architect shall review concrete work to verify that all surface defects have been repaired, all stains removed, residue from floor sealer/dustproof or chemical hardener has been removed, and that the required finish is acceptable.
   b. Where requested, flood selected areas of floor to a depth satisfactory to demonstrate that the area or areas drain properly to the floor drains and sumps and that there are no areas ponding water outside acceptable tolerances.
   c. Furnish water for testing and convey it to the areas being examined.
3. Liquid-Bearing Structures. Demonstrate that all structures designed to hold water or other liquids are watertight.

B. Repair or Replacement of Defective Work. Correct concrete work which is unacceptable in accordance with paragraph 3.4 of this section. Replace concrete which cannot be repaired satisfactorily in an acceptable manner at no additional cost to the Owner.

3.7 CONCRETE CURING AND PROTECTION

A. General. Protect freshly placed concrete from premature drying and excessively cold or hot temperatures. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation control compound applied in accordance with manufacturer's instructions.

B. Curing Duration

1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing.
2. Keep continuously moist for not less than 7 days; 14 days for concrete sections with a minimum specified dimension that is greater than or equal to 3'-6".
3. Maintain concrete temperatures as recommended in ACI 301 throughout the curing period.

C. Curing Methods. Perform curing of concrete by curing compound, by moist curing, by moisture-retaining-cover curing, and by combinations thereof in accordance with the schedule below unless noted otherwise.

1. If unspecified, all methods specified below are acceptable.
2. Prior to use of curing compound on any surface, verify compatibility between curing compound and finish surface treatment.

Location	Curing Method
Floors and other unformed concrete surfaces	Any specified curing method below
Formed concrete surfaces	Moist curing prior to form removal, followed by any of the methods specified below
All other concrete	Any specified curing method below

3. Moisture Curing. Provide moisture curing by following methods:
   a. Keep concrete surface continuously wet by with a continuous water fog spray.
   b. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet.
   c. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.
4. 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 3 inches. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
5. Curing Compound. Provide curing compound as follows:
   a. Apply specified curing compound to concrete as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared).
   b. For formed surfaces, apply curing compound immediately after form removal.
   c. Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions. Apply in two coats, spread in perpendicular directions.
   d. Recoat areas subjected to heavy rainfall within 3 hours after initial application.
   e. Maintain continuity of coating and repair damage during curing period.
   f. Use curing compounds that will not affect finish materials applied directly to concrete.
   g. Do not use curing compounds on surfaces which are to be covered with coating material applied directly to concrete, chemical hardener, waterproofing, damp proofing, membrane roofing, flooring (such as ceramic or quarry tile, glue down carpet that is not compatible with curing compound), painting, and other coatings and finish materials, unless otherwise approved.

3.8 REMOVAL OF FORMS

A. **Formwork which is not supporting** the weight of concrete, such as sides of beams, walls, columns, and similar parts of the work may be removed after cumulatively curing at not less than 50° F. for 24 hours, provided concrete is sufficiently hard not to be damaged by form removal operations, and provided curing and protection operations are maintained. Backfill operations at retaining walls shall not be commenced until concrete has reached its full 28-day compressive strength.

B. **Formwork supporting weight** of concrete, such as beam soffits, joists, slabs, and other structure elements, may not be removed in less than 14 days and concrete has attained at least 75 percent of the design 28-day minimum compressive strength. Determine potential compressive strength of in-place concrete by testing field cured specimens representative of concrete location or members.

C. **Form facing material may be removed** 3 days after placement only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

3.9 **PROTECTION OF FORMED AND UNFORMED CONCRETE SURFACES**. Protect concrete from damage or discoloration during the construction period caused by subsequent work performed by all other trades, including, but not limited to, concrete forming, resteel placement, equipment installation, plumbing work, electrical work, construction loading to the point of overstressing concrete, and all other actions which might adversely affect the strength or appearance of the concrete. Repair chipped or damaged concrete and remove rust, stains, efflorescence, and surface deposits by acceptable methods.

END OF SECTION 03 30 00

SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Platform
2. Handrails

B. Products furnished, but not installed, under this Section include the following:

1. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

C. Related Sections include the following:

1. Structural drawings for installing anchor bolts, steel pipe sleeves, wedge-type inserts and other items indicated to be cast into concrete.

1.3 PERFORMANCE REQUIREMENTS

A. All fabrication shall meet applicable code requirements including OSHA.

B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

C. Handrails and Guardrails : per ASCE 7-10 section 4.5

1. Specification section 05 52 13 – 1.5

D. Platforms:

1. Bollard will remove completely from the ground sleeve and provide flush surface when galvanized lid drops down on the open ground sleeve.

2. Design all components, including supports above grade and connections to primary structure, to withstand all applicable loads.

    1. Live Loads:

        a. Surfaces shall be designed to support safely the following uniformly distributed or concentrated live loads, whichever produces the greater load effects:

    Elevated platforms: 60 psf Uniform load and 300 lb Concentrated load

3. Determine length of stairs, number and dimension of treads, and number and dimension of risers, based on finish grades and building elevations, and the requirements of IBC1009.7

1.4 SUBMITTALS

A. Product Data: For the following:

1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Grout.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
2. Provide templates for anchors and bolts specified for installation under other Sections.
3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
4. For products indicated to comply with design loads Installation / Erection drawings must be sealed and signed by qualified professional Engineer licensed in Commonwealth of Kentucky

C. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code-Steel."
2. AWS D1.2, "Structural Welding Code-Aluminum."
3. AWS D1.6, "Structural Welding Code-Stainless Steel."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. General Contractor shall coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
2. Provide allowance for trimming and fitting at site.

1.7 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 ALUMINUM

A. Extruded Aluminum: ASTM B221, Alloy 6061, Temper T6.

B. Sheet Aluminum: ASTM B209, Alloy 3005.

C. Aluminum-Alloy Bars: ASTM B211, Alloy 6061, Temper T6.

D. Bolts, Nuts, and Washers: Stainless Steel.

E. Welding Materials: AWS D1.2; type required for materials being welded.

2.3 ACCESSORIES

A. Stair Treads:

1. Stair treads for aluminum stairs shall be constructed of nonslip grating and shall have an integral nosing. Treads shall be IKG Industries, or equal, serrated, aluminum swage-locked treads with 1 1/4-inch abrasive nosing.

2. Stair treads for stairs in the Splitter Box and Filter Building shall be Alumogrit Type 105 safety treads as manufactured by Wooster Products, Inc., or equal. Abrasive shall be No. 20 virgin grain aluminum oxide abrasive integrally cast into the walking surface to a minimum depth of 1/32 inch. All fasteners shall be countersunk. Provide solid aluminum riser plates.

B. All accessories and connections for aluminum fabrication shall be aluminum or stainless steel.

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36.

1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

D. Machine Screws: ASME B18.6.3.

E. Lag Bolts: ASME B18.2.1.

F. Plain Washers: Round, ASME B18.22.1.

G. Lock Washers: Helical, spring type, ASME B18.21.1.

H. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

I. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Division 09 painting Sections.

C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

D. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

F. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.

G. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

H. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 5000 psi, unless otherwise indicated.

2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.7 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:

1. ASTM A 123/A 123M, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 INSTALLING BEARING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges / shims. After bearing members have been positioned and plumbed, pack with grout. Provide final adjustments. Cut shims flash after grout has set.

1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 50 00

SECTION 05 50 00 METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Removable and Non-Removable Metal Bollards

B. Products furnished, but not installed, under this Section include the following:

1. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

C. Related Sections include the following:

1. Structural drawings for installing anchor bolts, steel pipe sleeves, wedge-type inserts and other items indicated to be cast into concrete.

1.3 PERFORMANCE REQUIREMENTS

A. All fabrication shall meet applicable code requirements including OSHA.

B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

C. Removable Bollards:

1. Bollard will remove completely from the ground sleeve and provide flush surface

2. Unlock the bollard to be removed. To replace the bollards, make sure the bollard is still unlocked, replace, and lock the cam lock to secure bollard in ground sleeve.

3.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Paint products.
3. Grout.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
2. Provide templates for anchors and bolts specified for installation under other Sections.
3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
4. For products indicated to comply with design loads Installation / Erection drawings must be sealed and signed by qualified professional Engineer licensed in Commonwealth of Kentucky

C. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code-Steel."
2. AWS D1.2, "Structural Welding Code-Aluminum."
3. AWS D1.3, "Structural Welding Code-Sheet Steel."
4. AWS D1.6, "Structural Welding Code-Stainless Steel."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. General Contractor shall coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
2. Provide allowance for trimming and fitting at site.

1.7 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.3 ACCESSORIES

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36.

1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

D. Machine Screws: ASME B18.6.3.

E. Lag Bolts: ASME B18.2.1.

F. Plain Washers: Round, ASME B18.22.1.

G. Lock Washers: Helical, spring type, ASME B18.21.1.

H. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

I. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

2.5 BOLLARDS

A. Bollards shall be either 5.563-inch diameter or 6” and usable height of 45-48”inches tall.

B. Bollards can be fabricated or supplied by vendor: Fabricate metal bollards from Schedule 40 steel pipe 1/4-inch wall-thickness steel shapes, as indicated.

C. Bollards supplied should be free from surface blemishes and defects where exposed to view in the finished installation.

D. Bollards shall be removable and lockable.

E. Finish bollard with high-performance powder coating or provide pre-finished bollard with equivalent finish.

1. Color: OSHA Safety Yellow

2.6 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Division 09 painting Sections.

C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

D. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

F. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.

G. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

H. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 5000 psi, unless otherwise indicated.

2.7 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.8 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:

1. ASTM A 123/A 123M, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 INSTALLING BEARING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges / shims. After bearing members have been positioned and plumbed, pack with grout. Provide final adjustments. Cut shims flash after grout has set.

1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.

2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 REMOVABLE BOLLARDS

A. Comply with manufacturer provided instructions and drawings.
See Vestil Manufacturing BOL-R-45-5.5 or equal

B. Ground sleeves should be installed with the top of the sleeve set flush with the finished surface. Insure 2" concrete cover over all below grade anchors, plates bars, etc.

C. Ensure that a minimum of a 6-inch gravel base is put down prior to installation to ensure drainage of the bollard, per installation details.

D. Bollard should not be inserted into the ground sleeve until it is leveled and fully cured. Attach bollard per manufacturer's instructions. Do not attempt to install bollard in the locked position.

E. If touch up painting in the field, be careful not to pain moving parts which may restrict the bollard's proper function.

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3.5 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop- painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 50 00

SECTION 05 52 13
PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Aluminum pipe railings.

1.3 COORDINATION

A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Railing brackets.
2. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Delegated-Design Submittal: For railings, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Samples for Verification: Aluminum pipe railing with clear anodic finish.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

D. Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Aluminum Pipe and Tube Railings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Braun, J. G., Company; The Wagner Companies.
   b. Hollaender Manufacturing Company.
   c. Moultrie Manufacturing Corporation.
   d. Superior Aluminum Products, Inc.
   e. Thompson Fabricating, LLC.
   f. Tuttle Railing Systems.

B. Source Limitations: Obtain each type of railing from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:
    a. Uniform load of 50 lbf/ ft. applied in any direction.
    b. Concentrated load of 200 lbf applied in any direction.
    c. Uniform and concentrated loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
    1. Temperature Change: 120 deg F, ambient; 180 deg F.

2.3 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
    1. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.4 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

B. Extruded Structural Pipe: ASTM B221/B210, Alloy 6061-T6.
    1. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.

C. Plate and Sheet: ASTM B209, Alloy 6061-T6.

D. Die and Hand Forgings: ASTM B247, Alloy 6061-T6.

E. Castings: ASTM B26/B26M, Alloy A356.0-T6.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
    1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

D. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with either welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove flux immediately.

4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

J. Nonwelded Connections: Connect members with internal/concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection using an epoxy structural adhesive (per manufacturer's recommendation), stainless steel machine screws with lock washers, and threaded tubular rivets.

2. Provide expansion joints at approximately 20’-0” o.c.

K. Form Changes in Direction as Follows:

1. By bending or as detailed.

L. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

M. Close exposed ends of railing members with prefabricated end fittings.

N. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.

O. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

P. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

Q. For removable railing posts, fabricate slip-fit sockets from aluminum pipe whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.

1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.

R. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.7 ALUMINUM FINISHES

A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples.

Noticeable variations in the same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

B. Clear Anodic Finish: AAMA 611, AA-M12C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (6 mm in 3.5 m).

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

B. Expansion Joints: Install expansion joints at approximately 20’-0” o.c., but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending a minimum of 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 2 inches of post.

3.3 ANCHORING POSTS

A. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material attached to post with set screws.

B. Leave anchorage joint exposed with 1/8-inch build-up, sloped away from post.

C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

1. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.

3.4 ATTACHING RAILINGS

A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends.

B. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

C. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.

3.5 ADJUSTING AND CLEANING

A. Clean aluminum by washing thoroughly with clean water and soap and rinsing with clean water.

3.6 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 05 52 13

SECTION 09 24 11
AGGREGATE PIER GROUND IMPROVEMENT

PART 1: GENERAL

1.01 Scope of Work

A. Work shall consist of designing, furnishing and installing Aggregate Pier (AP) ground improvement to the lines and grades designated on the project foundation plans and as specified herein. AP elements shall be in a columnar-type configuration and shall be used for support of footing and slab-on-grade loads. AP elements shall be constructed by either augering a cavity or driving a hollow mandrel to the design depth and vertically ramming lifts of aggregate using the specially designed tamper head and high-energy impact densification equipment to create the compacted aggregate pier.

1.02 Work Included

A. Provision of all equipment, material, labor, and supervision to design and install AP elements. Design shall rely on subsurface information presented in the project geotechnical report by Vector Engineers, Inc. dated June 20, 2019 and slope stability report dated June 19, 2020. Survey layout of AP elements, spoil removal (as required), footing excavations, and footing/slab subgrade preparation following AP installation is not included.

B. The AP design and installation shall adhere to all methods and standards described in this Specification.

C. Drawings and General Provisions of the Contract, including General and Supplemental Conditions, and Division 1 Specifications, apply to the work in this specification.

1.03 Approved Installers

A. The AP Installer (the Installer) shall be approved by the Owner's Geotechnical Representative. The Owner's Geotechnical Representative is hereinafter referred to as "Geotechnical Representative".

B. Installers shall have a minimum of 5 years of experience with the installation of AP systems, completed at least 20 AP projects.

1.04 Reference Standards

A. Design

1. "Control of Settlement and Uplift of Structures Using Short Aggregate Piers," by Evert C. Lawton (Assoc. Prof., Dept. of Civil Eng., Univ. of Utah), Nathaniel S. Fox (President, Geopier Foundation Co., Inc.), and Richard L. Handy (Distinguished Prof. Emeritus, Iowa State Univ., Dept. of Civil Eng.), reprinted from *IN-SITU DEEP SOIL IMPROVEMENT,*

Proceedings of sessions sponsored by the Geotechnical Engineering Division/ASCE in conjunction with the ASCE National Convention held October 9-13, 1994, Atlanta, Georgia.

2. "Settlement of Structures Supported on Marginal or Inadequate Soils Stiffened with Short Aggregate Piers," by Evert C. Lawton and Nathaniel S. Fox. *Geotechnical Special Publication No. 40: Vertical and Horizontal Deformations of Foundations and Embankments,* ASCE, 2, 962-974.

3. "Technical Bulletin No. 12, Proper Load Testing Procedures to Verify Adequate Design of Geopier-Supported Foundation Systems," by Kord Wissmann and W. Lake Carter, Geopier Foundation Company, Inc. ©2015.

B. Modulus Testing

1. ASTM D 1143 - Pile Load Test Procedures
2. ASTM D 1194 - Spread Footing Load Test

C. Materials and Inspection

1. ASTM D 1241 - Aggregate Quality
2. ASTM D 422 - Gradation of Soils

D. Where specifications and reference documents conflict, the AP Designer shall make the final determination of the applicable document.

1.05 Certifications and Submittals

A. Qualifications – With reference to Paragraph 1.03.B, the Installer shall submit the following with their proposal to document/demonstrate the minimum experience requirements for this project.

1. Documentation verifying a minimum of 50 previous projects completed.

B. Design Submittal - The Installer shall submit detailed design calculations and construction drawings prepared by the Designer for review and approval by the Geotechnical Representative and the project Structural Engineer. All plans shall be sealed by a Professional Engineer licensed in the State in which the project is constructed.

C. Professional Liability Insurance - The Designer shall have Errors and Omissions design insurance for the work. The insurance policy should provide a minimum coverage of $3 million per occurrence.

D. Modulus Test Reports - A modulus test(s) shall be performed on a non-production AP element as required by the Designer to verify the design assumptions. The Installer shall furnish the General Contractor a description of the installation equipment, installation records, complete test data, analysis of the test data and verification of the design parameter values based on the modulus test

results. The report shall be prepared under direction of a Registered Professional Engineer licensed in the State in which the project is constructed.

E. Daily AP Progress Reports - The Installer shall furnish a complete and accurate record of AP installation to the General Contractor. The record shall indicate the element location, length, volume of aggregate used or number of lifts, densification forces during installation, and final elevations or depths of the base and top of elements. The record shall also indicate the type and size of the installation equipment used, and the type of aggregate used. The Installer shall immediately report any unusual conditions encountered during installation to the General Contractor, the Designer, and Testing Agency.

PART 2: MATERIALS

2.01 Aggregate

A. Aggregate used by the Installer for element construction shall be pre-approved by the Designer and shall demonstrate suitable performance during modulus testing. Typical aggregate consists of Type 1 Grade B in accordance with ASTM D-1241-68, No. 57 stone, recycled concrete, or other graded aggregate approved by the Designer.

B. Clean, potable water or other suitable source shall be used to mix grout and increase aggregate moisture content where required. The General Contractor shall provide such water to the Installer.

PART 3: DESIGN REQUIREMENTS

3.01 Aggregate Pier Design

A. The design of the Aggregate Pier system shall be based on the service load bearing pressure and the allowable total and differential settlement criteria of all footings indicated by the design team for support by the Aggregate Pier system. The Aggregate Pier system shall be designed in accordance with generally-accepted engineering practice and the methods described in Section 1 of these Specifications. The design life of the structure shall be 50 years.

B. The design shall meet the following performance criteria:

Footings

*Maximum Allowable Bearing Pressure for Footings Supported by AP Reinforced Soils	2500 psf
Total Settlement for Footings:	≤ 1-inch
Differential Settlement of Adjacent Footings:	≤ ½-inch

Slab-on-Grade

Settlement of Slabs-on-Grade: ≤ 1/2-inch

C. The AP elements shall be designed and installed to completely penetrate existing fill.

D. The AP elements shall be designed using a AP stiffness modulus to be verified by the results of the modulus test described in Section 5.02 of these specifications.

3.02 Design Submittal

A. The Installer shall submit detailed design calculations, construction drawings, and shop drawings, (the Design Submittal), for review and approval at least 3 week(s) prior to the beginning of construction.

B. A detailed explanation of the design parameters for settlement calculations shall be included in the Design Submittal. Additionally, the quality control test program for Aggregate Pier system, meeting these design requirements, shall be submitted. All computer-generated calculations and drawings shall be prepared and sealed by a Professional Engineer, licensed in the State or Province where the piers are to be built. Submittals will be submitted electronically only unless otherwise required by specific submittal instructions.

C. A detailed explanation of the design parameters for settlement calculations shall be included in the Design Submittal.

D. The quality control test program for the AP system, meeting the design requirements described herein, shall be submitted.

E. All calculations and drawings shall be prepared and sealed by a Professional Engineer licensed in the State which the project is constructed.

PART 4: EXECUTION

4.01 Approved Installation Procedures

The following sections provide general criteria for the construction of the AP elements. Unless otherwise approved by the Designer, the installation method used for AP element construction shall be that as used in the construction of the successful modulus test.

A. AP elements installed using augered installation methods.

1. Augered AP systems shall be pre-augered using mechanical drilling or excavation equipment.

2. If cave-ins exceeding 10% of the lift volume occur during excavation such that the sidewalls of the hole are deemed to be unstable, steel casing shall be used to stabilize the cavity or a displacement AP system may be used.

3. Aggregate shall be placed in the augered cavity in compacted lift thicknesses as determined by the Designer.

4. Should cave-ins occur on top of a lift of aggregate such that the volume of the caved soil is greater than 10 percent of the volume of the aggregate in the lift, then the aggregate shall be considered contaminated and shall be removed and replaced with uncontaminated aggregate.

5. A specially-designed beveled tamper and high-energy impact densification apparatus shall be employed to densify lifts of aggregate during installation. The apparatus shall apply direct downward impact energy to each lift of aggregate. Compaction equipment that induces horizontal vibratory energy (such as Vibroflot equipment) is not permitted.

B. AP elements installed using displacement installation methods.

1. Displacement AP systems shall be constructed by advancing a specially designed mandrel with a minimum 15 ton static force augmented by dynamic vertical ramming energy to the full design depth. The hollow-shaft mandrel, filled with aggregate, is incrementally raised, permitting the aggregate to be released into the cavity, and then lowered by vertically advancing and/or ramming to densify the aggregate and force it laterally into the adjacent soil. The cycle of raising and lowering the mandrel is repeated to the top of AP element elevation. The cycle distance shall be determined by the Designer.

2. Special high-energy impact densification apparatus shall be employed to vertically densify the AP elements during installation of each constructed lift.

3. Densification shall be performed using a mandrel/tamper. The mandrel/tamper foot is required to adequately increase the lateral earth pressure in the matrix soil during installation.

4. Downward crowd pressure shall be applied to the mandrel during installation.

4.02 Plan Location and Elevation of AP Elements

The as-built center of each AP element shall be within 6 inches of the locations indicated on the plans. Piers installed outside of the above tolerances and deemed not acceptable shall be rebuilt at no additional expense to the Owner.

4.03 Rejected AP Elements

AP elements installed beyond the maximum allowable tolerances shall be abandoned and replaced with new elements, unless the Designer approves the condition or provides other remedial measures. All material and labor required to replace rejected elements

shall be provided at no additional cost to the Owner, unless the cause of rejection is due to an obstruction or mislocation.

PART 5: QUALITY CONTROL

5.01 Quality Control Technician

The Installer shall have a qualified, full-time, quality control (QC) technician to verify and report all installation procedures. The Installer shall immediately report any unusual conditions encountered during installation to the Designer, the General Contractor, and to the observing Geotechnical Representative. The quality control procedures shall include the preparation of AP Progress Reports completed during each day of installation containing the following information:

i. Footing and AP element location.
ii. Pre-auger diameter and soil conditions encountered during drilling (if required).
iii. AP element length.
iv. Planned and actual AP element elevations at the top and bottom of the element.
v. Average lift thickness of each AP element.
vi. Volume of aggregate used in each element.
vii. Documentation of any unusual conditions encountered.
viii. Type and size of densification equipment used.

5.02 Single-Element AP Modulus Test(s)

A minimum of one single-element AP Modulus Test shall be performed at a location agreed upon by the Designer and the Geotechnical Representative to verify or modify the AP design. The modulus tests shall be of the type and installed in a manner specified herein.

A. Modulus test procedures shall utilize appropriate portions of ASTM D 1143 and ASTM D 1194 and comply with Technical Bulletin No. 12 (Wissmann and Carter, 2015).

B. The test plate/cap shall have the same diameter as the AP element design diameter and shall not extend beyond the edge of the AP element and over the matrix soil.

C. ASTM D-1143 general test procedures shall be used as a guide to establishing load increments, load increment duration, and load decrements. As a minimum, the following loading increments, decrements and duration shall be used.

Increment	Approximate Load (percent design)	Minimum Duration (min)	Maximum Duration (min)
Seat	< 9	0	N/A

1	17	15	60
2	33	15	60
3	50	15	60
4	67	15	60
5	83	15	60
6	100	15	60
7	117	60	120
8	133	15	60
9	150	15	60
10	100	N/A	N/A
11	66	N/A	N/A
12	33	N/A	N/A
13	0	N/A	N/A

D. With the exception of the load increment representing approximately 117% of the AP element maximum design stress, all load increments shall be held for a minimum of 15 minutes. Loads are then maintained until the rate of deflection reduces to 0.01 inch per hour or for the maximum of 1 hour, whichever is occurs first.

E. Creep Test - The load increment that represents approximately 117% of the AP element maximum design stress shall be held for a minimum of 15 minutes. Loads are then maintained until the rate of deflection reduces to 0.01 inch per hour or for the maximum of 4 hours, whichever is occurs first.

1. If Rigid Inclusions are proposed in lieu of ungrouted/uncemented or partially grouted/cemented AP elements, then the creep test shall be performed at the load increment that represents approximately 133% of the AP element maximum design stress.

F. A seating load equal to 5 percent of the total load shall be applied to the loaded steel plate prior to application of load increments and prior to measurement of deflections to compensate for surficial disturbance.

G. Single-element modulus tests that are proposed to be loaded as a function of allowable bearing pressure are not considered standard practice and will not be accepted. Modulus tests that are proposed to be loaded as a function of allowable bearing pressure must consist of full-scale spread footing load tests that include a test footing supported by a minimum of three AP elements and having a AP area-replacement ratio ($Area_{APs}/Area_{Footing}$) that is representative of the smallest area replacement ratio used in the AP design. The test spread footing shall be loaded to at least 200 percent of the allowable bearing pressure to demonstrate that the AP-supported footing exhibits safe response during service loading.

5.03 Bottom Stabilization Testing (BSTs) / Crowd Stabilization Testing (CSTs)

Bottom stabilization testing (BSTs) or Crowd stabilization testing (CSTs) shall be performed by the Quality Control Technician during the installation of the modulus test element. Additional testing as required by the Designer shall be performed on selected production AP elements to compare results with the modulus test element.

PART 6: OWNER'S QUALITY ASSURANCE

6.01 Owner's Independent Quality Assurance

The Installer shall provide full-time Quality Control monitoring of AP construction activities. The Owner is responsible for retaining their observing Geotechnical Representative to provide Quality Assurance services.

6.02 Responsibilities of the Owner's Independent Quality Assurance

A. The Testing Agency shall monitor the modulus test pier installation and testing. The Installer shall provide and install all dial indicators and other measuring devices.

B. The Testing Agency shall monitor the installation of AP elements to verify that the production installation practices are similar to those used during the installation of the modulus test elements.

C. The Testing Agency shall report any discrepancies to the Installer and General Contractor immediately.

D. The Testing Agency shall observe the excavation, compaction and placement of the foundations as described in Section 7.05. Dynamic Cone Penetration testing may be performed to evaluate the footing bottom condition as determined by the Testing Agency.

PART 7: RESPONSIBILITIES OF THE GENERAL CONTRACTOR

7.01 Site Preparation and Protection

A. The General Contractor shall locate and protect underground and aboveground utilities and other structures from damage during installation of the AP elements.

B. Site grade for AP installation shall be within 1 foot of the top of footing elevations or finished grade to minimize AP depths. Ground elevations and bottom of footing elevations shall be provided to the Installer in sufficient detail to estimate installation depth elevations to within 3 inches.

C. The General Contractor will provide site access to the Installer, after site preparation in the area has been completed. A flat and stable working pad subgrade shall be established and maintained by the General Contractor to provide wet weather protection of the subgrade and to provide access for efficient operation of the AP installation.

D. Prior to, during and following AP installation, the General Contractor shall provide positive drainage to protect the site from wet weather and surface ponding of water.

E. If spoils are generated by AP installation, spoil removal from the AP work area in a timely manner to prevent interruption of AP installation is required.

7.02 Aggregate Pier Layout

The location of Aggregate Pier-supported foundations for this project, including layout of individual Aggregate Pier elements, shall be marked in the field using survey stakes or similar means at locations shown on the drawings.

7.03 Excavations for Obstructions

A. Should any obstruction be encountered during AP installation, the General Contractor shall be responsible for promptly removing such obstruction or the element shall be relocated if possible. Obstructions include, but are not limited to, boulders, timbers, concrete, granite blocks, utilities, etc., which shall prevent placing the elements to the required depth, or shall cause the AP element to drift from the required location.

B. Dense natural rock or weathered rock layers shall not be deemed obstructions, and AP elements may be terminated short of design lengths on such materials.

7.04 Contractor's / Owner's Independent Testing Agency (Owner's Quality Assurance)

General Contractor is responsible for acquiring an Independent Testing Agency (Quality Assurance) as required. Testing Agency roles are as described in Part 6 of this specification. The Aggregate Pier Installer will provide Quality Control services as described in Part 5 of this specification.

7.05 Utility Excavations

The General Contractor shall coordinate all excavations made subsequent to AP installations so that excavations do not encroach on the elements as shown in the AP construction drawings. Protection of completed AP elements is the responsibility of the General Contractor. In the event that excavations are required in close proximity to the installed AP elements, the General Contractor shall contact the Designer immediately to develop construction solutions to minimize impacts on the installed AP elements.

7.06 Footing and Slab Subgrade Preparation

A. Excavation and subgrade preparation of all footing and slab subgrades shall be the responsibility of the General Contractor and performed in conformance with the Project Specifications and AP design submittal.

A. Foundation excavations to expose the tops of AP elements shall be made in a workman-like manner, and shall be protected until concrete placement, with procedures and equipment best suited to (1) avoid exposure to water, (2) prevent softening of the matrix soil between and around the AP elements before pouring structural concrete, and (3) achieve direct and firm contact between the dense, undisturbed AP elements and the concrete footing.

B. All excavations for footing bottoms supported by AP elements shall be prepared in the following manner by the General Contractor. Recommended procedures for achieving these goals are to:

1. Limit over-excavation below the bottom of the footing to 3-inches (including disturbance from the teeth of the excavation equipment).

2. Compaction of surface soil and top of AP elements shall be prepared using a motorized impact compactor ("Wacker Packer," "Jumping Jack," or similar). Sled-type tamping devices shall only be used in granular soils and when approved by the Designer. Loose or soft surficial soil over the entire footing bottom shall be recompacted or removed, respectively. The surface of the AP elements shall be recompacted prior to completing footing bottom preparation.

3. Place footing concrete immediately after footing excavation is made and approved, preferably the same day as the excavation. Footing concrete must be placed on the same day if the footing is bearing on moisture-sensitive soils. If same day placement of footing concrete is not possible, open excavations shall be protected from surface water accumulation. A lean concrete mud-mat may be used to accomplish this. Other methods must be pre-approved by the Designer.

C. The following criteria shall apply, and a written inspection report sealed by the project Testing Agency shall be furnished to the Installer to confirm:

1. That water has not been allowed to pond in the footing excavation at any time. Ponded water may soften the unconfined matrix soil between and around the AP elements, and may have detrimental effects on the supporting capability of the AP reinforced subgrade.

2. That all AP elements designed for each footing have been exposed in the footing excavation.

3. That immediately before footing construction, the tops of AP elements exposed in each footing excavation have been inspected and recompacted as necessary with mechanical compaction equipment.

4. That no excavations or drilled shafts (elevator, etc) have been made after installation of AP elements within the excavation limits described in the AP construction drawings, without the written approval of the Installer or Designer.

E. Failure to provide the above inspection and certification by the Testing Agency, which is beyond the responsibility of the Aggregate Pier Installer, may void any written or implied warranty on the performance of the Aggregate Pier system.

END OF SECTION - 092411

SECTION 23 07 19
HVAC PIPING INSULATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following HVAC piping systems:

1. Refrigerant suction piping, indoors and outdoors.

2. Condensate piping indoors.

1.3 SUBMITTALS

A. First four paragraphs below are defined in Division 01 Section "Submittal Procedures" as "action submittals."

B. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

C. Qualification Data: For qualified Installer.

D. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

E. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Retain first paragraph below if available at Project location. Apprenticeship programs are usually associated with union shops. Other craft training programs are available.

B. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

C. When fire-performance characteristics are important requirements, verify surface-burning characteristics of insulation materials by an independent testing agency and require test report submittals.

D. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

PART 2 – PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

D. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Aeroflex USA, Inc.; Aerocel.
    b. Armacell LLC; AP Armaflex.
    c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Aeroflex USA, Inc.; Aeroseal.
b. Armacell LLC; Armaflex 520 Adhesive.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
d. K-Flex USA; R-373 Contact Adhesive.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.

2. Verify that surfaces to be insulated are clean and dry.

3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

B Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, and Unions:

1. Install insulation over fittings, valves, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.

2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.

3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.

6. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.

2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.

2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.

3. Install insulation to flanges as specified for flange insulation application.

4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 FINISHES

A. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

3.8 INDOOR PIPING INSULATION SCHEDULE

A. Refrigerant Liquid and Suction Piping:

1. All Pipe Sizes: Insulation shall be the following:

a. Flexible Elastomeric: 1 inch thick.

B. Condensate Drain Piping:

1. All Pipe Sizes: Insulation shall be the following:

a. Flexible Elastomeric: ½ inch thick.

3.9 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Refrigerant Liquid and Suction Piping:

1. All Pipe Sizes: Insulation shall be the following:

a. Flexible Elastomeric: 2 inches thick.

END OF SECTION 23 07 19

SECTION 23 23 00
REFRIGERANT PIPING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

1.3 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-410A:

1. Hot-Gas and Liquid Lines: 535 psig.

1.4 SUBMITTALS

A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for the following:

1. Thermostatic expansion valves.

2. Hot-gas bypass valves.

3. Filter dryers.

B. Field quality-control test reports.

C. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

B. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.6 PRODUCT STORAGE AND HANDLING

A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B 280, Type ACR.

B. Wrought-Copper Fittings: ASME B16.22.

C. Wrought-Copper Unions: ASME B16.22.

D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

E. Brazing Filler Metals: AWS A5.8.

F. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.

2. End Connections: Socket ends.

3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch- long assembly.

4. Pressure Rating: Factory test at minimum 500 psig.

5. Maximum Operating Temperature: 250 deg F.

2.2 VALVES AND SPECIALTIES

A. Diaphragm Packless Valves:

1. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.

2. Diaphragm: Phosphor bronze and stainless steel with stainless-steel spring.

3. Operator: Rising stem and hand wheel.

4. Seat: Nylon.

5. End Connections: Socket, union, or flanged.

6. Working Pressure Rating: 500 psig.

7. Maximum Operating Temperature: 275 deg F.

B. Check Valves:

1. Body: Ductile iron, forged brass, or cast bronze; globe pattern.

2. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.

3. Piston: Removable polytetrafluoroethylene seat.

4. Closing Spring: Stainless steel.

5. Manual Opening Stem: Seal cap, plated-steel stem, and graphite seal.

6. End Connections: Socket, union, threaded, or flanged.

7. Maximum Opening Pressure: 0.50 psig.

8. Working Pressure Rating: 500 psig.

9. Maximum Operating Temperature: 275 deg F.

C. Service Valves:

1. Body: Forged brass with brass cap including key end to remove core.

2. Core: Removable ball-type check valve with stainless-steel spring.

3. Seat: Polytetrafluoroethylene.

4. End Connections: Copper spring.

5. Working Pressure Rating: 500 psig.

D. Thermostatic Expansion Valves: Comply with ARI 750.

1. Body, Bonnet, and Seal Cap: Forged brass or steel.

2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.

3. Packing and Gaskets: Non-asbestos.

4. Capillary and Bulb: Copper tubing filled with refrigerant charge.

5. Suction Temperature: 40 deg F.

6. Superheat: Nonadjustable.

7. End Connections: Socket, flare, or threaded union.

8. Working Pressure Rating: 700 psig.

E. Hot-Gas Bypass Valves: Comply with UL 429; listed and labeled by an NRTL.

1. Body, Bonnet, and Seal Cap: Ductile iron or steel.

2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.

3. Packing and Gaskets: Non-asbestos.

4. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.

5. Seat: Polytetrafluoroethylene.

6. Equalizer: Internal.

7. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter, and 24-V ac coil.

8. End Connections: Socket.

9. Throttling Range: Maximum 5 psig.

10. Working Pressure Rating: 500 psig.

11. Maximum Operating Temperature: 240 deg F.

F. Moisture/Liquid Indicators:

1. Body: Forged brass.

2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.

3. Indicator: Color coded to show moisture content in ppm.

4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.

5. End Connections: Socket or flare.

6. Working Pressure Rating: 500 psig.

7. Maximum Operating Temperature: 240 deg F.

G. Replaceable-Core Filter Dryers: Comply with ARI 730.

1. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.

2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.

3. Desiccant Media: Activated charcoal.

4. End Connections: Socket.

5. Access Ports: NPS 1/4 connections at entering and leaving sides for pressure differential measurement.

6. Maximum Pressure Loss: 2 psig.

7. Working Pressure Rating: 500 psig.

8. Maximum Operating Temperature: 240 deg F.

H. Liquid Accumulators: Comply with ARI 495.

1. Body: Welded steel with corrosion-resistant coating.

2. End Connections: Socket or threaded.

3. Working Pressure Rating: 500 psig.

4. Maximum Operating Temperature: 275 deg F.

2.3 REFRIGERANTS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Atofina Chemicals, Inc.

2. DuPont Company; Fluorochemicals Div.

3. Honeywell, Inc.; Genetron Refrigerants.

4. INEOS Fluor Americas LLC.

B. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-410A

A. Hot-Gas and Liquid Lines:

1. NPS 1-1/4 and Smaller: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with 95-5 tin-antimony soldered joints.

3.2 VALVE AND SPECIALTY APPLICATIONS

A. Install diaphragm packless valves in suction and discharge lines of compressor.

B. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.

C. Except as otherwise indicated, install diaphragm packless valves on inlet and outlet side of filter dryers.

D. Install a full-sized, three-valve bypass around filter dryers.

E. Install thermostatic expansion valves as close as possible to distributors on evaporators.

1. Install valve so diaphragm case is warmer than bulb.

2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.

3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.

F. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.

G. Install filter dryers in liquid line between compressor and thermostatic expansion valve.

H. Install receivers sized to accommodate pump-down charge.

I. Install flexible connectors at compressors.

3.3 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Install piping adjacent to machines to allow service and maintenance.

D. Install piping free of sags and bends.

E. Install fittings for changes in direction and branch connections.

F. Select system components with pressure rating equal to or greater than system operating pressure.

G. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

H. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

I. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.

2. Install horizontal suction lines with a uniform slope downward to compressor.

3. Install traps and double risers to entrain oil in vertical runs.

4. Liquid lines may be installed level.

J. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

K. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

3.4 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.

D. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.

2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

F. Threaded Joints: Thread steel pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry-seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.5 HANGERS AND SUPPORTS

A. Hanger, support, and anchor products are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.

2. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.

2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.

3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.

4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.

2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.

3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.

a. Fill system with nitrogen to the required test pressure.
b. System shall maintain test pressure at the manifold gage throughout duration of test.
c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.7 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.

2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.

3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.

4. Charge system with a new filter-dryer core in charging line.

3.8 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.

D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Open shutoff valves in condenser water circuit.

2. Verify that compressor oil level is correct.

3. Open compressor suction and discharge valves.

4. Open refrigerant valves except bypass valves that are used for other purposes.

5. Check open compressor-motor alignment and verify lubrication for motors and bearings.

E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 23 23 00

SECTION 23 87 00
VRF HVAC SYSTEM

PART 1 – GENERAL

1.1 SYSTEM DESCRIPTION

The variable capacity, air conditioning system shall be a Mitsubishi, or approved equivalent, Variable Refrigerant Volume Series (heat pump model) split system as scheduled on the drawings specified herein. The system shall consist of evaporators, controls, joints and headers, a refrigeration distribution system using Mitsubishi VRF® condenser unit. The condenser shall be a direct expansion (DX), air-cooled heat recovery, multi-zone air-conditioning system with variable speed inverter driven compressors using R-410A refrigerant.

1.2 VRF FEATURES AND BENEFITS

A. Voltage Platform –Condensing units shall be available with a 460V/3/60 power supply.

B. VFD Inverter Control and Variable Refrigerant Temperature – Each condensing unit shall use high efficiency, variable speed all "inverter" compressor(s) coupled with inverter fan motors to optimize part load performance. The system capacity and refrigerant temperatures shall be modulated automatically to set suction and condensing pressures while varying the refrigerant volume for the needs of the cooling or heating loads. The control will be automatic and customizable depending on load and weather conditions.

C. Defrost Heating – Multiple condenser VRV systems shall maintain continuous heating during defrost operation. Reverse cycle (cooling mode) defrost operation shall not be permitted due to the potential reduction in space temperature.

D. Oil Return Heating – Multiple condenser VRV systems shall maintain continuous heating during oil return operation. Reverse cycle (cooling mode) oil return during heating operation shall not be permitted due to the potential reduction in space temperature.

E. Low Ambient Cooling – Each system shall be capable of low ambient cooling operation to -10°F DB.

1.3 QUALITY ASSURANCE

A. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL), in accordance with ANSI/UL 1995 – Heating and Cooling Equipment and bear the Listed Mark.

B. All wiring shall be in accordance with the National Electric Code (NEC).

C. The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.

D. Mechanical equipment for wind-born debris regions shall be designed in accordance with ASCE 7-2010 and installed to resist the wind pressures on the equipment and the supports.

E. The condensing unit will be factory charged with R-410A.

1.4 DELIVERY, STORAGE AND HANDLING

A. Unit shall be stored and handled according to the manufacturer's recommendations.

PART 2 – PRODUCTS

2.1 STANDARD LIMITED WARRANTY

A. This warranty shall apply to compressor and all parts and is limited in duration to ten (10) years starting from the ''installation date'' which is one of the two dates below:

a. The installation date is the date that the unit is originally commissioned, but no later than 18 months after the manufacture date noted on the unit's rating plate.

2.2 DESIGN BASIS

A. The HVAC equipment specified here in shall be Mitsubishi, or equal. All bidders shall furnish the minimum system standards as defined by the base bid model numbers, model families or as otherwise specified herein. In any event, the Contractor shall be responsible for all specified items and intents of this document without further compensation.

2.3 CONDENSING UNIT

A. General: The condensing unit is designed specifically for use with VRF series components.

B. The condensing unit shall be factory assembled in the USA and pre-wired with all necessary electronic and refrigerant controls. The refrigeration circuit of the condensing unit shall consist of inverter

scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaryes, filters, shut off valves, oil separators, service ports, liquid receiver and suction cumulator.

C. High/low pressure gas line, liquid and suction lines must be individually insulated between the condensing and indoor units.

D. The system will automatically restart operation after a power failure and will not cause any settings to be lost, thus eliminating the need for reprogramming.

E. The following safety devices shall be included on the condensing unit; high pressure sensor and switch, low pressure sensor, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers.

F. Oil recovery cycle shall be automatic occurring 2 hours after start of operation and then every 8 hours of operation. Each system shall maintain continuous heating during oil return operation.

G. The condensing unit shall be capable of heating operation at -13°F wet bulb ambient temperature without additional low ambient controls or an auxiliary heat source.

H. Unit Cabinet:

The condensing unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-proofed mild steel panels coated with a baked enamel finish.

I. Fan:

1. The condensing unit shall consist of one or more propeller type, direct-drive fan motors that have multiple speed operation via a DC (digitally commutating) inverter.

2. The fan motor shall be provided with a fan guard to prevent contact with moving parts.

J. Condenser Coil:

1. The condenser coil shall be manufactured from copper tubes expanded into aluminum fins to form a mechanical bond.

2. The heat exchanger coil shall be of a waffle louver fin and rifled bore tube design to ensure high efficiency performance.

3. The heat exchanger on the condensing units shall be manufactured from Hi-X seamless copper tube with N-shape

internal grooves mechanically bonded on to aluminum fins to an e-Pass Design.

K. Compressor:

1. The inverter scroll compressors shall be variable speed (PVM inverter) controlled which is capable of changing the speed to follow the variations in total cooling and heating load as determined by the suction gas pressure as measured in the condensing unit. In addition, samplings of evaporator and condenser temperatures shall be made so that the high/low pressures detected are read every 20 seconds and calculated. With each reading, the compressor capacity (INV frequency) shall be controlled to eliminate deviation from target value.

2. The inverter driven compressor in each condensing unit shall be of highly efficient reluctance DC (digitally commutating), hermetically sealed scroll “G-type” or “J-type”.

3. The capacity control range shall be as low as 18% to 100%.

4. The compressors’ motors shall have a cooling system using discharge gas, to avoid sudden changes in temperature resulting in significant stresses on winding and bearings.

5. Each compressor shall be equipped with a crankcase heater, high pressure safety switch, and internal thermal overload protector.

6. Oil separators shall be standard with the equipment together with an intelligent oil management system.

7. The compressor shall be spring mounted to avoid the transmission of vibration eliminating the standard need for spring insolation.

8. In the event of compressor failure the remaining compressors shall continue to operate and provide heating or cooling as required at a proportionally reduced capacity. The microprocessor and associated controls shall be designed to specifically address this condition.

L. Electrical:

1. The control voltage between the indoor and condensing unit shall be 16VDC non-shielded, stranded 2 conductor cable.

2. The control wiring shall be a two-wire multiplex transmission system, making it possible to connect multiple indoor units to one condensing unit with one 2-cable wire, thus simplifying the wiring installation.

2.4 INDOOR UNITS SUSPENDED FROM STRUCTURE ABOVE

A. General: Indoor units shall be suspended from structure above as indicated on the drawings, operable with refrigerant R-410A, equipped with an electronic expansion valve. A mildew-proof, polystyrene condensate drain pan and resin net mold resistant filter shall be included as standard equipment.

B. Indoor Unit:

1. The Mitsubishi unit shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch. The drain pipe can be fitted to from either left or right sides.

2. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.

3. Both refrigerant lines shall be insulated from the outdoor unit.

4. The indoor units shall be equipped with a condensate pan.

5. The indoor units shall be equipped with a return air thermistor.

6. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.

7. Provide with an optional filter box with a bottom return inlet.

C. Fan:

1. The fan shall be a direct-drive fan, statically and dynamically balanced impeller with high and low fan speeds available.

2. The fan motor shall be thermally protected.

D. Coil:

1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.

2. The coil shall be a 2-row cross fin copper evaporator coil with 14 fpi design completely factory tested.

3. The refrigerant connections shall be flare connections and the condensate will be 11/16 inch outside diameter PVC.

4. A thermistor will be located on the liquid and gas line.

E. Electrical:

1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.

F. Control:

1. The units shall have MA Non-Programmable remote local stats provided by Mitsubishi to perform input functions necessary to operate the system.

G. Optional Accessories:

1. A condensate pump as scheduled on the drawings.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install condenser components on equipment rails mounted and flashed into the roof.

D. Install and connect refrigerant tubing to component's fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, startup and to assist in testing.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace malfunctioning units and retest as specified above.

D. Prepare test and inspection reports.

3.4 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

END OF SECTION 23 87 00

SECTION 26 05 04
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 CONTRACTOR'S UNDERSTANDING

A. Contractors bidding word under this Contract shall read and understand Division Zero and Division 1 – 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 the 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.

1.02 SCOPE OF WORK

A. Work included in this section of the Specifications shall include the furnishings 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. 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 to wiring devices except as otherwise specified.

C. 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 Contractor Documents, and/or as shown in manufacturer furnished, Engineer reviewed Shop Drawings.

D. 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.

E. All devices and items of equipment mentioned in this section of the Specifications whether electrical or not whether furnished under this or other Division of the Specifications shall be installed under this Division of the Specifications, unless specifically indicated otherwise.

F. 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.

G. 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 work to be an aid to the Contractor and is not necessarily a complete list of all work be performed under this Contract: Connect all motors and accessories furnished by equipment suppliers.

   a. Furnish, install, and connect all electrical conduit, duct and cables.
   b. Furnish, install, and connect all utility poles, line wire, and hardware.
   c. Furnish, install, and connect all power distribution equipment.
   d. Abandon and remove all existing wiring and materials not to be reused, as shown on the Contract Drawings.
   e. Furnish and install standby power equipment.

1.03 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 in accordance with Division 1.

B. Shop Drawings shall be submitted on the following materials specified in Division.

   a. Conduit.
   b. Boxes – all types and sizes.
   c. Metal framing system (Strut type channel).
   d. Conduit fittings, expansion joints, support hardware.
   e. Power distribution equipment.
   f. Wire.
   g. Light fixtures.
   h. Wire markers, signs and labels.
   i. Lightning/transient suppressors.
   j. Transformers.
   k. Utility poles, cross arms, pole line hardware.
   l. Standby power equipment and accessories.
   m. Communication system.

1.04 SYMBOLS AND ABBREVIATIONS

The symbols and abbreviations general follow stand electrical and architectural practice, however, exceptions to this shall be as shown on the Contract Drawings.

1.05 COORDINATION WITH OTHER TRADES

The Contractor shall coordinate the electrical work with that of other trades to ensure proper final location of all electrical and/or connections. The Contractor shall verify door swings to see that light switches are located properly.

1.06 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 that 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 or Codes:

a. Kentucky Building Code	KBC
b. National Electrical Code	NEC
c. Factory Mutual System	FM
d. National Fire Protection Association	NFPA
e. National Electrical Manufacturers Association	NEMA
f. Occupational Safety and Health Administration	OSHA
g. Insulated Cable Engineers Association, Inc.	ICEA
h. Illuminating Engineering Society of North America	IES
i. Instrument Society of America	ISA
j. Institute of Electrical and Electronic Engineers, Inc.	IEEE
k. Certified Ballast Manufacturers Association	CMB
l. American National Standards Institution, Inc.	ANSI
m. Anti-Friction Bearing Manufacturers Association, Inc.	AFBMA
n. Joint Industry Council	JIC
o. American Society of Heating, Refrigerating And Air Conditioning Engineers, Inc.	ASHRAE
p. Federal Communications Commission	FCC
q. American Society for Testing and Materials	ASTM
r. American Wood Preservers Association	AWPA
s. Rural Electrification Association	REA

1.07 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. 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 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.

1.08 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 delivered to 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.

1.09 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 Contractor and shall be removed from the job site upon completion of the project, unless otherwise noted on the Contract Drawings or specified herein.

E. The existing transformer to be removed shall be considered as PCB filled, and shall be handled as PCB filled. The transformer and contents shall be packaged, marked, transported, stored, handled, and disposed in accordance with the Toxic Substance Control Act, the Occupational Safety and Health Act, and all other pertinent federal, state, and local laws and regulations. Upon successful disposal of all PCB's and PCB article, the Owner shall receive a report to document the destruction of the transformer. A shipping manifest and all associated documentation shall also be provided. The Contractor shall be totally responsible for this work and the cost

shall be part of the lump sum bid.

1.10 ERRORS, CORRECTIONS, AND/OR OMISSIONS

A. 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.

B. 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/repaired before the Contractor receives final payment).

C. 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.

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.

D. Cost of utilities for testing done prior to beneficial occupancy by the Owner shall be borne by the Contractor.

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 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 notes 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 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 OPENING

A. 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 POWER COMPANY COORDINATION

A. The Contractor is responsible for coordinating all activities onsite by the power company. It is the Contractor’s responsibility to contact the power company to schedule service installation and/or modifications.

B. All power company metering equipment shall be electrically located “upstream” of

any manual/automatic transfer equipment on projects requiring onsite emergency power generation equipment.

C. Any special provisions required by the serving electrical utility shall be as outlined on the Contract Drawings or as advised by the utility at the time of construction, and work required by these special provisions shall be executed with no extra cost to the Owner.

1.18 TEMPORARY ELECTRICAL POWER

A. The Contractor shall be responsible for providing temporary electrical power as required during the course of construction and shall remove the temporary service equipment when no longer required. Temporary power is also addressed in Division1.

1.19 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.

1.20 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
Paralleling Switchgear	2	2
Standby Power System & Accessories	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 videotape all training sessions.

1.21 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.

1.22 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 duration in excess of a few minutes, 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.

1.23 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.

1.24 RELATED SPECIFICATION DIVISIONS

Other divisions contain Specifications on utilization equipment, equipment accessories, and procedures related to execution of the electrical work. Bids shall

still be based on complete Contract Documents.

1.25 SERVICE ENTRANCE

A. Conductors and terminations for service entrances shall be furnished and installed by the Contractor. Voltage, phase, and number of wires shall be as shown on the Drawings. Clearances for overhead entrance wires shall be per Power Company, NEC, and NESC requirements.

B. Any details not shown on the Drawings or written in the Specifications pertaining to the service entrance shall be per power company requirements. It is the Contractor's responsibility to contact the utility prior to bidding and obtain any special requirements they will be imposing.

1.26 CONTRACTOR LICENSING

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.

1.27 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. The Contractor shall be sure that all supports are consistent with the KBC requirements in regard to seismic requirements.

1.28 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
a. Wall type light switch	4'-0"	To top of box
b. Low wall outlet	16"	To bottom
c. Wall type exit signs	8'-0" Max.	Top of sign 2" below ceiling
d. Push-button or control stations	4'-0"	
e. Top of panel boards or control panels	6'-6"	Maximum (except for handicapped areas)
f. Wall mount exterior light fixtures	8'-0"	

g. Wall mount emergency light fixtures	6'-6"	Maximum to test button
h. Wall thermostats	4'-0"	To top of thermostat

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

Not Applicable.

END OF SECTION-26 05 04

SECTION 26 05 05
CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. 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.

1.02 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

2.01 ACCEPTABLE MANUFACTURERS

A. Building Wire (types "THWN" and "THW"-cu.) – "American," "Carol," or equal.

B. Power cables, for conduit installation or direct-burial (600V, 5KV or 15 KV) – "Okonite," "Anaconda," or equal.

C. Instrumentation Cables (Shielded) 600V mx. – "American," "Belden," "Okonite," or equal.

2.02 MATERIALS

A. General

a. In general, all conductors shall be 98 percent conductive, annealed copper unless otherwise noted on the Contract Drawings.
b. 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.
c. 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.
d. Aerial power cables shall be as specified in this division, Section: Overhead Power Distribution.

PART 3 - EXECUTION

3.01 INSTALLATION/APPLICATION/ERECTION

A. General

a. 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.
b. Conductors shall be color coded in accordance with the following schedule:

	480/277V 3 Phase	208/240V 3 Phase	120/240, Single Phase
Phase A	Brown	Black	Black
Phase B	Orange	Red	Red
Phase C	Yellow	Blue	
Neutral (Grounded)	White or Light Gray	White or Light Gray	White or Light Gray
3-Way Tracers			Blue
Grounding	Green	Green	Green
Remote Energized Conductors (Control)			Yellow
Control	Std. Code	Std. Code	

c. Conductors shall be pulled into raceways in strict accordance with manufacturer's recommendations.
d. Ample slack conductors shall be allowed at each terminal point, and pull or junction box, to permit installation with ease and without crowding.
e. All conductors terminating at terminal blocks shall be identified with numbers and/or letters identical to circuit or control identification.
f. Overhead, pole-line supported conductors shall be sagged in accordance with the manufacturer's tables provided for that purpose.
g. 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.
h. All connections and splices shall be made in accordance with conductor manufacturer's recommendations, and as written herein.
i. 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.

j. Unless otherwise specifically indicated, neutrals may not be shared.

B. Feeders

a. All feeders are of the secondary type, below 600 volts, unless otherwise noted. The Contractor shall furnish and install all feeders from the distribution center(s) to each of the other structures/sub panels as shown on the Contract Drawings.

b. 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. Instrument Cable

a. General

1. All signal lines shall be constructed of individually twisted pairs (6 to 10 twists per foot), including thermocouple extension leads. Cables shall be made of twisted pairs, with all lays and pairs twisted in the same direction for maximum flexibility.
2. Wire size shall be #16 AWG minimum for exterior runs and lengths over 5,000 feet. Wire size may be #16 - #18 AWG for interior under 5,000 feet in length.
3. Stranded tinned copper conductor shall be used for all wiring other than thermocouple extension leads.
4. Insulation resistance at 68 degrees Fahrenheit between conductors and between conductors and ground should be at least 500 megohms per 1,000 feet.
5. Multi-pair cable should be jacketed with poly-vinyl-chloride, polyethylene or Teflon at least 0.045" thick. Voltage rating shall be 600 volts.

b. Signal Wiring

1. 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.
2. 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.
3. Analog outputs (normally 0-4 d-c or 4-20 ma). Same as b.
4. Contact inputs - use twisted pairs and run in separate conduit.
5. Contact outputs - same as d.
6. Pulse inputs - same as 4.

c. Signal and Shield Grounding

7. All shields must be grounded at one point only as close as possible to the signal source.
8. Thermocouples may be grounded or ungrounded.
9. Analog signals, if grounded, should be grounded as near the signal source as possible.
10. Resistance bulbs should not be grounded.

d. Signal and Wiring Separation
    11. High level analog signals may share the same conduit or run with contact or pulse signals.
    12. Thermocouple and low level signals should be run in a separate conduit.
    13. 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.

3.02 TESTING

A. Testing Agency: The Contractor shall engage a qualified testing agency to perform tests and inspections and prepare tests reports.

B. Perform tests and inspections and prepare test reports.

C. Test and Inspections

    a. After installing conductors and cables and before electrical circuitry has been energized, test all new feeders and control wiring for compliance with requirements.
    b. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
    c. Infrared Scanning: After substantial completion, but not more than 60 days after final acceptance, perform an infrared scan of each splice in cables and conductors #3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.

D. Test Reports: Prepare a written report record the following:

    a. Test procedures used.
    b. Test results that comply with requirements.
    c. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

E. Remove and replace wiring and/or splices that do not meet the NETA criteria for the given circuit type and retest as specified above.

END OF SECTION-26 05 05

SECTION 26 05 13
UNDERGROUND MEDIUM VOLTAGE POWER DISTRIBUTION

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The underground power distribution system shall be installed in accordance with NEC and NESC requirements, and as written herein and as shown on Contract Drawings. For further information on components/installation not addressed in this article, refer to other sections of this Division, and the Contract Drawings.

B. Ends of conduits shall be sealed where they enter buildings at service equipment and empty (spare) conduits shall be capped at both ends. Spare conduits shall extend 5 feet from buildings or structures unless otherwise shown on the Contract Drawings.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Conduit
Underground nonmetallic conduit shall be “FRE Composites” and “United Fiberglass.”, or equal. Other types of conduit for transitions to building interiors, etc., shall be as specified in 26 05 33 - Raceways.

B. Duct Spacers and Terminators
Duct spacers and terminators shall be Formex, or equal.

C. Medium Voltage Insulated Power Cables
Medium voltage insulated power cables shall be Okonite, Anaconda, or equal.

D. Prefabricated Splice Kits and Terminations
Prefabricated stress cones, shield grounding adapters, splice kits, and terminations hall be as manufactured Elastimold, 3M, Cooper, G&W, or equal.

2.02 MATERIALS

A. Conduit
Underground duct lines for medium voltage shall be fiberglass duct or PVC, concrete encased.

B. Duct Spacers and Terminators

1. Spacers shall be made from high density polyethylene and shall be double wall construction. They shall consist of interlocking modules, i.e. bases, intermediates and caps. Base pads shall be used to assure specified dimensions between trench floor and bottom of first tier of ducts. The interlocking

modules shall include an internal vertical channel on both side edges of the spacers. The interlocking module spacers shall provide independent support for each duct, and 3-inch separation between ducts.

2. Terminator modules shall be made from high impact, high strength, prime virgin acrylonitrile butadiene styrene (ABS) plastic, Marbon Type G.S., or equal. Terminator module shall interlock and be sealed together using a recommended plastic solvent cement. The openings of the terminator facing the inside of the manhole shall be belled.

C. Medium Voltage Insulated Power Cables

1. 5 KV cables shall have the following specifications:

Conductor:	Uncoated copper, stranded
Cable Arrangement:	Single conductor
Strand Screen:	Extruded, semi-conducting
Insulation:	5 KV cable 115 mils EPR
Insulation Screen:	Extruded, semi-conducting
Shield:	Uncoated copper tape, helically wrapped, 12.5% overlap
Jacket:	PVC
Temperature Rating:	105EC continuous 140EC emergency 250EC short circuit

D. Prefabricated Splice Kits and Terminations

1. Molded Rubber Shielded Cable Splice
   a. The shielded cable splices must be capable of normal continuous operation at the rated voltage and current on the cable on which it is to be used (up to 35 KV). The splice must consist of an all-molded rubber splice body with black semi-conductive EPR rubber. All EPR rubber must be cured with a peroxide cure. All splices must be able to be installed without the use of mechanical advantage installation tools. Where required, shield adapters must be capable of quickly extending the cable shielding for outdoor, indoor, and buried applications.
2. Molded Rubber Cable Termination
   a. The shielded cable termination must be capable of normal continuous operation at the rated voltage and current on the cable it is to be used on (up to 35 KV); and it should meet all the requirements of a Class 1 Termination as given in IEEE Standards. The termination must consist of a high-quality rubber molded stress cone made of track resistant peroxide cured EPR rubber and a one-piece silicone rubber skirted insulator for 15 KV (two-piece silicone skirted insulator for 25 and 35 KV). A mechanical (non-solder) ground strap assembly shall be included as a part of the kit. All materials (except lug) necessary to make three terminations shall be included as part of the basic 5 to 15 KV kit. This should include cable preparation materials. Additional materials may be necessary in order to convert the basic 5 to 15 KV kit into a 25 or 35 KV

termination; however, the instructions packed with the kit should include all of the information as to what is needed for 25 and 35 KV.

3. Shield Grounding Adapter
   a. The shield ground adapter must be capable of use at the rated voltage of the cable it is used on, and shall be totally mechanical, requiring no soldering or taping. It shall be watertight. The housing shall be molded conductive rubber. The ground lead shall be copper. Contact with the cable shield shall be by compression of a corrugated internal contact. Compression shall be accomplished by external stainless-steel clamp(s).
4. Load-break and Dead-break Elbow Connectors and Accessories
   a. Insulated high voltage cable shall be terminated using dead-front elbows at pad-mount transformers. 200 Ampere elbows shall be load-break and 600 ampere elbows shall be dead-break. Voltage class shall be 15 KV. The insulating elbows shall be molded of EPDM rubber with integral stress cones. The 200 ampere devices shall accept No. 6 - No. 4/0 conductors and the 600 ampere devices shall accept No. 2/0 - 1000 MCM conductors. Both type connectors shall be watertight and shall include all accessories needed for connection to conductor. Other characteristics:

Impulse Voltage:	95 KV BIL
Withstand Voltage:	34 KV, 60 Hz., 1 Minute
Minimum Corona Extinction Level:	11 KV
Momentary:	10,000 amps RMS Symmetrical

   b. Cable shield grounding adapters shall be furnished and installed as needed. Necessary bushing shall be furnished and installed in switches and transformers for proper mating with the elbow connectors. Feed through bushings shall be used at transformers so that dead-front arresters may be connected to the unused feed through bushing.
   c. The dead-front arrestor shall be gapless, of solid-state design using a metal oxide varistor enclosed in a molded elbow similar to the elbow connector housing.
   d. Furnish insulated protective caps where needed to maintain the dead-front, watertight arrangement where a bushing is unused.

PART 3 - EXECUTION

3.01 INSTALLATION/APPLICATION/ERECTION

A. Duct

1. General
   a. The duct system shall consist of single or multiple round-bore conduit for the electrical-distribution system. The number and size of the ducts shall be as indicated on the Contract Drawings. Duct lines shall be laid to a minimum grade of 4 inches per 100 feet. Duct shall be laid so that the top of the duct is 36 inches below finished grade or finished paving.

Changes in direction of runs exceeding a total of 10 degrees, either vertical or horizontal, shall be accomplished by long sweep bends having a minimum radius of curvature of 25 feet, except that manufactured bends may be used at the ends of the run. The long sweep bends may be made up of one or more curved or straight sections and/or combinations thereof. Manufactured bends shall have a minimum radius of 18 inches for use with ducts of less than 3 inches in diameter and a minimum radius of 36 inches for ducts of 3 inches in diameter and larger. Conduits shall terminate in end bells where duct lines enter manholes. Conduit shall be thoroughly cleaned before using or laying. During construction and after the duct line is completed, the ends of the conduit shall be plugged to prevent water washing mud into the conduits or manholes. Care shall be taken to keep the conduits clean of concrete, dirt, and any other substance during construction.

b. Where it is necessary to cut a tapered end on a piece of conduit at the site, the cut shall be made with a tool or lathe designed to cut a taper to match the taper of the conduit being used. After the duct line has been completed, a standard flexible mandrel not less than 12 inches long, having a diameter approximately 1/4 inch less than the inside diameter of the conduit, shall be pulled through each conduit, after which a brush with stiff bristles shall be pulled through each conduit to make certain that no particles of earth, sand, or gravel have been left in the line. Pneumatic rodding may be used to draw in the lead wire. Where connection is made to an existing duct that is of different material and shape than the duct line being installed, a suitable coupling of a type recommended by the duct manufacturer shall be used. Conduits shall be stored to avoid warping or deterioration. Plastic conduit shall be stored on a flat surface and protected from the direct rays of the sun. Conduit joints in concrete encasement may be placed side by side horizontally but shall be staggered at least 6 inches vertically.

c. Each single conduit of the duct bank shall be completely encased in concrete if indicated on the Contract Drawings. The thickness of the concrete encasement indicated is the minimum thickness and may be increased to fit the actual shape of the trench. Duct spacers shall be used, placed on 4 feet centers. When the duct bank is assembled, a No. 3 reinforcing rod shall be passed through the internal vertical channels on one side of the spacer bank and driven into the trench floor. At the next spacer location, the No. 3 rod shall be inserted on the opposite side, etc. The reinforcing rods shall be bent inwardly at the top of the spacer bank sufficiently to squeeze the spacer cap, so the duct assembly will not float or move in any direction during the concrete pour. Concrete encasement shall not be less than 3 inches on the side, bottom, and top of the conduits.

2. Couplings

a. Joints in conduit shall be made up in accordance with the manufacturer’s recommendations for the conduit and coupling used. The plastic or fiberglass conduit joints shall be made up by brushing a plastic solvent cement or epoxy (as applicable) on the inside of the coupling and on the outside of the conduit ends. The conduit and fitting

shall then be slipped together, until seated, with a slight twist to set the joint tightly, and the conduit then rotated slightly to distribute the cement evenly. Excess cement build-up on the inside surface of the conduit shall then be removed.

B. Medium Voltage Insulated Power Cable Systems

1. The power cable systems shall consist of ethylene-propylene rubber (EPR) insulated PVC jacketed conductors. The size and number of conductors shall be as indicated on the Contract Drawings. Conductors shall be stranded. Cables for use on 4,160-volt power systems shall be rated 5,000 volts and cables for use on 12,470-volt power systems shall be rated 15,000 volts. Cables shall be insulated to the 133 percent level. The neutral conductors of grounded neutral systems shall consist of stranded 600-volt polyethylene jacketed cables suitable for direct burial or duct shown on the Contract Drawings. Power cables shall be installed in duct lines as specified this section.
2. It is intended that cables be continuous as much as is practical without unnecessary splices. Cable splices, however, shall be made in manholes or junction boxes if necessary, and shall be installed at no extra cost to the Owner. Cable splices and terminations shall be made up in accordance with cable manufacturer recommendations, by persons qualified to make such splices/terminations. Qualification shall consist of proof that the person(s) working on splices and terminations has at least 3 years experience with the type cables and connectors encountered on this project.
3. Cable pulling shall be accomplished using industry recognized pulling equipment and techniques. Cable pulling shall also be done in accordance with cable manufacturer's recommendations. All cable shields shall be grounded at both ends.

C. Prefabricated Splice Kits and Terminations

1. Splices and terminations shall be of a type appropriate for the cable type and for the environment encountered, either indoor or outdoor. All kits shall include pre-molded stress cones and all necessary materials needed for proper installation. The Contractor shall furnish necessary lugs, etc. for mechanical hookup from cables to equipment.
2. All terminations and splices shall be installed in accordance with manufacturer recommendations and shall be complete with all necessary accessories for an operational system. All terminations and splices shall be made prior to cable Hi-pot testing. All lightning arresters shall be properly grounded. All terminations in outdoor cabinets shall be treated as outdoor and terminated accordingly.

3.02 FIELD QUALITY CONTROL

A. A DC Hi-pot test shall be conducted on all cables before hookup and after pulling, when the cables are fitted with all terminating and splicing kits. testing shall be in accordance with IEEE and manufacturer recommendations with test voltage for each cable as advised by the manufacturer. All cable shields shall be grounded during testing and ends of cables under test adequately insulated from grounded

equipment and other equipment not under test. Submit a written report of test results to the Engineer on all cables.

B. Prior to Hi-pot testing, the Contractor shall utilize a high voltage megger to detect gross insulation system failure. The Hi-pot test on a very low quality insulated cable is destructive and screening the cables first with the megger may prevent the Contractor replacing an otherwise salvageable cable.

C. Hi-pot testing shall also be performed on existing cables which have been disturbed during the course of this work.

END OF SECTION – 26 05 13

SECTION 26 05 26
PRIMARY GROUNDING

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Grounding shall conform to applicable requirements in the NEC and NESC and as written elsewhere in these Specifications. Neutral conductors, cable shields, metallic conduits, termination bodies, junction boxes, lightning arrestors, fences (if applicable), and all non-current carrying metallic parts of equipment, shall be grounded. Ground rods shall be copper, or copper-clad steel, 3/4 inch minimum diameter, at least 10 feet long, driven fully into the earth.

B. Grounding electrodes at transformers and switches shall have a ground resistance not to exceed 5 ohms. Ground resistance shall be measured not less than 48 hours after rainfall. A bare copper cable not smaller than No. 4/0 AWG shall be installed not less than 30 inches below grade connecting to the indicated ground rods. Fence and equipment connections shall not be smaller than No. 4 AWG. Fences shall be grounded at every gatepost and cornerpost. Each gate section shall be bonded to the fencepost with a flexible braided copper grounding strap. Transformer neutral connections shall not be smaller than 1/0 AWG. Where rated secondary current exceeds 400 amperes, the size of the neutral ground connection shall be increased to not less than 2 of the area of secondary phase conductors. Where measured ground resistance exceeds 5 ohms, additional rods shall be driven, not less than 10 feet apart, connected with 4/0 cable, until proper resistance is achieved (50 foot total rod length maximum).

C. All concealed or buried grounding system connections or grounding electrode connection shall be of the exothermic weld type.

D. Lightning arrestor grounding conductors shall be separate from other grounding conductors, but shall be bonded to the neutral or to the equipment ground where such ground exists within 50 feet.

E. All grounding electrodes at transformers and lightning arrestors shall be tested for conformance to the 5 ohm value and the procedure shall be the same as described in Section 16060 on secondary grounding.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL

A. Testing

a. The Contractor shall be required to provide all labor, tools, instruments, and materials as necessary to perform testing of the grounding electrode system. Results shall be submitted in writing to the Engineer. The testing shall be done to determine the effectiveness of the selected grounding scheme and to see that it conforms with resistance specified (5 ohms maximum).
b. The testing should be done using a fall-of-potential method test at the point of grounding electrode conductor connection to main power distribution equipment and at each separately derived system. The test shall be performed no sooner than 48 hours after a rainfall event.
c. The written report should contain the following information:
    1. Type of ground scheme used, i.e., building steel, driven rod, mat, etc.
    2. Type of instrument used.
        i. Manufacturer
        ii. Model Number
        iii. Confirm fall-of-potential test
        iv. Serial Number*
        v. Where instrument was obtained*

        *These 2 items are required so that the same instrument may be utilized should reproduction of the test be necessary due to unsatisfactory readings/instrument miscalibration.

    3. Ground resistance readings obtained at various test distances.
    4. Ground resistance/distance curve.
    5. Value of Grounding Electrode Resistance at knee of curve.
    6. Sketch showing setup of instrumentation and location of grounding electrode and test probes.
    7. Proposed method to achieve the specified resistance, should an unacceptable reading be obtained.
    8. Ground resistance readings obtained (if applicable) after modifications incorporated.

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END OF SECTION 26 05 26

SECTION 26 05 29
SUPPORTING DEVICES

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. All electric equipment shall be rigidly mounted, and installed using supporting devices as indicated on the Contract Drawings, as required by the work, and described herein.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. “Cooper B-Line,” “Unistrut,” or equal.

2.02 MATERIALS

A. All mounting brackets and strut used outside shall be aluminum. Fasteners used to mount equipment outside shall be stainless steel.

B. All mounting brackets and strut used inside in dry locations shall be galvanized or aluminum, if galvanized is used, then the cut ends shall be cold galvanized and painted. Fasteners used inside to mount equipment into concrete shall also be stainless steel. Ungalvanized strut is prohibited.

C. In process areas, and in all interior wet locations mounting strut shall be aluminum or stainless steel, with stainless steel mounting hardware.

PART 3 - EXECUTION

3.01 ANCHORING CABINETRY

A. All free standing equipment shall be anchored to its foundation using expansion bolts of the size and number recommended by the equipment manufacturer.

3.02 SEISMIC CONSIDERATIONS

A. Where required, seismic restraints shall be provided for electrical equipment.

END OF SECTION-26 05 29

SECTION 26 05 33
RACEWAYS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This section of the Technical Specifications includes all raceways for accommodation of electrical conductors, communications conductors, sleeves for underground electrical installations, conduit stubs for future installations, fittings therefore 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

2.01 ACCEPTABLE MANUFACTURERS

A. Tubular Raceways

a. Aluminum, Rigid, Heavy-Wall, Threaded – "Wheatland Tube Co.," "Thomas and Betts," "Allied Tube & Conduit Corp.," or equal.
b. Plastic (PVC); Type A (Thin Wall); Type 40 (or Schedule 40); Type 80 (or Schedule 80) (Heavy -Wall) – "Allied Tube & Conduit Corp.," "Carlon," or equal.
c. Flexible Metal Conduit – "Thomas and Betts," "Allied Tube & Conduit Corp," or equal.
d. Liquidtight Flexible Metal Conduit – "Thomas and Betts," "Allied Tube & Conduit Corp." "Carlon," or equal.
e. PVC Coated Rigid Aluminum – "Robroy", or equal.

B. Wireways - "Square-D," "Hoffman," or equal.

C. Raceway Fittings

a. Conduit fittings – "Crouse-Hinds," "Appleton," "OZ Gedney," or equal.
b. Non-metallic conduit fittings – "Carlon," or equal.
c. Surface metal raceway fittings and fasteners shall be provided by the manufacturer of the raceway.
d. PVC coated rigid aluminum fittings shall be provided by the conduit manufacturer.

e. Flexible conduit fittings – “Raco,” “T & B,” “OZ Gedney,” or equal.

2.02 MATERIALS

A. Aluminum Conduit

a. 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.
b. 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.
c. Aluminum conduit proposed for concrete slab or underground applications shall be UL listed for the purpose and factory pre-coated.

B. Polyvinylchloride (PVC) Conduit

a. 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 Celsius minimum UL rated, have a tensile strength of 7,000 psi @ 73.4 degrees Fahrenheit, flexural strength of 11,000 psi and compressive strength of 8,000 psi.

C. Flexible Conduit

a. Flexible metallic conduit shall be constructed from flexibly or spirally wound elecro-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.

D. PVC Coated Aluminum Conduit

a. PVC coated aluminum 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.

b. Rigid Aluminum Conduit Fittings
1. 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.
2. Locknuts and bushings: As specified for rigid steel and IMC conduit.
3. Set screw fittings: Not permitted for use with aluminum conduit.

c. Expansion and Deflection Couplings
1. Accommodate 1.9 cm (0.75 inch) deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
2. 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.
3. Watertight, seismically qualified, corrosion-resistant, threaded for and compatible with rigid or intermediate metal conduit.
4. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber material and stainless steel jacket clamps.

PART 3 - EXECUTION

3.01 PREPARATION

A. Exterior underground metallic conduits shall be degreased, pretreated, and coated with 2 coats of Carboline 888 epoxy, or equal.

3.02 INSTALLATION

A. Conduit

a. 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.

b. 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.

c. 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. All conduit in walls and slabs shall be securely braced, capped, and fastened to the forms to prevent dislodgement during vibration and pouring of concrete.

d. 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.

e. 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.
f. All underground conduits entering a building shall be sealed against water/condensate entering around the conductors. Sealant may be silicone rubber based caulk.
g. Conduit expansion fittings shall be provided in exposed vertical conduit runs between underground transition and termination into an exterior enclosure or LB fitting. Expansion fittings shall also be provided in all exposed exterior conduit lengths of more than 50ft.
h. Conduits to electrical enclosures installed below grade shall be sealed using silicone elastomer foam.
i. All conduit to be added to an existing structure shall be exposed in unfinished and process areas.
j. PVC conduit installed underground shall be schedule 40 concrete encased. Long radius PVC coated aluminum sweeps shall be used at pad mounted transformers and utility riser poles and at all underground to above-grade transitions.
k. Aluminum conduit shall not be used underground, in chlorine, or placed in concrete slabs.
l. 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.
m. 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.
n. **Minimum conduit size shall be ¾ inch.** Conduit burial depths shall be per the ductbank details on the Drawings.
o. Maximum conduit burial depth shall be 60" unless otherwise indicated or agreed on a case-by-case basis.
p. 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.**
q. All conduits entering and leaving instrument enclosures shall be sealed around the wires with silicone caulk.
r. Areas of use for each type of conduit:

Space Description	Schedule 40 PVC	Aluminum	PVC Coated Aluminum
Electrical Rooms		X	X
Process Rooms		X	X
Exterior Exposed		X	X
Exterior Underground-Concrete Encased	X		

s. All conduit shall have an insulated ground wire pulled to all equipment and

receptacles.

t. 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.
u. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
v. No conduit shall be run exposed across roofs without first obtaining permission from the Engineer.
w. Conduit may be run inside concrete slabs as long as the slab is at least 6-inches thick and conduit will have at least 2-inches of cover on both sides.
x. Flexible conduit used in mechanical rooms shall be liquid tight.
y. Runs of flexible conduit above accessible ceilings shall be limited to 10 ft. Runs of exposed flexible conduit shall be limited to 5 ft. All runs of flexible conduit shall be supported in accordance with NEC requirements.
z. Communications conduits shall utilize minimum 15 inch radius for all bends. LB's may not be used for communications conduits. Communications ductbanks shall have marker tape installed in trench directly above, at 12 inch below grade.

END OF SECTION-26 05 33

SECTION 260536
CABLE TRAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents:
   1. Drawings and general provisions of the Subcontract apply to this Section.
   2. Review these documents for coordination with additional requirements and information that apply to work under this Section.

B. Section Includes:
   1. Cable trays - Ladder Type.

1.2 REFERENCES

A. General:
   1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
   2. Unless otherwise noted, the edition of the referenced code or standard that is current at the time of the "date of record" for the Work shall be considered the effective code or standard for the duration of the project.
   3. Refer to Division 01 for the list of applicable regulatory requirements.
   4. Refer to specific Division 26 Sections for additional referenced codes and standards.

B. ANSI/NFPA 70 - National Electrical Code.

C. ASTM International.

D. LBNL Construction Details and Design Guidelines (CDDG), Vol. 3 – Construction Details, Part VI – Electrical Details.

E. NEMA – National Electrical Manufacturers Association.

1.3 SUBMITTALS

A. Submit under provisions of Division 01.

B. Shop Drawings: The Subcontractor shall submit for approval Shop Drawings prepared in accordance with Division 01 and as required by other sections of the Specifications.

C. All submittals and shop drawings shall be reviewed and approved by the Engineer before procurement or fabrication of material and equipment.

D. Submit product data for materials and equipment of the cable tray system components proposed for use. Clearly identify the specific products and material intended to be used.

1.4 QUALITY ASSURANCE

A. Products shall be tested, approved and labeled/listed by Underwriters Laboratories, Inc., or by a nationally recognized testing laboratory (NRTL).

B. Electrical equipment and materials shall be new and within one year of manufacture, complying with the latest codes and standards. No used, re-built, refurbished and/or re-manufactured electrical equipment and materials shall be furnished on this project.

C. Refer to Construction Drawings for the type of the cable trays to be furnished and installed under this project.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in unopened cartons or bundles as appropriate, clearly identified with manufacturer's name, Underwriters' or other approved label, grade or identifying number.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect equipment and material from dirt, water, construction debris, and traffic.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Husky/Burdy

B. Globe

C. Cooper B-Line Cable Tray

2.2 GENERAL

A. All electrical materials shall be new and within one year of manufacture, complying with the latest codes and standards. No used, re-built, re-sold through secondary market (salvage, recycle, etc.), refurbished and/or re-manufactured electrical materials shall be furnished and installed on this project. Completed tray lengths and fittings shall be hot-dip galvanized after fabrication and welding.

B. All straight tray sections, angles, offset, corners, cable dropouts, reducers, splice plates, coupling connectors, covers including tray fittings and hardware shall be from the same selected manufacturer.

C. Trays shall be fabricated of No. 14 gauge minimum thickness steel.

D. Bends, both horizontal and vertical, shall have a minimum center radius of 24 inches, unless otherwise indicated.

E. Trays shall have an overall side rail height of 6 inches with a minimum loading depth of 5 inches. Tray width shall be 42 inches in accordance with the Construction Documents.

F. Tray brackets with integral tray clamps assembled as a part of the bracket shall be provided. The assembly shall be of such a design that one tray clamp shall be stationary and the other shall require the tightening of one bolt only, or its equivalent, in order to securely clamp and position the tray.

2.3 LADDER CABLE TRAYS

A. Ladder type cable trays shall consist of minimum 6 inches deep two longitudinal solid sides with cable supporting transverse members (rungs), spaced at not more than 6 inches on center.

B. All transverse members shall have rounded edges that will not damage cable insulation and may be used as dropouts without further cable protection.

C. No portion of the rungs shall protrude below the bottom plane of the side rails.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cable tray in accordance with manufacturer's instructions and Construction Drawings.

B. Support cable tray system on 8-foot centers (maximum), at bends, and tee fittings in accordance with the manufacturer’s recommendation, codes and standards, and construction documents.

C. Connect sections of cable tray together with edges free from burrs and sharp projections.

D. Cable tray shall be supported on trapeze-style hangers, 1-5/8 by 1-5/8 inches channel and 1/2 inch diameter threaded-rod hangars from preset concrete inserts. The tray supports shall be spaced in accordance with the requirements of NEC and manufacturer. Refer to Construction Drawings for additional installation details.

E. Tray system shall be assembled as one raceway system in accordance with the Construction Drawings. Splice plates shall be used for connecting straight sections and fittings with provision for thermal expansion. The nuts and bolts shall be installed so as not to damage the cables during their pull in the trays.

F. Install #2/0AWG copper jumper ground wire at each tray splice, fitting and between tray systems with connection to ground grid at minimum of two places at trays' ends.

G. Take-off conduits shall be grounded via grounding bushing and jumper to the tray grounding system.

H. Tray covers shall be installed with clamps on trays in areas exposed to accidental touch by personnel, damage due to process piping above the tray, and where shown or noted on the Construction Drawings. The tray covers under process piping shall extend at least 18 inches (457 mm) beyond each side of the piping.

END OF SECTION 26 05 36

SECTION 26 05 40
BOXES

PART 1 - GENERAL

1.01 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

2.01 ACCEPTABLE MANUFACTURERS

A. Boxes – "Wiegmann," "Appleton," "Raco," "Crouse-Hinds," "Hoffman," "Robroy Industries," "Cloud Concrete Products," "Spring City," "Carlon," or equal.

2.02 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), and shall be suitable for flush or surface mounting as required. 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

3.01 INSTALLATION, APPLICATION, AND ERECTION

A. General

a. 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.

b. All supports for outlet boxes shall be furnished and installed by the electrical trades.

B. Exposed Work

a. 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.
b. Outlet or junction boxes for use with exposed aluminum conduit shall be copper free, cast aluminum type.
c. Outlet or junction boxes for use with exposed PVC conduit shall be PVC.

C. Pull Boxes

a. Pull boxes for exterior underground work are 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:
b. Exterior – Polymer concrete with open gravel bottom. Enclosure, box, and cover shall conform to all test provisions of ANSI/SCTE 77 for Tier 8 applications. All components in an assembly shall be manufactured using matched surface tooling. All covers shall have a minimum coefficient of friction of 0.05 in accordance with ASTM C1028 and the corresponding Tier level embossed on the top surface. Dimensions shall be as required to meet applicable NEC requirements for the number and configuration of conduits entering and exiting the enclosure. Box depth shall be as required for conduit burial depth. Cover shall be stamped "ELECTRICAL" or "COMMUNICATIONS" as applicable.
c. 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.

D. Openings in Electrical Boxes

a. 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 – 26 05 40

SECTION 26 05 53
ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 EQUIPMENT LABELING

A. All feeder units in panel boards, switchgear, etc. shall be marked to indicate the motor, outlet, circuit they control. 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 lighting panels 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. Furnish and install “Authorized Personnel Only” signs by doors into all power distribution equipment rooms/buildings. Furnish and install other signs as indicated on the Contract Drawings.

D. All electrical equipment shall be marked in accordance with NEC Article 110.16 and the results of the power system study specified in 26 05 70.

1.02 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-26 05 53

SECTION 26 05 70
ELECTRICAL POWER SYSTEM STUDIES

PART 1 - GENERAL

1.01 SUMMARY

A. The electrical equipment manufacturer shall provide electrical power system studies as specified herein for the entire power system for the project, including existing equipment. The type and content of each study is specified in the following articles.

1.02 SUBMITTALS

A. Study Report

a. The results of the power system study shall be summarized in a final report. Five bound copies of the final report shall be submitted for review.
b. The report shall include the following sections:
1. Description, purpose, basis and scope of the study and a single line diagram of that portion of the power system which is included within the scope of the study.
2. Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short circuit duties, and commentary regarding same.
3. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse settings, fuse selection, and commentary regarding same.
4. Fault current calculations including a definition of terms and guide for interpretation of computer printout.
5. Results of arc flash analysis as described below.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

B. The specified electrical power system studies shall be performed by the manufacturer of the power distribution or control equipment furnished for the project.

2.02 ELECTRICAL POWER SYSTEM STUDIES

A. Short-Circuit Analysis

a. Calculation of the maximum rms symmetrical three-phase short-circuit current at each significant location in the electrical system shall be made using a digital computer.
b. Appropriate motor short-circuit contribution shall be included at the appropriate locations in the system so that the computer calculated values represent the highest short-circuit current the equipment will be subjected to

under fault conditions.

c. A tabular computer printout shall be included which lists the calculated short-circuit currents, X/R ratios, equipment short-circuit interrupting or withstand current ratings, and notes regarding the adequacy or inadequacy of the equipment.
d. The study shall include a computer printout of input circuit data including conductor lengths, number of conductors per phase, conductor impedance values, insulation types, transformer impedances and X/R ratios, motor contributions, and other circuit information as related to the short-circuit calculations.
e. Include a computer printout identifying the maximum available short-circuit current in rms symmetrical amperes and the X/R ratio of the fault current for each bus/branch calculation.
f. The system one-line diagram shall be computer generated and will clearly identify individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location and other information pertinent to the computer analysis.
g. A comprehensive discussion section evaluating the adequacy or inadequacy of the equipment must be provided and include recommendations as appropriate for improvements to the system.
h. The contractor shall be responsible for supplying pertinent electrical system conductor, circuit breaker, generator, and other component and system information in a timely manner to allow the short-circuit analysis to be completed prior to final installation.
i. Any inadequacies shall be called to the attention of the Engineer and recommendations made for improvements as soon as they are identified.
j. The short circuit analysis shall be provided prior to shop drawing approval of electrical distribution equipment. Provide preliminary short circuit analysis if requested by the contractor or engineer.

B. Protective Device Time-Current Coordination Analysis

a. The time-current coordination analysis shall be performed with the aid of computer software intended for this purpose, and will include the determination of settings, ratings, or types for the overcurrent protective devices supplied.
b. Where necessary, an appropriate compromise shall be made between system protection and service continuity with service continuity considered more important than system protection.
c. A sufficient number of computer generated log-log plots shall be provided to indicate the degree of system protection and coordination by displaying the time-current characteristics of series connected overcurrent devices and other pertinent system parameters.
d. Computer printouts shall accompany the log-log plots and will contain descriptions for each of the devices shown, settings of the adjustable devices, the short-circuit current availability at the device location when known, and device identification numbers to aid in locating the devices on the log-log plots and the system one-line diagram.
e. The study shall include a separate, tabular computer printout containing the suggested device settings of all adjustable overcurrent protective devices, the

equipment where the device is located, and the device number corresponding to the device on the system one-line diagram.

f. A computer generated system one-line diagram shall be provided which clearly identifies individual equipment buses, bus numbers, device identification numbers and the maximum available short-circuit current at each bus when known.
g. A discussion section which evaluates the degree of system protection and service continuity with overcurrent devices, along with recommendations as required for addressing system protection or device coordination deficiencies.
h. Significant deficiencies in protection and/or coordination shall be called to the attention of the Engineer and recommendations made for improvements as soon as they are identified.
i. The Contractor shall be responsible for supplying pertinent electrical system conductor, circuit breaker, generator, and other component and system information in a timely manner to allow the time-current analysis to be completed prior to final installation.
j. The Contractor shall be responsible to set or adjust low voltage circuit breakers.
k. The generator control switchgear manufacturer shall program the relays in the field based on the settings determined in the analysis. SEL settings will be provided as part of the power system study.

C. Arc-Flash Hazard Analysis

a. The Arc-Flash Hazard Analysis shall be performed with the aid of computer software intended for this purpose in order to calculate Arc-Flash Incident Energy (AFIE) levels and flash protection boundary distances.
b. The Arc-Flash Hazard Analysis shall be performed in conjunction with a short-circuit analysis and a time-current coordination analysis.
c. Results of the Analysis shall be submitted in tabular form, and shall include device or bus name, bolted fault and arcing fault current levels, flash protection boundary distances, personal-protective equipment classes and AFIE levels.
d. The analysis shall be performed under worst-case Arc-Flash conditions, and the final report shall describe, when applicable, how these conditions differ from worst-case bolted fault conditions.
e. The Arc-Flash Hazard Analysis shall be performed by a registered professional engineer.
f. The Arc-Flash Hazard Analysis shall be performed in compliance with IEEE Standard 1584-2002, the IEEE Guide for Performing Arc-Flash Calculations.
g. The Arc-Flash Hazard Analysis shall include recommendations for reducing AFIE levels and enhancing worker safety.

PART 3 - EXECUTION

3.01 LABELLING

A. All new and existing electrical equipment shall be labeled for arc flash in accordance with the requirements in the National Electrical Code and the National Electrical Safety Code, with the information obtained as part of the power system

study.

B. Label shall be 4”x6”, have rounded corners, thermal transfer type of high adhesion polyester – chemically resistant and suitable for UV. No hand marking on label. Label shall comply with ANSI Z535.4-2011 Product Safety Signs and Labels.

C. If equipment front face is not large enough to accommodate arc flash label, use an approved plastic backing for the label and use a nylon tie-wrap to tie the arc flash label to the incoming conduit.

END OF SECTION – 26 05 70

SECTION 26 05 83
WIRE CONNECTIONS AND CONNECTING DEVICES

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Wire connection and connecting devices shall be as herein specified.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Connectors, Lugs, etc. – "T & B", "Anderson", "Burndy", or equal.

B. Termination and splice connectors – "3M Scotchlok", "Anderson", "T & B", "Burndy", or equal.

2.02 MATERIALS

A. Wire Splicing and Terminations (600 Volts and Below)

a. Electrical Terminal and Splice Connectors (#22 - #4 AWG)
1. 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.
2. 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.
3. 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 form nylon, PVC, or equal.

b. Electrical Lugs and Connectors (#6 AWG - 1000 Kcmil)
1. 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.

c. Twist-on Wire Connectors (#22 AWG - #10 AWG)
    1. 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.
    2. 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.
d. 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

1.02 INSTALLATION, APPLICATION, & ERECTION

A. Insulation of Splices and Connections

a. 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, alkalies, 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.
b. 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 a 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.
c. 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

a. 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.

END OF SECTION-26 05 83

SECTION 26 09 13
POWER MONITORING SYSTEM

PART 1 - GENERAL

1.01 SYSTEM DESCRIPTION

A. Furnish and install a Power Monitoring System (PMS) as detailed on the drawings and as described in this specification. The system is defined to include, but not be limited to, remote devices for monitoring, control and protection, and ancillary equipment.

1.02 REFERENCES

A. All Power Meters and Circuit Monitors shall be UL 508 Listed, CSA approved, and have CE marking. They shall also have certified revenue accuracy as per ANSI C12.20 and IEC 60687 class 0.5S or better.

B. The system shall comply with the applicable portions of NEMA standards. In addition, the control unit shall comply with FCC Emission Standards specified in Part 15, Sub-part J for Class A application.

1.03 SUBMITTALS

A. PMS Drawings: Drawings for power monitoring equipment shall be submitted with the respective switchboard and/or motor control center in which the meter will be mounted. Drawings shall show all field monitoring devices, key networking components, and cabling required to complete the system. Drawings shall identify network connections and protocols.

B. Product Data: Provide catalog sheets and technical data sheets to indicate physical data and electrical performance, electrical characteristics, and connection requirements of each device supplied under the PMS scope of work.

1.04 QUALITY

A. The PMS vendor shall be ISO 9000 registered to demonstrate quality compliance.

B. PMS components included within the power equipment lineups shall be factory installed, wired and tested prior to shipment to the job site.

PART 2 - PRODUCTS

2.01 POWER METERS

A. General Provisions

a. All setup parameters required by the Power Meter shall be stored in nonvolatile memory and retained in the event of a control power interruption.
b. The Power Meter may be applied in three-phase, three- or four-wire systems.

c. The Power Meter shall be capable of being applied without modification at nominal frequencies of 50, 60, or 400 Hz.

B. Measured Values

a. The Power Meter shall provide the following, true RMS metered quantities:
1. Real-Time Readings
i. Current (Per-Phase, N (calculated), 3-Phase Avg, % Unbalanced)
ii. Voltage (L–L Per-Phase, L-L 3-Phase Avg, L–N Per-Phase, 3-Phase Avg, % unbalanced
iii. Real Power (Per-Phase, 3-Phase Total)
iv. Reactive Power (Per-Phase, 3-Phase Total)
v. Apparent Power (Per-Phase, 3-Phase Total)
vi. Power Factor (True)(Per-Phase, 3-Phase Total)
vii. Power Factor (Displacement)(Per-Phase, 3-Phase Total)
viii. Frequency
ix. THD (Current and Voltage)
2. Energy Readings
i. Accumulated Energy (Real kWh, Reactive kVARh, Apparent kVAh) (Signed/Absolute)
ii. Incremental Energy (Real kWh, Reactive kVARh, Apparent kVAh) (Signed/Absolute)
iii. Conditional Energy (Real kWh, Reactive kVARh, Apparent kVAh) (Signed/Absolute)
iv. Reactive Energy by Quadrant
3. Demand Readings
i. Demand Current Calculations(Per-Phase, 3-Phase Avg, Neutral):
(1) Present
(2) Running Average
(3) Last completed interval
(4) Peak
ii. Demand Real Power Calculations(3-Phase Total):
(1) Present
(2) Running Average
(3) Last completed interval
(4) Predicted
(5) Peak
(6) Coincident with peak kVA Demand
(7) Coincident with kVAR Demand
iii. Demand Reactive Power Calculations (3-Phase Total):
(1) Present
(2) Running Average
(3) Last completed interval
(4) Predicted
(5) Peak
(6) Coincident with peak kVA Demand
(7) Coincident kW Demand
iv. Demand Apparent Power Calculations (3-Phase Total):
(1) Present
(2) Running Average
(3) Last completed interval

(4) Predicted
(5) Peak
(6) Coincident with peak kVA Demand
(7) Coincident kW Demand

v. Average Power Factor Calculations, Demand Coincident (True),(3-Phase Total)
(1) Last completed interval
(2) Coincident with kW peak
(3) Coincident with kVAR peak
(4) Coincident with kVA peak

vi. Power Analysis Values
(1) THD – Voltage, Current (3-Phase, Per-Phase, Neutral)
(2) thd - Voltage, Current (3-Phase, Per-Phase, Neutral)
(3) Displacement Power Factor (Per-Phase, 3-Phase)
(4) Fundamental Voltage, Magnitude and Angle (Per-Phase)
(5) Fundamental Currents, Magnitude and Angle (Per-Phase)
(6) Fundamental Real Power (Per-Phase, 3-Phase)
(7) Fundamental Reactive Power (Per-Phase)
(8) Harmonic Power (Per-Phase, 3-Phase)
(9) Phase Rotation
(10) Unbalance (Current and Voltage)
(11) Harmonic Magnitudes & Angles for Current and Voltages (Per Phase) up to the 63rd Harmonic (31st on the PM820).

C. Demand

a. All power demand calculations shall use any one of the following calculation methods, selectable by the user:
1. Thermal demand using a sliding window updated every second for the present demand and at the end of the interval for the last interval. The window length shall be set by the user from 1-60 minutes in one minute increments.
2. Block interval, with optional sub-intervals. The window length shall be set by the user from 1-60 minutes in 1 minute intervals. The user shall be able to set the sub-interval length from 1-60 minutes in 1 minute intervals. The following Block methods are available:
i. Sliding Block that calculates demand every second with intervals less than 15 minutes and every 15 seconds with an interval between 15 and 60 minutes.
ii. Fixed Block that calculates demand at the end of the interval
iii. Rolling Block that a subinterval is configured. Demand is calculated at the end of each subinterval and displays at the end of the interval.
3. Demand can be calculated using a Synchronization signal:
i. Demand can be synchronized to an input pulse from an external source. The demand period begins with every pulse. A synchronized input can be configured to either a block or rolling block calculation
ii. Demand can be synchronized to a communication signal. This can be configured to either a block or rolling block calculation
iii. Demand can be synchronized to the clock in the Power Meter.

D. Sampling

a. The current and voltage signals shall be digitally sampled at a rate high enough to provide true rms accuracy to the 63rd harmonic (fundamental of 60 Hz).
b. The Power Meter shall provide continuous sampling at a minimum of up to 128 samples/cycle, simultaneously on all voltage and current channels in the meter.

E. Minimum and Maximum Values

a. The Power Meter shall provide a monthly minimum and maximum values for the following parameters:
   1. Voltage L-L
   2. Voltage L-N
   3. Current per phase
   4. Voltage L-L Unbalance
   5. Voltage L-N Unbalance
   6. True Power Factor
   7. Displacement Power Factor
   8. Real Power Total
   9. Reactive Power Total
   10. Apparent Power Total
   11. THD Voltage L-L
   12. THD Voltage L-N
   13. THD Current
   14. Frequency
b. For each min/max value listed above, the Power Meter shall record the following attributes:
   1. Date/Time of the min/max value
   2. Min/Max. Value
   3. Phase of recorded Min/Max (for multi-phase quantities)

c. Minimum and maximum values shall be available via communications and display.

F. Harmonic Resolution

a. Advanced harmonic information shall be available via the Power Meter. This shall include the calculation of the harmonic magnitudes and angles for each phase voltage and current through the 63rd harmonic (31st harmonic with PM820).
b. Harmonic information shall be available for all three phases, current and voltage, plus the residual current. To ensure maximum accuracy for analysis, the current and voltage information for all phases shall be obtained simultaneously from the same cycle.
c. The harmonic magnitude shall be reported as a percentage of the fundamental or as a percentage of the rms values, as selected by the user.

G. Current Inputs

a. The Power Meter shall accept current inputs from standard instrument current transformers with 5 amp secondary output and shall have a metering range of 0-10 amps with the following withstand currents: 15 amp continuous, 50 amp

10 sec per hour, 500 amp 1 sec per hour.
b. Current transformer primaries through 327 kA shall be supported.

H. Voltage Inputs

a. The circuit monitor shall allow connection to circuits up to 600 volts AC without the use of potential transformers. The Power Meter shall also accept voltage inputs from standard instrument potential transformers with 120 volt secondary output. The Power Meter shall support PT primaries through 3.2 MV.
b. The nominal full scale input of the circuit monitor shall be 347 Volts AC L-N, 600 Volts AC L-L. The meter shall accept a metering over-range of 50%. The input impedance shall be greater than 2 Ohm.

I. Accuracy

a. The Power Meter shall comply with ANSI C12.20 Class 0.5 and IEC 60687 Class 0.5 for revenue meters.
b. The Power Meter shall be accurate to 0.25% of reading + .025% of full scale for power and energy. Voltage and current shall be accurate to 0.075% of reading plus 0.025% of full scale. Power factor metering shall be accurate to ±.002 from 0.5 leading to 0.5 lagging. Frequency metering shall be accurate ±.01 Hz at 45-67 Hz.
c. These accuracy's shall be maintained for both light and full loads.
d. No annual calibration shall be required to maintain this accuracy.

J. Waveform Capture

a. The Power Meter shall provide steady state waveform captures of the voltage and current channels. Waveform capture shall be for 3 cycles and is initiated manually using software.
b. The Power Meter shall capture, and store in internal non-volatile memory, 128 digitally sampled data points for each cycle of each phase voltage. The number of waveform captures stored onboard the circuit monitor is configurable and shall be dependent on the amount of memory available.
c. The Power Meter shall transmit the waveform samples over the network to the personal computer workstation for display, archival, and analysis.
d. Harmonic analysis performed on the captured waveforms shall resolve harmonics through the 63rd.
e. The data used for the three-cycle waveform capture display shall also be used to derive metered quantities in order to provide meaningful additional data.
f. All waveforms must reflect actual circuit performance. Waveforms synthesized or composed over time shall not be acceptable.
g. The Power Meter shall have disturbance sag/swell detection for troubleshooting and solving anomalies (PM870 only).
h. The Power Meter shall have Configurable Waveform Capture with flexible resolution permits to adapt the waveform captures according to the type of even/disturbance or channel (PM870 only).

K. Input/Output

a. The Power Meter shall supply 1 digital input and 1 digital solid state output/KY

pulse output as standard.

b. The Power Meter shall be capable of operating a solid state KY output relay to provide output pulses for a user definable increment of reported energy. Minimum relay life shall be in excess of one billion operations. The standard KY output shall operate up to 240 volt AC, 300 volt DC, 96mA max, and provide 3750 volt rms isolation.
c. The Power Meter shall support multiple input/output options including digital inputs, mechanical relay outputs. This optional I/O shall be in the form of an option module that can be field installable.
d. The digital inputs shall have four operating modes:
    1. Normal mode for simple on/off digital inputs
    2. Demand Interval Synch Pulse to accept a demand synch pulse from a utility demand meter
    3. Conditional Energy Control input to control conditional energy accumulation.
    4. The optional relay output module shall provide a load voltage range from 20 to 240 VAC or from 20 to 30 VDC. It shall support a load current of 2A.

L. Output Relay Control

a. Relay outputs shall operate either by user command sent over the communication link, or in response to a user defined alarm or event.
b. Output relays will have normally open and normally closed contacts and can be configured to operate in several modes:
    1. Normal contact closure where the contacts change state for as long as the signal exists
    2. Latched mode when the contacts change state when a pick-up signal is received and hold until a dropout signal is received.
    3. Timed mode when the contacts change state upon receipt of a pick-up signal and are held for a pre-programmed duration.
    4. End of Power Demand Interval when the relay operates as a synch pulse for other devices.
    5. Energy pulse output. The Relay will pulse quantities used for Absolute kWh, Absolute kVARh, kVAh, kWh In, kVARh In, kWh Out and kVARh Out
c. It shall be possible for individual relay outputs to be controlled by multiple alarms using Boolean type logic (PM850 & PM870 only).

M. Logging

a. The Power Meter shall provide for onboard data logging. Each Power Meter shall be able to log data, alarms and events, and waveforms. The Meter shall offer 800kB(80kb on PM820) of on-board nonvolatile memory. Logged information to be stored in each Power Meter include the following:
    1. Billing Log: The Power Meter shall store in non-volatile memory a configurable billing log that is updated every 15 minutes. Data shall be recorded by month, day and 15 minute interval. The log shall contain 24 months of monthly data, 32 days of daily data and between 2 to 52 days of 15 minute interval data depending on the number of quantities selected.
    2. Custom Data Logs: The Power Meter shall provide 1 data log (PM820) or up to 3 separate data logs (PM850 & PM870), configurable by the user. Each log entry shall be date and time stamped to the second. Each log entry shall

hold data of up to 96 parameters each. It shall be possible to set up each log to take data at a different user defined schedule interval. In addition, it shall be possible for a user to define an event. Data logs can be configured by users to be Fill & Hold or Circular (FIFO).

3. Alarm Log. This log shall contain time, date, event information, and coincident information for each user defined alarm or event.
4. Waveform Logs. This log shall store captured waveforms. Waveform logs shall be either Fill & Hold or Circular (FIFO) as defined by the user.

b. The Power Meter shall have default values for all logs loaded at the factory and begin on device power up.

N. Alarming

a. Alarm events shall be user definable.
b. The user shall be able to define over 50 alarm conditions.
c. The following shall be available as alarm events:
   1. Over/under current
   2. Over/under voltage
   3. Current imbalance
   4. Phase loss, current
   5. Phase loss, voltage
   6. Voltage imbalance
   7. Over kW Demand
   8. Phase reversal
   9. Digital Input OFF/ON
   10. End of incremental energy interval
   11. End of demand interval
d. For each over/under metered value alarm, the user shall be able to define a pick-up, drop-out, and delay.
e. There shall be four alarm severity levels in order make it easier for the user to respond to the most important events first.
f. Indication of an alarm condition shall be given on the front panel.
g. The Power Meter shall provide Boolean alarms in the form of combine up to four other alarms with NAND, NOT, OR, and XOR(PM850 & PM870 only).

O. Output Relay Control

a. Relay outputs shall operate either by user command sent over the communication link, or set to operate in response to user defined alarm event.
b. Output relays shall close in either a momentary or latched mode as defined by the user.
c. Each output relay used in a momentary contact mode shall have an independent timer that can be set by the user.
d. It shall be possible for individual relay outputs to be controlled by multiple alarms using Boolean type logic (PM850 & PM870 only).

P. Feature Addition

a. It shall be possible to field upgrade the firmware in the Power Meter to enhance functionality. These firmware upgrades shall be done through the communication connection and shall allow upgrades of individual meters or

groups. No disassembly or changing of integrated circuit chips shall be required and it will not be necessary to de-energize the circuit or the equipment to perform the upgrade.

Q. Control Power

a. The Power Meter shall operate properly over a wide range of control power including 90-457 VAC or 100-300 VDC.

R. Communications

b. The Power Meter shall provide Ethernet I/P communication, either inherently or by use of a gateway configured by the supplier of the power meter.

S. Display

a. The Power Meter display shall allow the user to select one of three languages to view on the screen: English, French, or Spanish. The Power Meter display shall also allow the user to select a date/time format.
b. The Power Meter display shall be back lit LCD for easy viewing, display shall also be anti-glare and scratch resistant
c. The Display shall be capable of allowing the user to view four values on one screen at the same time. A summary screen shall also be available to allow the user to view a snapshot of the system.
d. The Power Meter display shall provide local access to the following metered quantities:
    1. Current, per phase rms, 3-phase average and neutral (if applicable)
    2. Voltage, phase-to-phase, phase-to-neutral, and 3-phase average (phase-to-phase and phase-to-neutral)
    3. Real power, per phase and 3-phase total
    4. Reactive power, per phase and 3-phase total
    5. Apparent power, per phase and 3-phase total
    6. Power factor, 3-phase total and per phase
    7. Frequency
    8. Demand current, per phase and three phase average
    9. Demand real power, three phase total
    10. Demand apparent power, three phase total
    11. Accumulated Energy, (MWh and MVARh)
    12. THD, current and voltage, per phase
e. Reset of the following electrical parameters shall also be allowed from the Power Meter display:
    1. Peak demand current
    2. Peak demand power (kW) and peak demand apparent power (kVA)
    3. Energy (MWh) and reactive energy (MVARh)
f. Setup for system requirements shall be allowed from the Power Meter display. Setup provisions shall include:
    1. CT rating
    2. PT rating
    3. System type three-phase, 4-wire
    4. Watt-hours per pulse

PART 3 - EXECUTION

3.01 INSTALLATION

A. All equipment included within the power equipment lineups shall be factory installed, wired and tested prior to shipment to the job site.

B. All control power, CT, PT and data communications wire shall be factory wired and harnessed within the equipment enclosure.

C. Where external circuit connections are required, terminal blocks shall be provided and the manufacturer's drawings must clearly identify the interconnection requirements including wire type to be used.

D. All wiring required to externally connect equipment lineups shall be installed by the Contractor.

E. Contractor interconnection wiring requirements shall be clearly identified on the PMS system drawings.

3.02 SYSTEM START-UP AND TRAINING

A. A factory authorized service technician shall provide startup and testing of the system on site.

B. Start-up shall include a complete working demonstration of the PMS with simulation of possible operating conditions that may be encountered.

C. Training shall include any documentation and hands-on exercises necessary to enable electrical operations personnel to assume full operating responsibility for the PMS after completion of the training period.

D. See Section 260504 for training hours required. Note that the Owner reserves the right to videotape training sessions.

END OF SECTION - 260913

SECTION 26 12 19
LIQUID-FILLED SUBSTATION TRANSFORMERS

1.0 SCOPE

A. The ABB Substation transformer design is the basis for specification.

B. This Specification provides the technical requirements for the design, manufacture and test of substation transformers.

C. The service conditions shall be as specified in Usual Service Conditions section of C57.12.00, unless otherwise modified herein.

1.2 CODES AND STANDARDS

A. All codes and standards referenced in this specification shall be those in effect at the time of Purchase Order award. Deviations from this specification and referenced codes and standards shall be obtained in writing from Buyer.
   1. ANSI/IEEE C57.12.00, Distribution, Power, and Regulating Transformers, General Requirements for Liquid-Immersed
   2. ANSI C57.12.10, American National Standard for Transformers 230 kV and Below.
   3. ANSI/IEEE C57.12.90, Test Code for Liquid-Immersed Distribution, Power and Regulating Transformers and Guide for Short-Circuit Testing of Distribution and Power Transformers
   4. ANSI/IEEE C57.98, Impulse Tests, Guide for Transformer (Appendix to ANSI/IEEE C57.12.90)

B. It shall be the Contractor's responsibility to be, or to become, knowledgeable of the requirements of these Codes and Standards. Any required changes or alterations to the equipment to meet the Codes and Standards requirements shall be at the expense of the Contractor.

C. Equipment proposed by the Contractor that cannot fully meet the requirements of this Specification shall have all exceptions clearly stated in the proposal. No exception shall be allowed, unless approved by the Engineer in writing.

1.3 QUALITY ASSURANCE

A. The manufacturer shall have specialized in the design, manufacture and assembly of liquid filled LV substation transformers for a minimum of 25 years. The transformer manufacturer and location of manufacture and test are to be supplied at the time of quotation.

B. The manufacturer shall a well documented quality assurance program, which includes procedures for all activities in order entry, design, material procurement, manufacturing processes, testing, shipping and post shipment product follow.

C. The test facility used to perform loss tests in accordance with ANSI C57.12.90 must be certified by an approved 3rd party to meet NBS 1204 standards for accuracy. Calibration of the equipment used for these loss measurements must be traceable to

NIST or an approved equal 3rd party laboratory. Records of all equipment calibration shall be made available to the Engineer upon request.

1.4 SUBMITTALS

A. Drawing Requirements
   1. Submittal drawings shall be completely dimensioned and, as a minimum, show the following:
      a. Plan, and all elevations, including clearance for bushing and core and coil removal.
      b. High voltage and low voltage bushing details.
      c. Location and identification of all accessories.
      d. Size and location of all conduit entrances for connections.
      e. Anchoring details.
      f. Ground pad locations.
      g. Weight of core and coil, transformer tank and fittings, weight and gallons of fluid, and total shipping weight.

B. Wiring diagrams
   1. Detailed connection (wiring) diagrams shall show the following:
      a. Wiring of all devices with switches and relays, or electrical connections, including current transformers.
      b. Identification of all terminal blocks and all connections to be made by Buyer.

C. Nameplate drawing
   1. A nameplate drawing showing required ANSI information shall be provided.

D. Installation, Operating, and Maintenance Instructions
   1. The manufacturer shall provide an instruction, operating and maintenance manual covering all equipment furnished in accordance with Division 1.

PART 2 - PRODUCTS

2.1 TRANSFORMER TECHNICAL REQUIREMENTS

A. Winding Characteristics
   1. All windings and internal connections shall be copper.
   2. All windings shall be circular.
   3. The windings shall be tightly wound utilizing tension devices to place the conductor into the coils.
   4. The transformer windings shall be designed and constructed to be completely self protected by its ability to withstand the external short-circuits, as defined by ANSI C57. 12.00 and tested in accordance with C57.12.90.
   5. The core and coil assembly must be processed using an inert liquid process commonly known as Vapor Phase or Condensation Heating.
   6. The transformer design shall be capable of operating above rated voltage or below rated frequency in accordance with ANSI C57.12.00.

B. Sound Level

1. The substation transformer and auxiliary cooling equipment shall be designed and constructed to minimize the audible noise generated with the transformer energized at rated voltage and with all auxiliary cooling equipment in operation. The acceptable noise level shall be in accordance with NEMA TR 1. The measurement procedure shall be as specified in ANSI C57.12.90.

C. Bushings
   1. High voltage and low voltage bushings shall be furnished with the ratings indicated herein.

D. Core
   1. The core shall be constructed of high-grade, grain oriented, silicon steel laminations, with high magnetic permeability. Magnetic flux density is to be kept well below the saturation point. The core construction shall include step-lap mitered joints to keep core losses, excitation current and noise level to a minimum.

E. De-Energized Tap Changer
   1. A manually operated de-energized tap changer shall be provided for changing the off circuit taps.
   2. Full capacity taps shall be located in the high voltage windings and shall be in accordance with the Transformer Data Sheet.
   3. The tap changer shall be capable of carrying the full transformer short-circuit current without damage or contact separation.
   4. The tap changer shall be gang operated from a single operating point and shall have an easily visible position indicator.
   5. The tap changer operating mechanism shall include provisions for pad locking in each tap position.

F. Arresters

   1. The HV side requirements are: 69 kV station class arresters. The arrester mounting location shall be in close proximity to the HV bushings.
   2. The LV side requirements are: 5 kV distribution class arresters. The arrester mounting location shall be in close proximity to the LV bushings.

G. Insulating Fluid and Preservation System

   1. The fluid preservation system shall be a sealed tank type.
   2. The insulating fluid shall be a dielectric coolant which is listed as a less-flammable fluid meeting the requirements of NEC Section 450-23 and the requirements of IEEE C2-1997, Section 15. The fluid shall be non-toxic, non-bioaccumulating and shall be readily and completely biodegradable per EPA OPPTS 835.3100. The fluid shall be comprised of edible oils and food grade performance enhancing additives. It shall have a minimum open cup flash point of 325 degrees Celsius and a fire point of 350 degrees Celsius per ASTM D92. The fluid shall be FM approved and UL certified.
   3. The transformer insulating fluid shall be certified to contain no detectable PCB's at the time of shipment and the tank shall be so labeled. Certification shall also

be provided that the transformer and components have not been contaminated with PCB's prior to shipment.

4. The transformer insulating fluid shall meet or exceed the requirements of the appropriate ANSI and ASTM fluid Standards. The transformer fluid shall be tested for dielectric breakdown and moisture content just prior to the time of shipment.

H. Tank Design
   1. The transformer tank, cooling equipment and compartments subject to operating pressures shall be designed for full vacuum, without permanent deformation. The maximum design withstand pressure shall be indicated on the nameplate.
   2. Tank design shall include sufficient expansion volume to allow operation under specified load conditions.
   3. The main cover shall be of welded onto the tank.
   4. One or more bolted-on handholes shall be provided in the tank cover for access to bushing connections and current transformers, when required. The opening shall be of sufficient size to allow removal of any CTs.
   5. The transformer base shall be suitable for rolling or skidding in the direction of either tank base centerline.
   6. Lifting lugs shall be provided at each corner of the tank. The lifting lugs shall be designed to provide a minimum safety factor of 5.
   7. Jacking pads or bosses shall be provided.
   8. Pulling provisions, for towing the transformer parallel to either centerline, shall be provided.

I. Gaskets
   1. The gaskets shall be compatible for the insulating fluid in the transformer tank.
   2. All gaskets shall have a circular cross-section and be made of oil and heat resistant synthetic nitrile rubber with a durometer hardness of 65 or more.
   3. All gaskets shall be captured in a machined groove.
   4. Gaskets for exposure to enclosed buss duct continuous shall be Viton material.
   5. Metal surfaces to which gaskets are applied shall be smooth, and shall have sufficient rigidity to assure proper compression of the gaskets.

J. Cooling System
   1. Cooling tubes or radiators shall be rigidly supported to the tank wall, either through pipes or brackets.

K. Grounding Provisions
   1. All non-energized metallic components of the transformer shall be grounded.
   2. Tank grounding provisions shall consist of two ground pads, welded to the base or to the tank wall near the base on diagonal corners.
   3. The ground pads shall be copper-faced or stainless steel with two holes spaced horizontally at 1.75-inch centers and tapped for 0.5 inch 13-UNC tread.

L. The transformer shall be furnished with level gauge, temperature gauge, pressure gauge, and vacuum pressure gauge. Each shall have dry contact alarm outputs rated 120V, 5A minimum.

M. The control cabinet shall be NEMA Type 4. The cabinet door shall have provisions for padlocking.

N. Wiring
   1. All devices mounted on the transformer, including current transformer LV circuits, shall be wired to the control cabinet.
   2. All control wiring shall be a minimum of #14 AWG SIS and #10 AWG for current transformers. Wiring between gauges and the control box can be #14 AWG SO cable.
   3. Wiring shall be terminated with a ring-type insulated compression lug.
   4. Current transformer terminal blocks shall be the shorting type.
   5. Each wire shall be identified with a wire marker.

O. Nameplates
   1. Transformer shall be furnished with a non-corrosive diagrammatic nameplate, permanently attached with non-corrosive hardware. The diagrammatic nameplate shall include the name of the manufacturer of the equipment as well as the location where the transformer was manufactured and tested.
   2. The nameplate shall contain all connection and rating information in accordance with ANSI C57.12.00 nameplate type C, plus the approximate weight of parts to be lifted for un-tanking, type and quantity of oil, and the date of manufacture.
   3. A non-corrosive nameplate located next to the operating handle of the de-energized tap changer shall be provided which states the following: 'Danger - Do not operate tap changer when the transformer is energized."

P. Exterior Finish
   1. The transformer exterior painting system shall be the manufactures standard. However, as a minimum, the transformer shall be thoroughly cleaned and phosphortized, painted with at least one corrosion inhibiting primer and one finish coat to provide a minimum total dry-film thickness of not less than 5 mils.
   2. All internal steel surfaces should be painted white except metals used in the electrical or magnetic circuit.
   3. The finish shall be ANSI 70.

2.2 ACCESSORIES

A. The transformer shall be equipped with a complete set of accessories, as per ANSI C57.12.10.

2.3 TRANSFORMER DATA

3 ϕ KVA Rating:	7,500
Frequency:	60 HZ
Impedance:	ANSI C57.12.10 Standard
Winding Temperature Rise:	65 °C
HV Voltage:	69 kV
HV Taps:	Standard (2 ANBN +2 ½ %)
HV BIL:	150 kV
HV Connection:	Delta
HV Termination:	Cover Bushing

HV Location:	Standard
LV Voltage:	2.4 kV
LV BIL:	45 kV
LV Connection:	Delta
LV Termination:	Air Terminal Chamber
LV Location:	ANSI Segment 4
Cooling:	Outside Air
Sound Level:	Standard

PART 3 – EXECUTION

3.1 TEST

A. Testing
   1. Each transformer shall receive all standard routine tests as required by ANSI C57.12.00 and performed as specified by ANSI C57.12.90.
   2. A certified test report shall be submitted and shall contain the test data for each transformer serial number manufactured. The certified test report shall as a minimum contain the data as specified in ANSI C57.12.90.
   3. Short Circuit withstand capability shall be verified by full short circuit tests on similar or larger units in accordance with the latest revision of ANSI C57.12.00 and ANSI C57.12.90. The maximum allowable variation in impedance measured on a per-phase basis after the test series shall not differ from that measured before the test series by more than 2% for category II and III equipment for circular or noncircular coils. Certified test reports from applicable short circuit tests shall be submitted to the purchaser, upon request, prior to shipment of the transformers.
   4. All symbols and wiring identification systems shall be in accordance with the applicable ANSI standard.

3.2 INSTALLATION

A. Transformers shall be furnished and installed in accordance with NEC, NESC, power company requirements, and manufacturer's instructions.

B. Anchor equipment to foundation.

END OF SECTION 26 12 19

SECTION 2613 26
MEDIUM VOLTAGE PARALLELING SWITCHGEAR

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Equipment specified in Section 26 32 13 shall be furnished with the equipment specified herein, to be coordinated, installed, and tested as a complete functional system.

1.2 SUMMARY

A. This specification section describes all labor, materials, equipment and services necessary for and incidental to furnishing the newly manufactured switchgear and control system required for the system specified herein.

B. The Switchgear Manufacturer shall manufacture and furnish all equipment as described in this section of the specification. All equipment shall have a practical layout, consistent with good engineering design practices and all for future expansion capability.

C. The Switchgear Manufacturer's scope of work shall also include factory testing and comprehensive system site start-up and testing.

D. Wherever the terms “plans” or “drawings” are used in these specifications, they shall refer to the Bid Documents for this project. These drawings, together with this specification and other related documents, make up the Contract Documents. The equipment proposed under these specifications shall be compatible with the space provisions and wiring configurations shown on these drawings.

1.3 REFERENCE STANDARDS

A. The design, equipment, installation, and testing shall be in strict accordance with the applicable requirements set forth in ANSI, UL, IEEE and NEMA.

B. The generator switchgear construction, including all internal components mounted, shall be UL listed and labeled under “Circuit Breakers and Metal-Clad Switchgear over 600 Volts (DLAH)”, with a bus withstand rating of *50* KA amperes symmetrical at the time of the bid opening. Manufacturers submitting equipment line-ups without being listed and labeled under UL (DLAH) prior to bid opening shall not be accepted.

C. The entire Critical Power Switchgear System, including all controls, breakers, buswork and components shall be completely manufactured and assembled by a single manufacturer and shall be UL listed and labeled under this manufacturer's name.

D. All equipment and material supplied shall be in accordance with the latest edition and amendments of all applicable standards, codes, laws and regulations listed below:
   1. IEEE 1547 - Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces
   2. ANSI/IEEE C12 – Code for Electric Metering
   3. ANSI C37.04 – Standard Rating Structure for AC High Voltage Circuit Breaker Rated on a Symmetrical Current Basis.
   4. ANSI C37.06 – Preferred Ratings and Related Required Capabilities for AC High Voltage Circuit Breaker Rated on a Symmetrical Current Basis.
   5. ANSI C37.11 – Requirements for Electrical Control for AC High Voltage Circuit Breaker Rated on a Symmetrical Current Basis or a Total Current Basis.
   6. ANSI C37.12 – Guide to Specifications for AC High Voltage Circuit Breaker Rated on a Symmetrical Current Basis or a Total Current Basis.
   7. ANSI C37.20.2-2015 – IEEE Standard for Metal-Clad Switchgear.
   8. ANSI/IEEE C39.1 - Requirements for Electrical Analog Indicating.
   9. ANSI C57.13 - Requirements for Instrument Transformers.
   10. ANSI 255.1 - Gray Finishes for Industrial Apparatus and Equipment.
   11. ANSI 48 – Test Procedures and Requirements for High-Voltage AC Cable Terminations
   12. NFPA 70 - National Electric Code.
   13. NFPA 110 - Emergency and Standby Systems.
   14. National Electrical Code (NEC)
   15. Underwriters' Laboratories, Inc. (UL)
   16. National Electrical Manufacturers' Association (NEMA)
   17. Federal, State and local codes.

1.4 STRUCTURAL PERFORMANCE REQUIRMENTS

A. The medium voltage paralleling switchgear shall have a seismic certification, based on shaker table testing, and certified in accordance with KBC, CBC and ICC-ES AC156.

1.5 SWITCHGEAR MANUFACTURER QUALIFICATIONS

A. It is the intent of the owner to receive bids only from domestic manufacturers who provide compete engineering, manufacturing production, testing and field services to manufacture and provide a highly reliable, fully integrated, state-of-the-art Critical Power Switchgear System that can be successfully supported by the Switchgear and Controls Manufacturer over the lifetime of the system. Qualified bidders shall meet the following requirements and provide the necessary support documentation indicated. Failure to provide this support documentation will be considered a non-responsive bid and will result in bid disqualification.

B. The manufacturer shall have at least twenty years of experience in the design, manufacturing and support of generator control power systems and automatic transfer switches.

C. Switchgear and Control Manufacturer shall be of adequate size and have necessary capital resources to demonstrate that it can fully support a project of this magnitude for the expected life of the equipment. The manufacturer must have a capitol net worth of at least 20 times the value of the proposed equipment. Bidder upon request shall provide a complete copy of its most recent annual financial statement, prepared by an independent accounting firm, showing the net worth of the bidder as of that date.

D. The switchgear manufacturer must have trained, factory employed, field service personnel on staff for installation support and start-up and to provide field support for the life of the system. Factory field service engineers shall be readily available twenty-four hours a day, 365 days a year. The manufacturer may not subcontract field service work or personnel. A 24 hour, toll free "Hot-Line", with a guaranteed call back response within 1 hour, from a qualified factory technician must be in place at the time of bid offering with a proven history of response.

   As protection to the owner, any manufacturer wishing to limit themselves to a maximum number and type of field service visits for the start up of this equipment, must state so in their bid. Provide published field service rates, including overtime and holiday rates for additional visits. This information shall be provided for bid evaluation.

E. Other manufacturers will only be considered on a pre-bid, pre-approval basis.

1.6 SUBMITTALS

A. Approval Submittal - Switchgear Manufacturer shall furnish a submittal with adequate information to fully define the system offered. Information that shall be submitted by the Switchgear Manufacturer as itemized below:
   1. A one-line diagram clearly indicating the functional relationship between equipment.
   2. Outline drawings showing plan and elevation views of each piece of equipment, and containing the following information for each item:
      a) Size.
      b) Weight.
      c) Dimensions and weight of the equipment shipping splits.
      d) Typical conduit entry areas
   3. Detailed cubicle front view drawings, equipment door detail drawings showing all meter, annunciator and control device locations with nameplate legends, with all required nameplate information
   4. Base plans for the location of the equipment floor channels, anchor bolts and conduit entrance spaces,
   5. Catalog data sheets for all circuit breakers and protective devices.
   6. Short-circuit rating of bus and interrupting and withstand ratings of breakers.
   7. Detailed bill of material indicating items to be released first, due to long lead time.
   8. System delivery schedule.
   9. Proposed sequence of operation for entire system.

10. A statement listing all deviations and/or exceptions to these specifications.

1.7 OPERATION AND INSTRUCTION MANUALS

A. The Switchgear Manufacturer shall submit O&M manuals in accordance with Division 1. These manuals shall include, but not be limited to, the following items:
   1. Detailed operating and maintenance instructions.
   2. All approved "As-Built" shop drawing information shall be updated to "As-Installed" and include all field modifications.
   3. Assembly splice-plate details for interconnection of shipping sections.
   4. Wiring diagrams for each breaker, switch, etc., with all terminal markings and connections for other circuits.
   5. Internal connection diagrams of relays, instruments and control switches.
   6. Complete parts list with all principal parts identified as to manufacturer and type or model number.
   7. Recommended spare parts list (with pricing) for one-year operation.
   8. Hard copy of the equipment PLC program (bound separately).
   9. Complete system interconnect diagrams

B. Maintenance: The manufacturer shall provide an optional, comprehensive preventive maintenance program.

C. Prior to training owner personnel, a set of complete O & M manuals shall be delivered to the Owner.

D. O & M manuals shall contain 100% accurate system "As-Installed" drawings, interconnect diagrams, schematic diagrams, wiring diagrams, individual sub-system component manuals, operation procedures, system description with theory of operation, maintenance schedules and procedures, original programmed settings and parameters, and all other information necessary for the Owner to maintain, operate, test, and troubleshoot the system.

E. O & M manuals shall not solely rely on sub-component manuals. A thorough consolidation of operation and maintenance information shall be available in a system overview guide. All major components of the system such as breakers, synchronizers, generator cubicle control, genset controls, PLC, Operator interface touch screen, and Master Cubicle shall be included in this overview.

1.8 WARRANTY

A. The Manufacturer shall provide a comprehensive two-year warranty that includes all parts and labor to repair or replace any defects that may appear within the two-year period, from date of shipment. All parts, labor and transportation costs to remedy any defect or failure to comply with the contract documents shall be provided by the manufacturer and corrected at no cost to the owner.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Subject to compliance with requirements specified herein, provide products by Russelectric, or approved equal.

2.2 SYSTEM OVERVIEW

A. Furnish the generator control and distribution switchgear, arranged to control the operation and distribution of power for the following generating units:

QTY.	Mover	KW/KVA	VOLTS	P.F.	F.L.A.	FREQ.
2	Diesel	2000/2500	2.4KV	0.8	601	60

Note only one generator will be furnished under this Contract. The paralleling switchgear shall be furnished as required for a second future generator.

B. The emergency generator paralleling switchgear shall be 3 phase, 3 wire.

C. The switchgear shall be arranged for fully automatic or manual operation at the discretion of the operator. The system shall be designed to provide safe, manual operation that is completely independent of the automatic PLC system and the OIP and/or computer-based control system. Manual operation is to include hard wired interlocks, instruments and control switches as specified herein. Systems that provide redundant PLCs, computers, operator interface panels or HMIs, to provide back-up manual operation are unacceptable. Each section shall be complete and include the necessary AC instrumentation, relaying, pilot lights, selector switches, etc., and accessories required to manually operate the paralleling switchgear to start/stop engine generators, synchronize the generators and control all circuit breaker operations. Include provisions to mount and wire engine/generator voltage regulator and/or governor control equipment, supplied by the engine generator vendor, for mounting in the switchgear.

D. All control voltage for auxiliary relays, circuit breakers, synchronizing and other automatic equipment shall be obtained from the emergency generators, the engine starting batteries and the station battery system.

2.3 SEQUENCE OF OPERATION

A. All system operation and control functions shall be coordinated and integrated such that during automatic and/or manual operation, no unsafe condition shall occur, no malfunction of intended operation shall occur, and the highest possible reliability of operation shall be maintained.

B. Coordinate and integrate the functions and circuitry of all selector switches to ensure that the various settings available do not cause a malfunction of the intended system operation.

C. Automatic Start Sequence: Provide interconnecting control circuits to produce the following normal operating function when a system start command is given to the engine generator standby system.
   1. Upon receipt of a start signal, start all the diesel generators.
   2. Close the generator output circuit breaker for the first generator to reach 90% operating voltage and a frequency of 58HZ. Any generator may be the first to close to the bus, independent of other generators. Systems that sequentially select which engine generator may close to the bus or systems that rely on timers to select which generator shall close to the bus shall not be acceptable.
   3. Once the next diesel (random selection) has reached operating voltage and frequency, it shall synchronize to the unit on-line and close into the bus.
   4. In like manner, each generator shall synchronize to the on-line units and close into the bus, independent of the other units, until all available units are on the bus.
   5. Provide positive lockout such that no two engine generators can be connected to a dead bus simultaneously.
   6. Upon receipt of a stop signal, all individual generator circuit breakers shall open and the engine generators shall continue to run at no load for an adjustable cool down period of time (0-56 minutes) before complete shutdown.

D. Loss of Utility Sequence (Closed Transition Return): Provide interconnecting control circuits to produce the following normal operating function when the utility power is lost (as determined by the adjustable, utility undervoltage setpoint) or if the utility has exceeded the adjustable hit counter limit for minor interruptions and the "Transfer Mode Selector Switch" is in the "Closed Transition" mode:
   1. Initiate an adjustable time delay of .5-10 seconds.
   2. Upon expiration of the time delay, initiate an automatic start sequence.
   3. After the first engine generator is connected to the bus, open the main utility breaker.
   4. Provide load control contacts to shed non-priority load. The remaining connected load shall be sized for any one generator.
   5. Initiate an adjustable time delay (by use of the register access panel) of .5 to 10 seconds, then close the generator main breaker. Set at 10 seconds initially.
   6. Provide load control contacts to add load, as generating capacity is added to the bus.
   7. Upon restoration of utility supply voltage, and after an adjustable period of time (0-60 minutes), the engine generator system shall synchronize with the utility power source, close the main utility breaker, transfer the load gradually to the utility source, and open the main generator breaker, providing a no-break (closed transition), soft load transfer, to the utility source. The operator shall be able to adjust the ramp rate and the generator bus, load setpoint of disconnect from the utility through a screen on the OIP.
   8. After the load has been transferred to the utility source, the individual engine generator breakers shall open and the engine generators shall continue to run at no load for an adjustable period of time from 0-56 minutes before complete shutdown.

E. Load Test Sequence (Actual Building Loads) - Closed Transition Load Assumption and Return: Provide interconnecting control circuits to produce the following normal operation functions when the "Test Normal" switch is selected to the "Load Test" position, and the "Transfer Mode Selector Switch" is in the "Closed Transition" mode.
   1. Initiate an automatic start sequence.
   2. After a pre-determined number of engine generators are closed to the bus (as selected by the register access panel on the master control cubicle door), the standby system shall be capable of assuming bus load.
   3. The generator bus shall be brought into synchronism with the utility and the main generator breaker shall close (closed transition) and parallel the utility and generator sources.
   4. The engine generators shall be gradually loaded until they have assumed the entire power requirements of the system load under test, then the utility main breaker shall open. This process shall occur in approximately 10-15 seconds. The operator shall be able to adjust this time through the operator interface panel and set the unload setpoint for disconnecting from the utility. The generator control system shall regulate the output power of the engine generators so they never exceed the actual feeder loads (to prevent a reverse power situation where generator power is fed into the utility system).
   5. Should a power failure occur while in this condition, the emergency system will continue to operate the system loads on generators.
   6. When the "Test Normal" switch is returned to the "Normal position after a power failure has occurred and the generators are supplying the load, the system will revert to the automatic loss of utility sequence described in Section 2.02, paragraph D.7.
   7. When the "Test Normal" switch is returned to the "Normal" position, and a power failure has not occurred, the engine generators shall synchronize with the utility power source, close the utility main breaker, gradually transfer the load back to the utility source, and open the main generator breaker (closed transition).
   8. After the load has been transferred back to the utility the individual engine generator breakers shall all open and the engine generators shall continue to run at no load for an adjustable period of time from 0-56 minutes before complete shutdown.

2.4 LOAD CONTROL CIRCUITS

A. Provide control circuits, interlocks, and relays to protect against overloading.

B. The programmable controllers shall allow only predetermined loads to be closed to the system bus, until additional engine generators are connected in parallel to the main switchboard bus.

C. The Operator interface panel shall include a load control screen that allows an operator to select from the OIP, the individual loads and assign load KW values and load priority levels. Sub-priorities shall be included to sequence loads within a set load priority. Load priority 1 shall have load priority 1.1, 1.2, 1.3…. and load priority 2 shall have 2.1, 2.2, 2.3…Individual, adjustable, time delays shall be provided to add the individual load sub priorities within each load priority group.

C. The load shedding controls shall also be backed-up, with a bus frequency monitor which shall shed all non-essential loads during a bus under frequency condition.

D. A means to initiate load shed bypass and allow supervised manual addition of shed loads shall be provided on the master control cubicle door or the operator interface panel, to permit manual disabling of the load shedding logic (except in an under-frequency condition).

2.5 CIRCUIT BREAKERS

A. All circuit breakers shall be Siemens type GM, Square D type VRO or Eaton type VCP and of the horizontal drawout type, with self-aligning line-side and load-side disconnecting devices. Primary disconnecting contacts shall be silver-plated copper.

B. All circuit breakers shall be of equal rating and shall be interchangeable. The circuit breakers shall be rated as follows:
- Nominal voltage rating of 4160 volts with a BIL of 60 KV.
- Continuous current rating of 3000 amperes elements shall be supplied, as indicated on the drawings and detailed elsewhere in this specification, with a close and latch capability of *130* KA.
- Nominal 3 phase symmetrical interrupting capability of *50* KA with interrupting time not more than 3 cycles.

C. Each circuit breaker shall contain three vacuum interrupters, separately mounted in a self-contained, self-aligning housing that can be removed as a complete unit. The interrupters shall be designed to facilitate the following work:
- Replacement of the interrupter assembly through a simple alignment of the primary contacts and adjustment of contact wipe.
- Measurement of available contact life by referring to a contact wear gap indicator for each vacuum interrupter, which requires no tools to operate and is easily visible when the breaker is withdrawn on extension rails.

D. The circuit breaker shall be equipped with tinned-plated secondary contacts that automatically engage in the breaker operating position and can be manually engaged in the breaker test position.

E. The breaker shall be operated via a spring-charged, stored energy system with an automatic electric recharging motor. The mechanism shall always store sufficient energy to insure a trip open operation. Trip, close and spring charge control power shall be 48 VDC derived from the Critical Power Switchgear Station Battery System.

F. All circuit breakers shall be equipped with minimum of four sets of breaker auxiliary (a/b) contacts with the final number required to be determined by the

Switchgear Manufacturer. Trip and close/spring charge control power fuse blocks shall be provided.

G. All circuit breakers shall have circuit breaker status annunciator lights as detailed elsewhere in this specification. The circuit breaker annunciator shall be a group of three, individual 1.5" x 1.5" (minimum) back lit LED annunciators with engraved marking plates as follows:
Circuit breaker open.
Circuit breaker closed.
Circuit breaker withdrawn.

H. In addition to monitoring the breaker position and availability, the system PLCs shall also monitor and alarm the following:
Circuit breaker disconnected
Protective relay trip
Control voltage failure
Springs not charged
Failure of breaker trip or close circuitry

I. Interlocks: Provide mechanical interlock to prevent removal or insertion of breaker while in the closed position. Provide interlock on breaker that automatically discharges closing springs upon removal from or insertion into compartment.

2.6 CONTROL AND SAFETY DEVICES

A. Alarm Horn: A station alarm horn and silencing circuit with indicating lamp shall be provided to sound an audible should a malfunction occur. Should the alarm be silenced after a malfunction, receipt of another signal shall cause the horn to sound again (Annunciator Ring Back). When the failed circuit has been corrected, the alarm horn shall be automatically reset. Horn shall be rated for 88 to 90 decibels at 10 feet.

B. Annunciator Alarm Ring-Back: All alarms shall be of the "Ring-Back" type. Any time the alarm horn is silenced, the next alarm shall re-energize the station alarm horn.

C. Automatic DC Control Voltage System: An automatic DC control system shall provide stable DC control voltage for all DC system components. DC control power shall be derived from the best battery source available, obtained from each of the engine starting batteries. Each engine battery shall be connected to a best battery source selector. The system shall automatically select the best control voltage from the available batteries. Isolate each battery source to prevent failure of one battery from disabling the entire system. The DC control voltage system shall ensure a stable system control voltage, as long as any of the battery sources are within 20% of nominal during all engine operations. Each generator control cubicle shall have a dedicated DC to DC converter to ensure stable DC control power for that section. The master cubicle shall have individual dedicated DC to DC converters for each PLC, a dedicated DC to DC converter for the OIP and dedicated

DC to DC converters for the communications network devices. Each DC converter shall regulate the DC output voltage and provide stable 24VDC output voltage over an input range of 18-32 VDC, with 6ms hold up time and 20% reserve power capacity. Overvoltage protection shall protect against excessive output overvoltage (up to 110 %) conditions. Each DC to DC converter shall have and efficiency of 90% or better. This protection shall extend to all DC circuits.

D. Automatic Synchronizer: Separate microprocessor-based synchronizers shall be provided for each generator and one shall also be provided that is dedicated to control the generator bus synchronization. The synchronizers shall be designed for use on three phase AC generators and provide for frequency, phase and voltage matching control, using either analog or discrete output signals compatible to the engine governor. Each synchronizer shall have a two line liquid crystal text display for operation, alarm indication and generator/bus voltage and frequency measured values. The synchronizer shall contain all control adjustments and input output terminals legibly marked. The synchronizers shall include an LED synchroscope indication on the front of the synchronizer. Separate LEDs shall be provided that indicate when the synchronizer is signaling the governor to raise or lower frequency and raise or lower generator excitation. Control designs that utilize "On-Board" engine paralleling control systems or control systems that utilize a single synchronizer switched between multiple generator sources, is not acceptable.

   The synchronizers shall operate over an ambient temperature range of -20 degrees Celsius to +70 degrees Celsius, 95% non-condensing ambient humidity. The synchronizers shall be capable of meeting the dielectric and surge withstand capabilities, as set forth in IEEE Standard 472-1974/ANSI C37.

E. Back-lit LED Annunciation Panel: All annunciators shall have individual 1.575" x 1.575" square translucent windows with black engraved 3/8' lettering to indicate the nature of the alarm condition, failure or status condition. LED indicators shall be plug in type with dual circuit design incorporation four redundant strings of LEDs such that a failed LED string does not render the lamp inoperative. A push-to-test button shall be furnished on each section with annunciation.

F. Current Transformers: 0-5 ampere output, wound type, molded construction, with single secondary winding and primary/secondary ratio as required, burden and accuracy consistent with connected metering and relay devices. Rated 50-400 Hertz, 600 volts at 10 kV BIL full wave and built to ANSI/IEEE C57.1.3 and UL in accordance with IEC 44-1.

G. Engine Generator Control: Engine starting will be controlled by the hot standby, dual redundant system PLCs, located in the master control section, utilizing distributed I/O, which shall reside in each respective generator control cubicle, with individual power supply, chassis, and input/output cards for each engine generator. PLC, I/O, networking equipment and appurtenances shall be in accordance with Division 40 Specifications. In the event of an I/O rack failure in the generator control section, the system shall be arranged such that an operator will still be able to manually start and parallel the associated engine generator.

Programming shall be the responsibility of the generator control switchgear manufacturer. A fail to synchronize time delay operation shall be provided for each generator to terminate the operation of the synchronizer and sound a warning horn, in the event the generator is unable to be synchronized within an adjustable period of time, adjustable from 30 to 180 seconds. After failing to synchronize automatically, the operator, at his discretion, shall be able to connect either one or all the machines to the emergency bus by turning the master control switch, located on the master control cubicle door, to the manual position, and by operating the manual Synchroscope system and the circuit breaker control switches. Each engine generator control section shall be provided with separate alarm relays and alarm lights, to shut down the engine generator, disconnect it from the main bus, and illuminate a light to indicate a failure. The failure status shall be displayed on the Operator Interface Panel. If the generating plant is running automatically with the master selector switch in the "AUTO" position, a failure at the engine shall cause the respective fail light to light and the engine will be shut down and locked out of the automatic mode of operation. To reset an engine generator after a failure while in automatic operation, the engine selector switch shall be rotated to the "stop" position. After the failure has been corrected, the engine generator shall then be returnable to a standby condition by returning the selector switch to the "AUTO" position.

H. Engine Generator Selector Switch: Rotary multistage snap-action type with 600 volt AC-DC silver plated contacts, engraved escutcheon plate, round, knurled, handle. An Electroswitch series 24 selector switch rated 30A at 600 vac, four-position engine selector switch labeled, "Stop-Off-Auto-Run", shall be provided on each engine generator control panel cubicle door." When the selector switch is in the "stop" position, the controls shall be locked out. Whenever the selector switch is placed in the "stop" position while the engine generator is operating, it will immediately shut down and its circuit breaker will trip. An "off" position shall be provided to allow a normal shutdown, with a time delay to allow the engine to cool after operating under load. Whenever the engine selector switch is placed in the "off" position while the engine is operating, the generator circuit breaker will trip, but the engine will continue to operate until the expiration of the cooldown time delay setting. When the engine selector switch is placed in the "auto" position, the engine generator shall be on standby and shall start whenever an engine start signal is received from the automatic transfer system. When the utility power returns, and the transfer system signals the engine generator to shut down, the circuit breaker will be tripped, and the engine will continue to operate for the idle time delay period before shutting down in readiness for the next power failure. When the engine selector switch is in the "run" position, the engine will start and come up to speed. It will continue to run until the selector switch is returned to "off" or "stop" position. This position is to be used for testing or for manual operation.

I. Sync Selector and Frequency Meter Switches: Each synchronizing breaker shall be provided with a keyed sync switch and a separate keyed frequency meter switch to operate the synchroscope and frequency meter on the master cubicle swing panel. Using the frequency meter selector switch, an operator can view the comparison

between the line and the load side frequency on the same meter. The sync selector switch turns on the synchroscope and provides phase angle comparison across the synchronizing breaker. The sync selector switch shall turn on the sync check relay to supervise the associated breaker. These switches shall have separate keyed handles that are removable in the Off position only, assuring that only one respective switch is on at any time. Only one keyed handle is provided for each of these functions ensuring that only one breaker may be synchronized at a given time.

J. Manual Sync Enable Pushbutton: Each generator control cubicle shall be provided with a push button, that when depressed will bring the generator into synchronism with the generator bus during manual paralleling of an engine generator.

K. Sync Check Relay: A separate sync check relay shall be located in the master control cubicle. The sync check relay shall be utilized for manual sync operation. Systems that utilize the automatic synchronizer in a sync check mode or automatic mode for manual operation are unacceptable. The sync check relay output contacts shall be rated 5A.

L. Master "Manual-Auto" Control Switch: A spring return to center, three position, key selector switch labeled “Manual-Auto", shall be provided on the master control cubicle door." Whenever the master "manual-auto" control switch is placed in the "manual" position, the system shall annunciate this condition and the engine generator power circuit breakers and synchronizing shall be operated manually. A swing panel in the master control section shall be provided with Synchroscope, synchronizing lights, frequency meter and bus voltmeter for manual synchronizing through the engine generator power circuit breaker control switches, the Synchroscope and frequency meter switches on the engine generator control section door.

M. Master Operator Interface Panel (OIP)
   1. The OIP shall be an industrial computer, with 23 inch, diagonal “TFT” color touch screen VGA display with HD 1080p (1920x1080, 16:9) resolution with 5ms response rate. The Operator Interface panel shall communicate with the two system PLCS and update the PLC time, every second for event time coordination. The OIP shall be supplied with a number of screens, described below, that shall allow the operator, with required clearance, to perform control functions and access adjustable system set-points in real time. Each set-point shall have preprogrammed high and low limits to ensure that a chosen value is within and acceptable range. The touchscreen shall have a maintenance mode that allows an operator to clean the screen without turning off the OIP or affecting system operation.
   2. Menu Screen: The menu screen will index all of the screens used on the operator interface panel.
   3. Security Screen: A password is required to change any settings. This screen shall allow the operator to enter a user ID and password to change control set points. The system shall allow up to eight levels of password protection. A password is not required to view existing settings or status screens. The

password is installed or changed via the Touch Screen using a virtual standard keyboard pop-up. Once an operator enters the system using his password, a password timer will run. The password lock will be reactivated after an adjustable time delay if there is no operator interaction with the OIP screen.

4. Date and Time Screen: The Date and Time screen shall allow an operator to change the system's date and time.
5. Legend Screen: The legend screen describes the meaning for each symbol/color on the one-line screen.
   a. Red – Closed or Energized
   b. Green – Open or De-energized
   c. Flashing – trouble
   d. Grey - Future
6. System Single Line screen: This screen shall be the main access screen to other screens. There shall be a tab soft-key button off to the right side of the screen labeled "Menu" to allow the operator access to additional screens.
7. This screen shall display the paralleling switchgear represented by an interactive single line screen. A block at the top of the screen shall display the overview system status with indications that the system is in auto or manual mode, engine load demand system status on or off, load control function in auto or manual mode and test status of the system whether it is in a load test or No-load test mode of operation. The Single line will display generator status and actual generator power in kW, rated kW and circuit breaker open/closed status for each generator in the system. Feeder breaker open/closed status shall be displayed. The device symbols and bussing depicted on the single line shall change color and will be red in color when energized and green if de-energized. An operator may view information, available from a device depicted on the one line (engine, circuit breaker); they would touch the symbol on the one line to view a pop-up screen displaying available information.
8. PLC Communication Status Screen: This screen shall indicate that the OIP is communicating properly with the two system PLCs and whether each PLC is in a run or disabled state with the PLC scan time displayed for each PLC
9. Engine Data Screens: Each engine generator shall be represented by a pop-up metering screen with twelve, individual, dial type analog meters which shall display engine oil pressure, oil temperature, coolant temperature, left and right exhaust temperature, engine RPM and engine battery voltage, generator voltage, frequency, power factor, current and KW. Soft keys shall be provided under the voltmeter to allow reading each phase to phase voltage, A-B, B-C and C-A. The Ammeter shall have soft key to allow reading individual phase current. And the KW meter shall have soft keys under the meter to switch between KW, KVAR and KVA. These metered values shall also be displayed again on another screen in digital readout form together with all engine and generator data available through the communications link to the engine generator.
10. Engine operating hours and the total number of engine starts shall be displayed. In addition, a separate bar graph indication of generator loading percentage shall be displayed on this screen.
11. The engine data screen shall have a visual replication of the engine control switch showing the status of the actual switch position. Timer setpoints and

actual real time status of the timers for cool down and fail to synchronize shall be displayed.

12. Demand Mode Screens: The generator Demand Mode screens allow an operator to select one of three different and distinct operating modes for generator loading control.
    a. KW Based Spinning Reserve – This mode allows an operator to select the amount of excess KW loading capacity that the system will operate at. The control system will automatically add and remove engines as needed to maintain this selected KW spinning reserve capacity.
    b. Engine Generator Spinning Reserve – This mode allows the operator to select the number of engines that will run for reserve capacity such as in an N+1 or N+2 configuration. The load will be balanced and shared between the units with the reserve amount of engines running on line sharing the load. If there are dissimilar engine generators the system will default to keeping the larger units on line in spinning reserve.
    c. Percent KW Based Generator Demand – The percent KW mode allows the operator to select the increase and decrease load set-points for the system to add and remove engine generating units. In this mode, the operator selects the increase load set-point (e.g.90%) at which time the next engine in sequence would be started when the loading on the bus reaches 90% of the on line generating capacity. Similarly, the decrease load set-point is selected to establish the bus load value at which to take a unit off line and maintain generation capacity, at the decrease load set-point, after the unit is taken off.
13. All three modes of load demand operation will operate such that no matter what settings are used, the system will never remove an engine generator where it would overload the system.
14. Each mode of load demand operation shall include a set-point and status screen that allows the operator to input the required set-points and view that actual real time values for increasing and decreasing engine generators on the bus. These various screens shall also display the selected engine sequence for adding and removing engines to the bus and the status of units online or offline and display totalized engine running hours.
15. Load Control Screen: A load control screen shall allow the operator to set load priorities for adding and shedding load to the system. The screen shall display load priority and expected kW load for each individual controlled loading device whether an ATS, breaker or contactor and whether a start signal, load shed or block transfer signal is present for each individual transfer switch. An operator can select individual load priority and can set the anticipated load level for each load control device. The system shall allow for sub-priority selection within any priority. For example, priority #1 loads are added when the first engine comes on the bus. A priority selection of 1.10 would cause that load to be added 10 seconds later, a priority 1.20 would be added 20 seconds later. This screen shall display the position status of the load controlled device and will display manual add and manual shed operation status.
16. Master Control Screen: Two virtual switches shall be displayed. The first switch allows the operator to select automatic or manual mode of operation from this screen. The second switch is provided to allow a generator no-load or load

testing with the selected load control devices. A pushbutton is provided for resetting bus alarms. This screen shall also display a running time counter that displays the time in days, hours, minutes and seconds for the latest system operation.

17. Utility Transfer Control Screen: Provide setpoint screen to set the loss of utility time delay, to initiate engine starting and transfer. Provide adjustable time delay to retransfer upon return of utility. Hit counter settings shall allow the operator to set the number and duration of utility interruptions that would not be otherwise sensed by the loss of utility time delay and initiates the start and transfer sequence.
18. Engine Test Screen: A test screen shall be provided to allow the operator to test the operation the engine generators. On this screen an operator can select which engines shall be tested and whether they will be started all at once or sequentially (consecutive or concurrent). A virtual selector switch shall be provided for each engine to select the unit for test mode of operation. A digital display for each unit shall display the test duration for that unit.
19. Manual Breaker Controls Screen: This screen displays the breaker positions and allows control of the feeder breakers from the OIP using Open and Close pushbuttons (breaker control is disabled in Automatic mode).
20. Active Alarm Screen: – Upon receipt of an alarm, the active alarm screen shall display up to 2048 active alarms and the time the alarm was activated. A red operator interface alarm indicator will illuminate on the master cubicle door and the operator has the ability to acknowledge an individual alarm or all alarms. The operator can also filter alarms to see specific priorities or groups of alarms.
21. Alarm and Event History Log Screen:
    a. The alarm and event history screen shall display up to 2048 alarms and events. The operator can also filter alarms and events to see specific Priorities or Groups of alarms and events. The operator also has the ability to launch an external program to view historical files. These external files are created daily and are stored on the local hard drive. Within this program, the external files can be searched by keyword or filtered by priority or group.
    b. Any switch operation either from the OIP or and actual hard wired switch shall be monitored and logged as to time of operation and who was logged in at the time.
22. Help Screens: Multiple help screens shall be provided that can be accessed from a button on each set point or control screen that provides a brief explanation of the associated set points and/or controls located on that screen.
23. Generator System Run Reports: A push button on the operator interface panel (OIP) is provided to initiate logging of all information required to generate a report of generator and transfer sequence parameters and operational sequences required for system test. Three types of reports will be generated:
    a. Engine Generator Testing Data for each unit
    b. Transfer Test and Timing Data
    c. Alarm and Event Log
24. Engine Generator Testing Data will include:
    a. Engine date and time stamp of each gen-set run period

b. Engine date and time stamp of each gen-set kilowatt setpoint requirement
c. Graphical trend of generator kW, kVA, and kVAR
d. Maximum and average values of generator kW, kVA, and kVAR
e. Graphical trend of generator A, B and C phase amperes
f. Maximum and average values of generator A, B and C phase amperes
g. Graphical trend of generator AB, BC and AC phase voltage
h. Maximum and average values of generator AB, BC and AC phase voltage
i. Graphical trend of generator volts, amps, RPM and frequency
j. Maximum and average values of generator volts, amps, RPM and frequency
k. Graphical trend of engine coolant temperature, oil pressure and battery voltage
l. Maximum and average values engine coolant temperature, oil pressure and battery voltage.
m. Graphical trend of engine left and right exhaust temperature
n. Maximum and average values of engine left and right exhaust temperature

25. Transfer Test Data Will Include:
    a. Time and date stamp for each Engine Start signal (on, off), normal position and emergency position (open, closed)
26. Alarm and Event Log will include:
    a. All alarms and events captured during recording period.
    b. Encompass all Generator set, ATS, circuit breaker and emergency switchgear operational activity monitored by the switchgear PLC system

N. Meters: Switchboard instruments with 4.5 inch (115 mm) square recessed case and 250 degree scale, white dial with black figures, 60 Hertz, one percent accuracy shall be furnished for the following meters:
Ammeters - 5 ampere, scale for primary current
Frequency Meter - 55 to 65 Hertz scale
Wattmeters – Calibrated madc movement, scale for available kilowatts
Voltmeters - 150v (3w) movement, scale for primary voltage

O. Meter Selector Switches: Rotary multistage snap-action type with 600 volt AC-DC silver plated contacts with engraved escutcheon plate. An Electroswitch series 24 selector switch rated 30A at 600 VAC shall be furnished for the following switches:
Ammeter switch with positions OFF, 1, 2, 3.
Sync Switch with “Off/On” positions
Frequency meter switch with positions LINE, OFF, LOAD
Voltmeter switch with positions OFF, 1-2, 2-3 and 3-1

P. Potential Transformers: 120 volt single secondary, with primary fusing and secondary circuit breaker protection, primary/secondary ratio as required, burden and accuracy consistent with connected metering and relay devices, 60 Hertz.

Q. Protective Relaying: All protective relaying shall be utility grade with drawout case or provided with CT and PT test switches to isolate the relays from the PTs and CTs for testing. The protective relays shall be separate and independent from all other controllers including the PLC control system and the engine mounted controls.

R. Synchroscope: Switchboard instrument with 4.5 inch (115 mm) square recessed case and 360 degree scale, white dial with black figures, 60 Hertz, one percent accuracy, 150v movement, Scale: Slow-Fast

S. Programmable Controllers: The system shall be controlled by two redundant, hot standby General Electric RX3i programmable logic controllers with dual redundant reflective memory modules for each PLC to provide high speed, redundant fiber communications for synchronizing the scans between the two PLCs. Each PLC shall be provided with a separate power supply and chassis with distributed input/output cards via Profinet ring topology. All PLCs shall be backed up by non-volatile "Flash" memory. In the unlikely event that both of the PLC's are inoperable, the switchgear system shall default to manual control and provide audible and visual alarms to alert personnel so corrective action can be taken. During this time, if the system is in standby mode, should an engine start signal be received, the switchgear system will start all available engine generators. If the system is operating, all on-line generators will remain operational. For both scenarios, the switchgear will allow full manual control with all required hardwired interlocks installed, to prevent improper operation.

T. Over and Under Voltage\Frequency Relay: An overvoltage (100 to 125%), undervoltage (75% to 100%), overfrequency (50 to 70 HZ) and underfrequency (50 to 70 HZ) relay shall be supplied to monitor the bus voltage and provide alarms and initiate load shedding external to all PLC controls for abnormal conditions. Red failure lights, auxiliary contacts, and an alarm in the engine generator master control section will be energized to indicate an abnormal voltage or frequency condition. Each setpoint has an independent time delay setting (adj. 1 to 30 seconds). Upon detecting a bus under frequency condition all available engines will be started. Under frequency load shedding will immediately trip all non-priority #1 loads. Automatic restoration of load occurs after the bus returns to normal frequency and the under frequency alarm has been reset using the failure reset push button.

U. All control cubicles shall have interior convenience LED lighting with motion detector that turns the interior light on when the door is opened and a convenience receptacle. Both devices shall be powered by an external, remote 120 VAC, 20A control power source provided by the Electrical Contractor.

2.7 INSTRUMENT AND CONTROL WIRING

A. Instrument and control wiring within the switchgear sections shall be of flame-retardant, type SIS, extra-flexible, tinned copper, rated 600 volts and approved for switchgear use.

B. Control wiring shall be protected with individual circuit breakers with trip indication, monitored by the system PLC and alarmed on the OIP and logged in the event log.

C. All wire terminations made at meters, relays CTs and PTs and other similar devices shall be made with ring-tongue or locking-spade crimp lugs or as required by the device termination point.

D. All terminations shall be clearly identified by means of heat embossed vinyl sleeve markers at each end. Labeling tape, or paper, wire markers are not acceptable. Wire numbers shall match the Manufacturer's interconnection, schematic and wiring drawings.

E. Terminal blocks shall utilize “Cage-Clamp” technology and shall be clearly marked for wiring to be installed or reconnected by the Contractor. All connections between shipping sections shall utilize plug connections to reduce installation time.

F. Cage Clamp terminal blocks that provide high clamping force, maintenance free terminations shall be provided for secondary wire terminations.

G. All current transformers shall be connected to shorting type mechanical, lever arm switches with test points. Current transformer secondary wiring shall be #12 AWG.

H. Control wiring shall be labeled at each terminal point, with designations keyed to wiring diagrams.

2.8 SWITCHGEAR CONSTRUCTION

A. The medium voltage switchgear shall be designed for operation at 2400 volt, three phase, three wire and 60 Hz.

B. The switchgear shall be arranged as shown on the drawings. Shipping splits shall be provided as determined during the approval meeting with the Approving Authority.

C. The assembled switchgear structures shall be designed for the following insulation levels:
   1. Maximum design voltage of 4.76 kV.
   2. Insulation test (60 Hz) of 19 kV.
   3. Full-wave impulse test of 60 kV BIL.

D. Compartments: Switchgear compartments shall be constructed as follows:
   1. All compartments and major components of the primary circuits, such as circuit breakers, transformers and bus, shall be completely enclosed within grounded metal barriers, isolating secondary control devices and their wiring from all high voltage primary devices.
   2. Power circuit breakers shall be installed in individual front compartments with separate doors. The breaker compartments shall have grounded metal safety shutters that automatically cover the primary breaker connections when the breaker is removed. The breaker compartment shall have a racking mechanism

to move the breaker from operating to drawout positions. The mechanism shall automatically align the breaker and hold it rigid in the operating position. The safety shutters shall be driven by the racking mechanism.

3. Potential transformer compartments shall have drawout tray type construction. Power connections shall be automatically disconnected when the tray is drawn out.
4. The main bus shall be fully compartmented. Access plates to the bus compartment shall be located in the rear of the switchgear.

E. Enclosures: The metal-clad switchgear enclosures shall be fabricated as follows:
   1. Freestanding, floor mounted, indoor type.
   2. Dead front, dead rear.
   3. Fabricated on a die-formed steel base or base assembly, welded or bolted together to rigidly support the entire shipping unit for moving on rollers and floor mounting.
   4. Die-pierced holes for connecting adjacent sections to assure alignment and facilitate future additions.
   5. Bolts, nuts and Belleville spring washers of zinc-plated metal.
   6. Designed to withstand the electrical and mechanical stresses occurring during operation of the assemblies.
   7. Framework formed of code gauge steel (12 gauge minimum), suitable for anchorage to the floor.
   8. Metal-clad construction, with rugged steel assemblies featuring bracing, reinforcing gussets and jig-welding, to assure rectangular-rigidity.
   9. Open bottom sections, as required for ready installation and termination of conduits.
   10. Removable side, top, front and back panels, attached by bolts and small enough for easy handling by one person.
   11. Front and rear hinged, cubicle doors
   12. Individual front doors for each power circuit breaker compartment.
   13. Suitable means near the top and bottom of each switchboard to insure adequate ventilation for all equipment within the switchboard assembly.
   14. The control section shall be isolated and separate from the switchgear. Each cubicle shall be formed and welded to completely isolate the control section from the bus compartment and adjacent sections. Bolted sheets of steel to form a control section are not acceptable.

F. Busses:
   1. All busses shall be 4,160 volt, three-phase, three-wire, 60 Hertz.
   2. All busses and stub connections shall be copper.
   3. All busses shall be insulated by means of flame-retardant, track resistant epoxy insulation.
   4. The continuous ampere rating of all power bus shall be 3000 amperes. Busses shall be sized such that the current density is not greater than the current carrying capacity of the rectangular copper bars, as required by UL and NEMA standards. Heat rise tests shall be conducted in accordance with ANSI C37.55. Buses and stub connections shall limit temperature rise to 30 degrees C at load current capacity and an ambient temperature of 40 degrees C.

5. A ground bus rated 25% of the current-carrying capacity of the switchgear main bus shall extend across the entire width of each switchgear assembly.
6. Nominal bus bracing capacity shall be equal to or greater than the interrupting rating of the highest rated breaker serving the bus. Minimum bus bracing shall be *50* KA symmetrical. Each bus connection to the breakers shall match the frame size of the circuit breaker to which the bus is connected.
7. Bus bar and interconnection joints shall be silver-plated, constant-high-pressure type, with Grade 5 steel, zinc plated bolts, nuts and Belleville spring washers.
8. Bus phase designations from front to back, top to bottom, left to right shall be A, B, C, respectively, when viewed from the front.

G. Dimensions:
1. The switchgear framework shall conform to the arrangements and details shown on the drawings, and to the space designated for installation.
2. The highest operating handles shall not appear higher than 6' 6" above the floor.
3. Adequate clearance shall be allowed to permit good accessibility of feeder conductors and bus terminations for maintenance purposes.

H. Finish: All steel parts shall be prepared for painting by a five (5)-step cleaning, phosphatizing and sealing process. The parts shall then be painted ANSI 61 gray, utilizing polyester powder coat applied by the electrostatic method and cured in a baking oven. This finish shall be suitable for outdoor, as well as indoor applications and have a corrosion resistance per ASTM B117 for 1000 hours, minimum.

I. Nameplates:
1. Externally visible, permanent nameplates shall be provided on the switchgear and control cubicle doors to identify each instrument, instrument switch, meter, protective relay, control switch, indicating light, circuit breaker compartment, etc. Relays shall be designated as to use, and as to the phase to which they are connected.
2. Nameplates shall be laminated plastic, attached with bolts. Characters shall be white engraved on a black background.
3. Equipment (i.e. relays, timer, PLC equipment, etc.) and terminal blocks within the switchgear compartments shall be suitably identified by labeling tape with thermally embossed text.

J. Surge Arresters
1. Provide GE Tranquell series distribution class surge arresters, metal-oxide disk type with polymer insulators complying with ANSI/IEEE C62.11 based upon an arrester rating of 2.4 kV rms and mounted where indicated on the switchgear one line diagram and connected between each phase and ground.

K. Miscellaneous:
1. The system controls shall utilize heavy-duty industrial grade, controls and relays. All synchronizing and failure circuit relays shall embody the fail safe principle of dual contacts in parallel.

2. The switchgear manufacturer shall be responsible for providing the coordinating wiring diagrams showing the electrical connections between the control switchgear and the engine generators, for use by the Electrical Contractor and engine generator service personnel during installation and checkout of the equipment.
3. Provide a portable, manually operated, circuit breaker hoist for removal/transporting of a circuit breaker element and/or potential transformer, trunnion rollout assembly

2.9 EQUIPMENT DESCRIPTION

A. Master Control Cubicle
1. The master control cubicle shall be furnished to control both automatic and manual synchronization of the engine generators, load management control and engine sequencing. The following basic components and any additional equipment necessary shall be furnished to provide for a complete and dependable system
2. A Synchronizing swing panel shall be built into the master cubicle door with the following metering:
   a. One Bus AC voltmeter, scaled as required
   b. One Synchroscope
   c. Two Synchronizing lamps
   d. One Frequency meter, for station bus and generator units, dial type, 55 to 65 hertz scale
3. One automatic (Best Battery) DC control voltage sensor system
4. One voltmeter selector switch, wired to the bus voltmeter for reading phase to phase voltage
5. Two, independent and redundant programmable logic controllers, General Electric Series RX3i, each PLC complete with Profinet communication and dual reflective memory modules, power supplies, etc., as required
6. Operator Interface Panel (OIP), 23 inch, HD1080P touch screen, with 1920 x 1080 resolution, for access of PLC timers and set-points, engine sequencing with graphic screens to display system status and alarms, and to enable certain master control functions. The operator interface panel shall contain the screens and operate as detailed in section 2.6.M
   i. The operator interface panel shall contain the following basic screens:

Main Menu
System Single Line (with breaker positions)
Alarm Screen
Generator Screen
Load Control Screen
Load Demand Screen

   ii. The following functions can be initiated from the touch screen:

Load Demand (On/Off Switch Function)
System No-Load Test (On/Off Switch Function)

Auto Load Shed (On/Off Switch Function)
Load Add (Pushbutton Function)
Load Shed (Pushbutton Function)
Increase Load Capacity (Pushbutton Function)

iii. Upon receipt of an alarm, the operator interface panel automatically displays an alarm screen. An amber Operator Interface Alarm Present indicator on the master cubicle door will also illuminate, and the alarm horn will sound. All alarms can be reset using the failure-reset pushbutton on the master door.

iv. The following system alarms are displayed on the operator interface alarm screen:

Control Voltage Problem
PLC Low Battery
Bus Over Voltage
Bus Under Voltage
Bus Over Frequency
Bus Under Frequency
Over Load
Load Shed On
Main Tank Low Fuel Level
All Engine Pre-alarm and Alarm
PLC I/O Failure (identifies location and type of failure)

7. A main bus over and under voltage/frequency alarm relay (Crompton type 27/59), with alarm indication
8. Underfrequency alarm reset pushbutton
9. Sync-check relay for manual sync control
10. Master "auto-man" switch, with red light
11. Lamp test switch
12. A backlit annunciation panel with the following conditions:

FUNCTION	COLOR	MODE
Alarm horn silenced	Red	Status
Control not in automatic	Red	Status
Critical control voltage failure	Red	Alarm
Load shed on	Red	Alarm
PLC No.1 in control	Green	Status
PLC No.2 in control	Green	Status
Operator Interface Alarm	Red	Alarm
PLC failure (Flashes on low Battery)	Red	Alarm
ARMS Mode Active	Red	Alarm
Station Battery Alarm	Red	Alarm
Start signal present	White	Status
(4) Spares		

13. USB port on the master cubicle door connected to the OIP to allow an operator to download files such as event and alarm logs (Joint Commission test reports)
14. Ethernet ports, one wired on the master cubicle door and one internal spare port, both wired to an Ethernet hub in the switchgear that connects to the system PLCs (and other Ethernet capable devices) for troubleshooting and providing access to the internal Ethernet LAN for customer use, utilizing MODBUS TCP/IP protocol.
15. A gateway shall be furnished to provide Ethernet I/P communication to the plant SCADA system. The gateway shall be configured by the supplier of the switchgear.
16. 120AC convenience, duplex receptacle, wired out for control power supplied from an external source
17. 48 VDC to 24 VDC convertor
18. Switchgear arc reduction selector "Off – On" switch, illuminated type, with clear, padlockable cover.
19. Control wiring, DC circuit breakers, WAGO terminals, nameplates, etc., as required. All wiring shall be labeled at both ends.

B. Utility Transfer and Sync Control Cubicles
   1. Provide a separate transfer control cubicle for each utility and generator transfer pair of breakers. Each utility transfer and sync control cubicle shall include a full complement of analog meters to allow the operator a true visual indication of the transfer sequence. This cubicle will allow the operator to manually transfer and soft load and unload the engine generators to and from the utility source. The following basic components and any additional equipment necessary to provide for a complete and dependable system shall be furnished:
      a. One AC utility voltmeter, scale as required with four position selector switch, for reading phase to phase voltage
      b. One AC utility ammeter, scale as required, with four position selector switch, for reading phase current
      c. One utility watt/varmeter, scale as required, for the utility main breaker with selector switch
      d. One generator main watt/varmeter, scale as required, for the generator main breaker with selector switch
      e. One AC generator main ammeter, scale as required, with four position selector switch, for reading phase current
      f. Two Synchroscope switches with one removable keyed handle, used for manual synchronizing (key interlocked) to allow manual synchronizing of one breaker at a time
      g. Two frequency meter switches, with utility-off-generator nameplate (key interlocked)
      h. Two circuit breaker control switches, each with a separate back-lit L.E.D. annunciators for circuit breaker status indications (circuit breaker opened, circuit breaker closed, circuit breaker withdrawn). The annunciator shall match the other annunciators and be as specified herein
      i. A transfer mode selector switch with "Closed Transition" and "Open Transition" positions shall allow the selection of open or closed transition operation
      j. One Load Test switch with "Norm- Test" positions
      k. One manual sync enable pushbutton

l. Provide a retransfer mode selector switch with "Manual-Auto" positions and a “Retransfer Initiate” push-button to allow an operator to elect to stay on generators after a power failure has occurred, until the pushbutton is manually operated or the system is placed back in the “Auto Return” mode
m. Lamp test switch
n. A back-lit annunciation panel with the following conditions:

FUNCTION	COLOR	MODE
Inline Device Opened	Red	Status
Generator Bus Synchronizer On	Green	Status
Retransfer mode not in Auto	Amber	Status
Protective Relay Trip	Red	Alarm
Fail to Synchronize/Transfer	Red	Alarm
Normal Power On	Green	Status
Load test On	White	Status

o. A manual Synchronizing permissive relay shall be provided to prevent manual paralleling until both systems are within acceptable limits
p. A bus automatic synchronizer with phase lock control Woodward type SPM-D2-10 shall be provided to control the engine generator bus and hold the system in synchronism with the utility for automatic synchronizing control
q. 120AC convenience, duplex receptacle, wired out for control power supplied from an external source
r. Control wiring, DC circuit breakers, WAGO terminals, nameplates, etc., as required. All wiring shall be labeled at both ends

C. Generator Control Cubicles
1. Separate generator control cubicle shall be furnished for each individual generator, arranged to control the start/stop sequence, synchronizing, monitoring and metering of its’ associated engine generator. The following basic components shall be furnished along with any additional equipment necessary to provide for a complete and dependable system:
a. One AC voltmeter, scale as required, for reading phase to phase voltage
b. One AC ammeter, scale as required, for reading phase current
c. One wattmeter, scale as required
d. One Synchroscope switch with one removable keyed handle, used for manual synchronizing (key interlocked) to allow manual synchronizing of one breaker at a time
e. One manual sync enable pushbutton
f. One frequency meter switch, with bus-off-generator nameplate (key interlocked)
g. One voltmeter selector switch
h. One ammeter selector switch
i. One Voltage adjust switch, spring return to center off
j. One circuit breaker control switch, with a separate back-lit L.E.D. annunciator for circuit breaker status indications (circuit breaker opened, circuit breaker closed, circuit breaker with drawn). The annunciator shall match the other annunciators and be as specified herein

k. One PLC Distributed I/O Module, complete with input/output modules, communication modules, power supplies, etc., as required, for starting and stopping controls for each engine generator
l. One automatic synchronizer, Woodward type SPM-D2-10, for individual phase lock control of the engine generator
m. One manual speed adjust, with integral locking
n. An engine selector switch, with "Stop/Reset-Off-Auto-Run" nameplate shall be provided to operate as described herein
o. The switchgear and controls manufacturer shall mount and wire the governor load sharing module, furnished by the engine generator manufacturer
p. One Modbus/Ethernet gateway interface to engine generator, for reading engine alarm and status
q. Lamp test switch
r. A back-lit annunciation panel with the following conditions:

FUNCTION	MODE	COLOR
Engine alarm; summary alarm indication of the type of fault condition shall be displayed on the Operator Interface Panel.	Pre-alarm	Amber
Protective relay tripped	Shutdown	Red
Breaker failure	Shutdown	Red
Engine not available	Status	Red (Flashing)
Engine running	Status	Green
Critical control voltage failure	Shutdown	Red
PLC I/O Drop Failure	Shutdown	Red

s. Control wiring, DC circuit breakers, WAGO terminals, nameplates, etc. as required. All Wiring labels shall match manufacturers drawings.

D. Generator Circuit Breaker Cubicles
1. Each generator breaker cubicle shall be metal-clad and furnished with the following basic components, and any additional equipment necessary to provide for a complete and dependable system.
a. One 4.160KV, vacuum circuit breaker, 3 phase, 1200 amperes, stored energy, draw out type, arranged for operation on 48 VDC control power, with *50* KA, 3 phase, interrupting rating.
b. Circuit breaker arc reduction selector “Off – On” switch, illuminated type, with clear, padlockable cover
c. One set of (2) potential transformers, roll-out type, with required primary and 120 volt secondary
d. Two sets of (3) current transformers, ratio as required, for metering, relaying, etc. One set shall be dedicated for differential relaying
e. One set current transformers, supplied loose for mounting in generator terminal box, as required for differential relaying
f. One multi-function generator protection relay, Schweitzer model 700G (ANSI devices #87, #81O/U, #50/51V, #51G , #46, #40, #32 and #27/59)
g. One lockout relay, Electroswitch Type LOR (ANSI device #86)

h. One circuit breaker control switch, with a separate back-lit L.E.D. annunciator for circuit breaker status indications (circuit breaker opened, circuit breaker closed, circuit breaker withdrawn). Annunciator shall match the other annunciators and be as specified herein
i. One lamp test pushbutton
j. A set of compression lugs for customer's generator connections
k. One set of three insulated boots for lug connections, each boot capable of handling up to 3 lugs, for use by the electrical contractor to eliminate the need for taped connections
l. A set of 3 phase, 3000 amperes, insulated copper bus and ground bus shall be furnished as required for main bus and breaker connections
m. Control wiring, DC circuit breakers, fuses, fuse blocks, WAGO terminals, nameplates, etc, as required. All wiring to be labeled at both ends with tubular sleeve, permanent wire markers.

E. Utility Main Breaker Cubicle(s)

1. Each utility main breaker cubicle shall be metal-clad and furnished with the following basic components, and any additional equipment necessary to provide for a complete and dependable system.
   a. One 4.160 KV, vacuum circuit breaker, 3 phase, 3000 amperes, stored energy, draw out type, arranged for operation on 48 VDC control power, with *50* KA, 3 phase, interrupting rating.
   b. Circuit breaker arc reduction selector “Off – On” switch, illuminated type, with clear, padlockable cover
   c. One set (2) potential transformers, roll-out type, with required primary and 120 volt secondary
   d. One set (3) current transformers, ratio as required, for metering, relaying, etc.
   e. One three phase overcurrent and ground overcurrent relay, Schweitzer model 751 (ANSI device 50/51 and 51N)
   f. One lockout relay Electroswitch Type LOR (ANSI device #86)
   g. One circuit breaker control switch, with a separate back-lit L.E.D. annunciator for circuit breaker status indications (circuit breaker opened, circuit breaker closed, circuit breaker withdrawn. Annunciators shall match the other annunciators and be as specified herein
   h. One lamp test pushbutton
   i. A set of compression lugs for customer's power cable connections
   j. One set of three insulated boots for lug connections, each boot capable of handling up to 3 lugs, for use by the electrical contractor to eliminate the need for taped connections
   k. A set of 3 phase, 3000 amperes, insulated copper bus and ground bus shall be furnished as required for main bus and breaker connections
   l. Control wiring, DC circuit breakers, fuses, fuse blocks, WAGO terminals, nameplates, etc, as required. All wiring to be labeled at both ends with tubular sleeve, permanent wire markers.

F. Distribution Breaker Cubicles
   1. Provide the required number of individual distribution feeder breaker cubicles. Each distribution feeder breaker cubicle shall be metal-clad and furnished with the following basic components, and any additional equipment necessary to provide for a complete and dependable system.
      a. One 4.160 KV,vacuum circuit breakers, 3 phase, 1200 amperes, stored energy, draw out type, arranged for operation on 48 VDC control power, with *50* KA, 3 phase, interrupting rating.
      b. One space for future 4.160 KV vacuum circuit breaker, 3 phase, 1200A.
      c. Two circuit breaker arc reduction selector "Off – On" switches, illuminated type, with clear, padlockable cover Two sets of (3) current transformers, ratio as required, for metering, relaying, etc.
      d. Two, three phase overcurrent and ground overcurrent relays, Schweitzer model 751 (ANSI device 50/51 and 51N),
      e. Two lockout relays, Electroswitch Type LOR (ANSI device #86)
      f. Two circuit breaker control switches, with a separate back-lit L.E.D. annunciator for circuit breaker status indications (circuit breaker opened, circuit breaker closed, circuit breaker drawn out). Annunciators shall match the other annunciators and be as specified herein
      g. One lamp test pushbutton
      h. Two sets of compression lugs shall be provided for each breaker, for power cable connections
      i. Two sets of three insulated boots for lug connections, each boot capable of handling up to 3 lugs, for use by the electrical contractor to eliminate the need for taped connections
      j. A set of 3 phase, 3000 amperes, insulated copper bus and ground bus shall be furnished as required for main bus and breaker connections
      k. Control wiring, DC circuit breakers, fuses, fuse blocks, WAGO terminals, nameplates, etc, as required. All wiring to be labeled at both ends with tubular sleeve, permanent wire markers.

G. Station Battery and Battery Charger
   1. A station battery shall be furnished for the Switchgear and Control System. The station battery shall be installed on a freestanding, two tiered seismic rated, battery rack with spill containment.
   2. Operation shall be completely automatic with the charger maintaining the battery fully charged under all normal service conditions. Cooling shall be by convection.
   3. A wall-mounted battery charger enclosure shall be equipped with the following:
      a. A DC voltmeter, DC ammeter, float-charged indicator and high-rate charge indicator shall be mounted on the front of the panel.
      b. The enclosure shall contain a potentiometer for adjusting float charge voltage and a potentiometer for adjusting the high-rate voltage. These controls shall be equipped with AC and DC fuses and an AC and DC failure alarm relay.
      c. An automatic, 24-hour timer shall be installed within the console cabinet. Following an AC power failure longer than 8 to 12 seconds, the timer shall automatically switch the charger to the high-rate mode. After the preset interval, the timer shall return the battery to float charge.

4. The storage batteries shall be a low maintenance nickel cadmium batter, manufactured by SAFT. The battery shall be designed for nominal 48 volt DC switchgear service and shall be capable of delivering 75-ampere-hour capacity at the 8-hour rate.
5. The battery charger shall be of the constant-potential, two-rate type with a regulated output voltage stability of +/- 1% from zero to full nominal current rating, over an input voltage variation of 10%. Input shall be 120 volts, 60 Hertz, single phase, AC. Nominal output shall be 25 amperes and 48 volts DC. Charger shall be A12B as manufactured by LaMarche.

PART 3 - EXECUTION

3.01 COORDINATION

A. The Switchgear Manufacturer shall be responsible for providing the coordinating interconnect diagrams showing the electrical connections between all related equipment specified this section of the specifications. The interconnect diagrams are for use by the Electrical Contractor and switchgear service personnel during installation and checkout of the equipment.

B. The Engine Generator supplier shall supply the Switchgear Manufacturer with any required engine interface hardware, electronic governor, and voltage regulator system components. Along with this equipment, the Engine Generator Vendor will furnish detailed drawings outlining proper interconnection and physical mounting data. The equipment shall be mounted and wired by the Switchgear Manufacturer.

C. The Switchgear Manufacturer shall verify the completion of all start-up commissioning and site testing of the Critical Power Switchgear System. The Switchgear Manufacturer shall also assist the Engine-Generator supplier as necessary in the performance of site start-up and testing of the engine-generators.

3.02 FACTORY TESTING

A. At the factory, the Switchgear Manufacturer shall perform tests on the switchgear and generator controls as required verifying the proper operation of each component and demonstrating full compliance with the requirements of this specification. The factory test reports will be available upon request.

B. The equipment shall be completely assembled, wired, adjusted, and tested at the factory. Rigid inspections before and after assembly shall assure correctness of design and workmanship. After assembly, each switchgear assembly shall be tested for operation under simulated conditions.

C. After a visual inspection, the following operational tests shall be performed:
   1. Operate all circuit breakers in connected as well as in test positions. Check the operation of all interlocks by attempting to close breaker into interlocked configurations.
   2. Check racking mechanisms by removing and reinstalling each circuit breaker.

3. Check stored energy mechanism of each breaker by tripping, closing and tripping each breaker after removal of control power.
4. Dielectric tests.
5. Test all protective relay devices by simulation tests.

D. The Manufacturer shall supply all equipment, devices and circuitry required to simulate all synchronizing and paralleling functions, digital and analog signal inputs, outputs and confirmation signals, diesel generator control and operation. Automatic and manual operation of the paralleling circuit breakers and protective and indicating devices shall be included.

3.03 PACKING AND SHIPPING

A. The Switchgear Manufacturer shall prepare all equipment covered by this specification in such a manner as to protect it against damage in transit.
B. The Switchgear Manufacturer shall perform the following steps to prepare the equipment for shipping and final assembly at the site:
   1. All equipment shall be adequately packed to prevent damage from handling, weather, shock, vibration and corrosion during shipment by common carrier.
   2. All metering and equipment shall be protected to ensure cleanliness during shipment, storage and erection.
   3. Each item of equipment shall be clearly marked. All boxes, crates and shipments shall be numbered and identified with the following information:
      a) Owner's purchase order number.
      b) Owner's name and delivery location.
      c) Manufacturer’s name and address.
      d) Contents.
   4. All equipment shall have provisions for lifting and skidding. All lifting points shall be clearly marked.
   5. Each shipping unit shall be braced adequately and rigidly both internally and externally to prevent damage during transit or in the process of erection.
   6. When assemblies are supplied that require disassembly for installation or are shipped disassembled, each piece of the subassembly so affected shall be uniquely identified as to its assembly position. All loose peripheral equipment shall be boxed, crated or otherwise completely enclosed and protected during storage, handling and shipment.

C. All equipment and material shall be shipped to the job site unless otherwise instructed.

D. All equipment shall be adequately protected, braced and secured to prevent physical and environmental damage during transit and handling. All material not mounted or installed on the major equipment during shipping shall be properly crated and shipped with the associated equipment.

E. Drawout circuit breakers shall be crated and shipped separately if recommended by the breaker vendor otherwise breakers will be shipped within the system.

F. The Vendor shall coordinate shipping of all equipment and material with the successful Contractor.

G. Shipping sections shall be arranged to permit transport through limited access as required.

H. The equipment shall be equipped for handling by crane, pallet jack and rollers.

3.04 INSTALLATION

A. The Electrical Contractor shall provide labor for the installation of the Critical Power Switchgear System plus all associated external wiring for power and controls. All rigging required for unloading and installation shall be the responsibility of the Electrical Contractor.

B. The Switchgear shall be installed following the procedures set forth by the Switchgear Manufacturer. The Switchgear Manufacturer shall assist the Electrical Contractor as required in interpreting the installation instructions. The Electrical Contractor shall certify to the Switchgear Manufacturer and Owner that the installation has been performed per the latest documents and instructions.

C. Following installation, the Switchgear Manufacturer shall inspect and verify the correct installation of the switchgear, including all individual components.

D. The switchgear housing and components shall be sealed to prevent rodent entry. Any openings not sealed by factory method shall be sealed in the field using permanent methods.

3.05 FIELD SERVICE START-UP AND TRAINING REQUIREMENTS

A. The Switchgear Manufacturer shall provide the services of a field service engineer for a pre-installation coordination meeting with the Engine Generator Vendor and Electrical Contractor to coordinate the installation and interconnection of the Critical Power Switchgear System and generators.

B. The Switchgear Manufacturer shall provide a field engineer for an initial visit to checkout the installation of the switchgear to allow the energization of the utility main service breaker if required.

C. The Switchgear Manufacturer shall provide a field engineer for post installation start-up and testing assistance, prior to system turnover and initial instruction and training for the facility's operating personnel. This trip shall include all service required to checkout the Critical Power Switchgear System and demonstrate the complete operation for final acceptance by the owner.

D. At the time of start-up of the system equipment, the Switchgear Manufacturer shall furnish (2) preliminary sets of installation, operating and maintenance manuals. At the conclusion of the site testing, the field engineer shall leave (1)

manual at the site. This manual shall include any and all changes that have occurred during the equipment start-up. The amended manual shall serve as a reference tool until the final sets of O&M manuals are supplied.

E. The instructions shall include recommended field test procedures as defined in the Standards. A schedule listing the frequency prescribed for performing the field tests shall be provided.

F. Approximately six months after the complete system turnover, a visit shall be made to provide instruction for operating personnel on the complete operation and maintenance program for the Critical Power Switchgear System.

G. The bid shall include the cost for the services of a factory authorized service representative to train the Owner's On-Site Work Force (OSWF) on procedures and schedules for programming, setting of relay, startup, shutdown, troubleshooting, servicing and preventive maintenance of all equipment. Included below:

1. The instruction shall be dedicated and intensive and shall be provided by competent instructors fully familiar with the equipment.
2. The instructions shall be presented in an eight hour session. The Field Service engineer will provide Instructions on the operation and maintenance of the switchgear, circuit breaker, protective relays and PLC equipment.
3. The Owner will provide a suitable classroom environment on site for the instruction session.
5. The training session may be recorded by the owner.
6. Training to be scheduled with at least seven working days advance notice.
7. Provide both classroom training and hands-on equipment operation covering the following:
   a. Safety precautions.
   b. Features and construction of switchgear and accessories.
   c. Routine inspection, test and maintenance procedures.
   d. Routine cleaning.
   e. Features, operation and maintenance of protective devices.
   f. Interpretation of readings of indicating and alarm devices.
   g. Review operating and maintenance manuals.
   h. Review troubleshooting operations.

END OF SECTION 26 13 26

SECTION 26 13 29
PRE-FABRICATED ELECTRICAL BUILDING

PART 1 - GENERAL

1.01 SYSTEM DESCRIPTION

A. General:
   1. The Electrical Building shall be a completely self-contained pre-engineered package custom designed to specific power requirements and environmental conditions. The enclosure is designed to house specified electrical equipment and any associated relay and control panels. The minimum aisle space and clearance around the equipment are designed per Section 110 (working clearances) of the latest National Electric Code.
   2. The Electrical Building shall be supplied (but not necessarily built) by the power distribution equipment manufacturer and furnished as a complete package custom built containing the exact equipment specified, enclosures, and building appurtenances. It is intended that the Electrical Building supplied be a specialized piece of equipment manufactured expressly for this application. The Electrical Building and components shall be pre-wired and shipped as a complete unit.
   3. Provide a NEMA 3R Electrical Building structure with exterior walls and roof fabricated from interlocking panels to house and protect the internal equipment from the elements.
   4. Type 3R Enclosures are intended for outdoor use primarily to provide a degree of protection against falling rain, sleet and snow; undamaged by the formation of ice on the enclosure (NEMA 250).
   5. Structural grid base and floor system shall be designed for applicable floor loading allowing the Electrical Control Building to be lifted and transported with the interior equipment installed.

B. Design and construction shall conform to the applicable sections of the latest standards as issued by the following agencies, as a minimum:
   1. Kentucky Building Code (KBC): Default Structural loading criteria shall be per the IBC.
   2. American National Standards Institute (ANSI).
   3. American Society of Civil Engineers (ASCE).
   4. American Institute of Steel Construction (AISC).
   5. American Iron and Steel Institute (AISI) - Specification for the Design of Cold Formed Steel Structural Members).
   6. Metal Building Manufacturers Association (MBMA).
   7. American Society for Testing and Material (ASTM).
   8. American Society of Heating, Refrigeration, and Air conditioning Engineers (ASHRAE).
   9. National Electric Manufacturers Association (NEMA).
   10. National Electric Code (NEC).
   11. National Fire Protection Association (NFPA)
   12. Steel Door Institute (SDI).

C. Structural Performance:
   1. The Electrical Building shall be designed and constructed to withstand external loading conditions as prescribed by the Kentucky Building Code for the specified final location.
   2. Building components shall be designed to withstand external loading as prescribed by the applicable codes as a minimum, with co-lateral considerations as follows:
   3. Base and floor system shall be designed to withstand all dead and live loads as applicable, or a minimum of 250 lb/sf over the entire floor area, while supported at indicated minimum support locations only.
   4. Maximum deflection of all base members shall not exceed L/240 with all applicable dead and live loads applied.
   5. Roof loading: Per Kentucky Building Code (30 lb/sf minimum).
   6. Wind loading: Per Kentucky Building Code - Exposure C minimum
   7. Seismic: Per Kentucky Building Code.
   8. Interior walls: Interior walls shall be capable of mounting and supporting 400 lb/lf and 200 ft-lbs of moment / torque at any place along the perimeter wall space, with attachment to the interlocking ribs, or metal studs, located on 16 inches centers behind interior walls.
   9. Each shipping piece shall be designed for lifting by lugs located along the base perimeter members at 15 feet approximate intervals.
   10. All lifting lugs shall be removable.
   11. The ceiling shall be capable of withstanding a single continuous load of 100 lb/lf located at mid span of the ceiling panels, and running the entire building length. The ceiling panels shall act alone, structurally, and not depend on the roof or the interior equipment for support.
   12. All shipping splits and other penetrations shall have adequate structural reinforcement via rigid frames or other means to minimize distortion during handling and transportation.

D. HVAC Performance:
   1. The amount of air shall be as required for the number of maximum occupancy based on square footage of the enclosure, and as required to heat/cool the space.
   2. Redundancy: NONE. One or multiple units as required to meet atmospheric and internal heating and cooling requirements.
   3. Exterior Design Temperatures:
   4. Summer: (Per ASHRAE 2.5% design temperature).
   5. Winter: (Per ASHRAE 97.5% design temperature).
   6. Interior Design Temperatures:
   7. Summer: 80 degree F.
   8. Winter: 60 degree F.
   9. Voltage: 480V

E. Certifications:
   1. The Electrical Control Building shall be Third Party certified by UL as NEC (National Electric Code) and / or CEC (Canadian Electric Code) and / or UL 3R RAIN TEST and / or IEEE C37.2.2-199 RAIN TEST compliant, and shall bear a UL Label.
   2. The Electrical Control Building design shall be accomplished under the auspices

of a Professional Engineer and drawings and supporting calculations shall bear the Professional Engineer's seal.

F. Submittals:
   1. The submittal shall contain details on the housing. The housing manufacturer shall certify/seal the Drawings prepared as Shop Drawings with an appropriate professional engineer's seal as required by local Code authorities.

PART 2 - PRODUCTS

2.01 WALK-IN ELECTRICAL BUILDING

A. The housing shall be factory assembled and construction arranged to facilitate Contractor installation. The housing shall have a footprint as indicated, and as required to house the specified equipment, plus required NEC clearances. It shall be at least 8 feet high inside, for a non-hazardous environment. The base shall be constructed of welded steel I-beams, channels, and angle supports, sized and reinforced to accommodate loading requirements. The base shall be primed with zinc chromate, followed by a layer of bituminous undercoating. The base exterior shall be finished with epoxy coating. The floor shall be steel plate welded to the base framework. Floor material shall be tread plate finished with skid resistant epoxy. Wall panel material shall be galvanized, formed in an interlocking design which is self-framing and capable of withstanding wind loads of 125 mph, of 12 gauge thickness. Roof panels shall be galvanized, formed of 12 gauge steel in a standing rib design eliminating the possibility of water entry. The roof shall be sloped for water runoff and capable of withstanding snow loads of 40 psf. The entire housing shall be painted with 3-5 mils of epoxy paint. Color shall be off-white outside and gray to match the MCC inside. Insulation levels shall be as follows:
   1. Ceiling: Fiberglass bat (R15).
   2. Walls: Fiberglass bat (R15).
   3. Floor: 1 inch Spray Applied Polyurethane insulation (R6).
   4. Personnel Doors: (R2.4).

B. LED lighting shall be provided in sufficient quantity to maintain 30 fc 30" AFF. Fixtures shall be equipped with diffusers. Lighting shall be switched beside the doors. Outdoor LED light fixture switched from beside the door or photocell controlled as indicated shall also be provided. Duplex receptacle shall be provided as shown

C. Wiring, incoming and outgoing, will be through the bottom. Access shall be provided as necessary for proper installation and maintenance. Thermostatically controlled electric ventilation equipment shall be provided including motorized automatic dampers, as well as thermostatically controlled electric heating equipment. Also, an emergency lighting fixture shall be furnished and installed, wired into the housing lighting power circuit. All accessory equipment shall be wired to a panelboard furnished with the enclosure, sized as required for the loads served.

D. A single entrance door shall be provided on each end of double wall fiberglass construction, complete with brushed aluminum panic bar, hardware, and door closer. The door shall include drip shield, aluminum threshold, weather stripping, and stainless steel hinges. The door shall have R2.4 thermal resistance rating and 1.5 hour fire resistance rating. A wire meshed tempered safety glass window is required in the door. A door size of 42 inches by 8 feet nominal is required, at the location shown on the Contract Drawings. Should that door size not allow for proper equipment installation/removal, then a removable wall panel shall be required. A "Danger High Voltage" and "Authorized Personnel Only" sign shall be mounted on the exterior of the door and a drip shield installed over the door. The door shall have a lockset, and 5 keys shall be furnished the Owner.

E. The housing shall be supplied (but not necessarily built) by the power distribution equipment manufacturer and shall be custom built to fit the exact equipment specified. It is intended that the housing supplied be a specialized piece of equipment manufactured expressly for this application. The housing manufacturer shall certify/seal the Drawings prepared as Shop Drawings with an appropriate professional engineer's seal as required by local Code authorities.

F. The housing shall be anchored to the concrete foundation in accordance with manufacturer's recommendations.

G. The housing shall contain a packaged through-wall air conditioner. The air conditioner shall be sized to accommodate actual heat load calculated. The unit shall be provided with low ambient controls and coated coils for corrosion resistance. A thermostat shall be provided to include the following:
   1. Auto Change Over, Digital, F or C Display:
   2. Smart recovery (heating mode).
   3. Droopless control, 4 cycles/hr.
   4. Backlit display.
   5. Settings never lost during power failure.
   6. 5 minute compressor protection.
   7. Separate set points for heating and cooling.
   8. Battery-less operation.
   9. Electro-Mechanical relay design.
   10. Low Pressure Switch.
   11. High Pressure Switch.
   12. Low Ambient Control.
   13. Compressor anti-cycle relay.
   14. Alarm Relay.
   15. Barometric Damper.
   16. Supply and Return Grills.
   17. Pleated Filter 2 inches MERV 8.
   18. R410A Refrigerant.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Do not begin installation until supporting foundation or building pad has been properly prepared.

B. Locate and verify utility services and structural foundation prior to installation.

C. Prepare foundation using the methods recommended by the manufacturer.

D. Electrical Control Building shall be installed by manufacturer installation services team.

E. The housing shall be anchored to the concrete foundation in accordance with manufacturer's recommendations.

F. Protect delivered units, accessories and installed products until completion of project.

G. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 26 13 29

SECTION 26 22 00
SMALL POWER AND MISCELLANEOUS TRANSFORMERS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Transformer locations and size shall be as shown on the Contract Drawings, as specified herein.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. "Square D", "Siemens," "Cutler Hammer", or equal.

2.02 FABRICATION

A. General Purpose Dry-Type Transformers

a. Single phase transformers shall be 480 or 600 volt primary and 120/240 volt secondary. Three phase transformers shall be 480 or 600 volts delta primary and 208 Y/120 or 240 volt delta secondary. Transformers 25 KVA and larger shall have a minimum of 4 (2 above, 2 below) 2-1/2 percent full capacity primary taps.
b. Transformers shall be 150 degrees Celsius temperature rise above a 40 degrees Celsius ambient. All insulating materials are to be in accordance with the latest NEMA Standards for a 220 degrees Celsius UL recognized insulation system.
c. Transformer coils shall be of the continuous wire wound construction and shall be impregnated with non-hygroscopic, thermo-setting varnish. The coils shall also have a final wrap of electrical insulating material to prevent mechanical injury to the wire as well as increasing the electrical breakdown strength.
d. All cores shall be constructed of high grade, non-aging silicon steel with high magnetic permeability, and low hysteresis and eddy current losses. Magnetic flux densities are to be kept well below the saturation point. The core laminations shall be clamped together with steel angles. The completed core and coil shall then be bolted to the base of the enclosure but isolated from the base by means of rubber, vibration absorbing mounts. There shall be no metal-to-metal contact between the core and coil to the enclosure. On transformers 500 KVA and smaller, the vibration isolation system shall be designed to provide a permanent fastening of the core and coil to the enclosure. To further facilitate vibration and noise isolation, the final section of conduit to the transformer shall be flexible.
e. Transformers 25 KVA and larger shall be in heavy gauge, sheet steel, ventilated enclosures. The ventilating openings shall be designed to prevent accidental access to live parts in accordance with UL, NEMA, and National Electrical Code Standards for ventilated enclosures. Transformers 25 KVA through 75 KVA shall be designed so they can either be floor or wall mounted. Above 75 KVA they

shall be of the floor mounted design.

f. The entire transformer enclosure shall be degreased, cleaned, phosphatized, primed, and finished in the same color as the motor control equipment.
g. The maximum temperature of the top of the enclosure shall not exceed 50 degrees Celsius rise above a 40 degrees Celsius ambient.
h. The core of the transformer shall be visibly grounded to the enclosure by means of a flexible grounding conductor sized in accordance with NEMA and NEC Standards.
i. The transformer shall be marked “DANGER HIGH VOLTAGE” with labels specified in the section on marking, this Division.
j. The transformers shall be manufactured to requirements of applicable standards, especially as they apply to noise level and surface temperatures.

PART 3 - EXECUTION

3.01 INSTALLATION / APPLICATION / ERECTION

A. Transformers shall be rigidly mounted to the structure or the foundation in the case of freestanding units.

B. Transformers shall be megger tested prior to energization.

C. Transformers with taps shall be adjusted to supply the nominal service voltage required on the secondary.

D. Transformers shall be installed in accordance with NEC requirements and manufacturer recommendations.

END OF SECTION – 26 22 00

SECTION 26 24 16
PANELBOARDS

PART 1 - GENERAL

1.01 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

2.01 ACCEPTABLE MANUFACTURERS

A. “Square D”, “Siemens”, “Cutler Hammer”, or equal.

2.02 GENERAL REQUIREMENTS

A. Rating - Panelboard ratings shall be as shown on the Contract Drawings. All panelboards shall be rated for the intended voltage.

B. References - The panelboard (s) and circuit break (s) referenced herein are designed and manufactured according to the latest revision of the following specifications.

a. NEMA PB 1 – Panelboards
b. NEMA PB 1.1 – Instructions for Safe Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or less.
c. NEMA AB 1 – Molded Case Circuit Breakers
d. UL 50 – Enclosures for Electrical Equipment
e. UL 67 – Panelboards
f. UL 489 – Molded-Case Circuit Breakers and Circuit Breaker Enclosures
g. CSA Standard C22.2 No. 29-M1989 – Panelboards and Enclosed Panelboards
h. CSA Standard C22.2 No. 5-M91 – Molded Case Circuit Breakers
i. Federal Specification W-P-115C – Type I Class 1
j. Federal Specification W-C-375B/Gen – Circuit Breakers, Molded Case, Branch Circuit and Service.
k. Federal Specification W-C-865C – Fusible Switches
l. NFPA 70 – National Electrical Code (NEC)
m. ASTM – American Society of Testing Materials

2.03 LIGHTING AND APPLIANCE PANELBOARD TYPE - 120/240V OR 120/208V

A. Interior

a. Continuous main current ratings, as indicated on the Drawings, not to exceed 600 amperes maximum.
b. Minimum short circuit current rating as indicated or as required to meet the short circuit study criteria specified elsewhere.
c. Provide one (1) continuous bus bar per phase. Each bus bar shall have sequentially phased branch circuit connectors suitable for plug-on or bolt-on branch circuit breakers. The bussing shall be fully rated. Panelboard bus current ratings shall be determined by heat-rise tests conducted in accordance with UL 67. Bussing rated 100-400 amperes shall be plated copper. Bussing rated for 600 amperes shall be plated copper as standard construction. Bus bar plating shall run the entire length of the bus bar. Panelboards shall be suitable for use as Service Equipment when application requirements comply with UL 67 and NEC Articles 230-F and -G.
d. All current-carrying parts shall be insulated from ground and phase-to-phase by high dielectric strength thermoplastic.
e. A solidly bonded copper equipment ground bar shall be provided. Where indicated, an additional copper isolated/insulated ground bar shall also be provided.
f. Split solid neutral shall be plated and located in the mains compartment up to 225 amperes so all incoming neutral cable may be of the same length. UL Listed panelboards with 200% rated solid neutral shall be plated copper for non-linear load applications. Panelboards shall be marked for non-linear load applications.
g. Interior trim shall be of dead-front construction to shield user from energized parts. Dead-front trim shall have pre-formed twistouts covering unused mounting space.
h. Nameplates shall contain system information and catalog number of factory order number. Interior wiring diagram, neutral wiring diagram, UL Listed label and short circuit current rating shall be displayed on the interior or in a booklet format.
i. Interiors shall be field convertible for top or bottom incoming feed. Main circuit breakers in 100A interiors shall be horizontally or vertically mounted. Main circuit breakers over 100A shall be vertically mounted. Sub-feed circuit breakers shall be vertically mounted. Main lug interiors up to 400 amperes shall be convertible to main breaker. Interior leveling provisions shall be provided for flush mounted applications.

B. Main Circuit Breaker

a. Main circuit breakers shall have an overcenter, trip-free, toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have a permanent trip unit with thermal and magnetic trip elements in each pole. Each thermal element shall be true RMS sensing and be factory calibrated to operate in a 40° C ambient environment. Thermal elements shall be ambient compensating above 40° C.
b. Two- and three-pole circuit breakers shall have common tripping of all poles. Circuit breakers frame sizes above 100 amperes shall have a single magnetic

trip adjustment located on the front of the circuit breaker that allows the user to simultaneously select the desired trip level of all poles. Circuit breakers shall have a push-to-trip button for maintenance and testing purposes.

c. Breaker handle and faceplate shall indicate rated ampacity. Standard construction circuit breakers shall be UL Listed for reverse connection without restrictive line or load markings.
d. Circuit breaker escutcheon shall have international I/O markings, in addition to standard ON/OFF markings. Circuit breaker handle accessories shall provide provisions for locking handle in the ON or OFF position.
e. Lugs shall be UL Listed to accept solid or stranded copper and aluminum conductors. Lugs shall be suitable for 90° C rated wire, sized according to the 75° C temperature rating per NEC Table 310-16. Lug body shall be bolted in place; snap-in designs are not acceptable.
f. The circuit breakers shall be UL Listed for use with the following accessories: Shunt Trip, Under Voltage Trip, Ground Fault Shunt Trip, Auxiliary Switch, Alarm Switch, Mechanical Lug Kits, and Compression Lug Kits.

C. Branch Circuit Breakers

a. Circuit breakers shall be UL Listed with amperage ratings, interrupting ratings, and number of poles as indicated on the Drawings.
b. Molded case branch circuit breakers shall have bolt-on type bus connectors.
c. Circuit breakers shall have an overcenter toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have thermal and magnetic trip elements in each pole. Two- and three-pole circuit breakers shall have common tripping of all poles.
d. There shall be two forms of visible trip indication. The breaker handle shall reside in a position between ON and OFF. In addition, there shall be a red indicator appearing in the clear window of the circuit breaker housing.
e. The exposed faceplates of all branch circuit breakers shall be flush with one another.
f. Lugs shall be UL Listed to accept solid or stranded copper and aluminum conductors. Lugs shall be suitable for 90° C rated wire.
g. Breakers shall be UL Listed for use with the following factory installed accessories: Shunt Trip, Auxiliary Switch, and Alarm Switch.

D. Enclosures

a. Type 1 Boxes
    1. Boxes shall be galvanized steel constructed in accordance with UL 50 requirements.
    2. Boxes shall have removable endwalls with knockouts located on one end. Boxes shall have welded interior mounting studs. Interior mounting brackets are not required.
    3. Box width shall be 26” wide maximum.
b. Type 1 Fronts
    1. Front shall meet the strength and rigidity requirements per UL 50 standards. Front shall have an ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
    2. Fronts shall be 1-piece with door. Mounting shall be flush or surface as indicated on the Drawings.

3. Panelboards shall have fronts with concealed door hinges and mounted with trim screws. Front shall not be removable with the door locked. Doors on front shall have rounded corners and edges shall be free of burrs.
4. Front shall have cylindrical tumbler type lock with catch and spring-loaded stainless steel door pull. All lock assemblies shall be keyed alike. A clear plastic directory cardholder shall be mounted on the inside of door.

PART 3 - EXECUTION

3.01 INSTALLATION/APPLICATION/ERECTION

A. Boxes for surface mounted panelboards shall be mounted so there is at least 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.

D. Provide the owner with five (5) keys for each type lock furnished.

END OF SECTION-26 24 16

SECTION 26 32 13
STANDBY POWER GENERATOR SYSTEMS - FIXED

PART 1- GENERAL

1.01 SCOPE OF WORK

A. This Specification covers the installation of a fixed emergency standby generator system and required items of auxiliary equipment. Provisions shall be made to parallel a future second generator to one power bus. The engine, generator, and all equipment that make up the standby generator systems shall be bid direct to each Contractor by the manufacturer or his authorized distributor maintaining a parts and service facility within 150 miles of the project location.

B. All materials equipment and parts comprising the units specified herein shall be new and unused, of current manufacture and of the highest grade. All equipment shall be free from all defects or imperfections.

C. Equipment specified in Section 26 13 26 shall be furnished with the equipment specified herein, to be coordinated, installed, and tested as a complete functional system.

1.02 SUBMITTALS

A. The submittal shall include complete wiring schematics and interconnection diagrams identifying by terminal number each required interconnection between the transfer switch, emergency shutoff pushbuttons, engine control panel, etc. The submittal shall also contain complete descriptive literature on every piece of equipment, battery sizing calculations, and spare parts list.

1.03 GUARANTEE AND SERVICE AGREEMENT

A. Equipment furnished under this section shall be guaranteed against defective parts or workmanship for a period of five years from the date of field testing and acceptance by the Owner. The warranty shall include 24 hour parts and service from the manufacturer through the local distributor.

B. During the five year warranty period, the supplier of the generator and transfer switch package shall provide regular maintenance of the equipment in accordance with the manufacturer's published operation and maintenance manuals. Regular maintenance shall include, but not be limited to tune-ups and associated parts, fuses, filter replacements, spark plugs, clamps, and hoses. Regular fluid replacements including oil and coolants shall also be included. Any required adjustments to the transfer switch and generator controls shall be included in the maintenance agreement.

C. After each maintenance or warranty site visit, a report shall be provided to the Owner outlining the maintenance performed, adjustments made, repairs or corrections, and a list of parts that were replaced during the site visit.

D. See General Requirements for general project warranty requirements.

1.04 TESTING

A. Generator Set:
   1. The generator set shall receive the manufacturer's standard testing and a full load bank test on site. Prior to acceptance of the installation, the equipment shall be tested to show it will perform satisfactorily, including automatic starting, subject to full load test, and reset as required in these Specifications. The generator shall be tested under full load for a minimum of 60 minutes, and under 75% load for an additional 60 minutes. Prior to acceptance, any defects which become evident during this test shall be corrected by the manufacturer.

B. Paralleling Switchgear
   1. Interconnection to 2400 volt switchgear breakers, paralleling the two generators for fully automatic operation is the responsibility of the generator manufacturer. In addition, an operating test shall be simulated to verify that all of the equipment performs as described above. A certified test report shall be furnished by the manufacturer to show that the generator controls meets all requirements of these Specifications and that the operational requirements have been met.

1.05 START-UP

A. Generator Set:
   1. On completion of the installation, the initial startup shall be performed by a factory-trained representative of the engine supplier. At the time of startup, operating instruction and maintenance procedures shall be thoroughly explained to operating personnel. Installation, operating, and maintenance instruction books shall be submitted for the electric set and all auxiliary equipment in a 3-ring binder, at the time of submittal of descriptive literature, for review. The manufacturer's service representative shall be prepared to check phase rotation "by instrument", prior to start-up. It will not be allowed to isolate one motor on the generator and check its rotation to determine phasing.

PART 2- PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Generator shall be manufactured by "Kohler", "Caterpillar", "Cummins", or equal.

B. Manufacturers for smaller components are listed under each component's description.

2.02 GENERATOR SET

A. Rating:
   1. The standby generator shall be rated 2000 KW minimum each with fan for continuous service with normally varying loads during interruption of utility power - 0.8 power factor, 2400 volts, 3 phase 3 wire, 60 Hz. and shall have a

maximum operating speed of 1,800 rpm.

2. Ratings must be substantiated with manufacturer's standard published curves. Special ratings for a particular application are not permitted. These ratings must reflect the net power available after deducting all engine driven accessories.

B. Engine:
   1. The 3783 cubic-inch displacement engine shall deliver 2923 hp at 1,800 rpm maximum and shall be full compression diesel type and of the 4 stroke cycle, turbo charged, intercooled. The engine and alternator shall be furnished to meet the SKVA requirement of 1177 KVA under 20% maximum voltage dip conditions.
   2. Engines shall be capable of normal operation on a commercial grade, No. 2-d domestic burner oil. The unit shall be furnished with filters for fuel, oil, and intake air. Air cleaner restrictor indicator shall be provided to indicate the need for maintenance of the air cleaner. A suitable lubrication oil cooler and transfer pump shall be furnished as part of the engine equipment. Lubricating oil for the unit shall be furnished by the engine manufacturer.
   3. The engine shall have an engine mounted radiator of sufficient capacity to maintain safe operating temperature at an ambient room temperature of 125°F. The engine shall be equipped with thermostats and a jacket water pump of sufficient capacity to overcome piping losses for the distances and heights shown on the Drawings. The system shall properly cool the engine with up to 0.5 H20 static pressure on the fan in an ambient temperature up to 105°F. The radiator shall be equipped with a core guard, fan guard, and flange for duct connection. Flexible hose connections shall be provided at the engine and radiator. The radiator and engine cooling system shall be filled with a 50 percent solution of ethylene glycol and water to prevent freezing. Electric set manufacturer shall furnish antifreeze prior to start-up.
   4. A critical silencer shall be furnished for the unit with a side inlet properly sized according to the silencer manufacturer's recommendation for the engines used. Mounting shall be as shown on the Drawings. A stainless steel flexible exhaust fitting shall be provided for mounting between the engine exhaust and exhaust pipe. The silencer system shall be of a type and size to ensure against loss of engine power due to excessive back pressure. The silencer shall be equipped with a condensate drain. A bird screen shall be welded into the end of the exhaust pipe which extends to the building exterior.
   5. Safety shutoff alarms shall be provided for high water temperature, low oil pressure, engine overspeed, engine overcrank, and high lubricating oil temperature.
   6. The engine assembly shall be mounted on a structural steel subbase and shall be provided with vibration isolators between the engine and the steel subbase or between the base and floor.
   7. The engine and all accessories shall comply with all applicable portions of NFPA 37 "Stationary Combustion Engines and Gas Turbines", NFPA 30 "Flammable and Combustible Liquids Code" latest revisions, International Fire Code, as well as NFPA 31 "Installation of Oil Burning Equipment" latest revision.
   8. The engine shall be equipped with an engine mounted thermal circulation type water heater to maintain engine jacket water at 90 degrees Fahrenheit in an ambient temperature of 30 degrees Fahrenheit. The heaters shall be 60 Hz. 208 volt a-c.

9. EPA certifications are currently required for generator sets. The level at which generators must be certified may be different at the time the project is awarded or equipment purchased than at the time these Specifications are written. The generator set for this project shall meet the current requirements at the time that the equipment is manufactured.
10. The unit shall be equipped with an electronic governor, capable of ±0.25% steady-state frequency regulation.

C. Generator:
1. The alternator shall be salient-pole, brushless, 12-lead reconnectable, self-ventilated of drip-proof construction with amortisseur rotor windings and skewed stator for smooth voltage waveform. The insulation shall meet the NEMA standard (MG1-33.40) for Class H and be insulated with epoxy varnish to be fungus resistant per MIL 1-24092. Temperature rise of the rotor and stator shall be limited to 130°C. The excitation system shall be of brushless construction controlled by a solid-state voltage regulator capable of maintaining voltage within ± .25% at any constant load from 0% to 100% of rating. The regulator must be isolated to prevent tracking when connected to SCR loads, and provide individual adjustments for voltage range, stability and volts-per-hertz operations; and be protected from the environment by conformal coating.
2. The generator set shall meet the transient performance requirements of ISO 8528-5, level G-3.
3. The alternator excitation shall be of a permanent magnet exciter design.
4. The generator shall be inherently capable of sustaining at least 250% of rated current for at least 10 seconds under a 3-phase symmetrical short circuit without the addition of separate current support devices.

5. The alternator having a single maintenance-free bearing, shall be directly connected to the flywheel housing with a semi-flexible coupling between the rotor and the flywheel.

D. Controller
1. Standards:
   a. Control – The generator must meet NFPA-110 Level 1 requirements (1996 version) and shall have an integral alarm horn as required by NFPA.
   b. NFPA-99 and NEC shall also be accommodated.
   c. Set control shall be listed under UL 508.
2. Applicability:
   a. For standardization purposes, the control described herein shall be available on generator sets 20kW and larger.
   b. The control shall be usable on 12- or 24-volt starting systems.
   c. Environment
      1) -40°C to +70°C operating temperature range
      2) 5-95% humidity, non condensing
   d. It shall be possible to mount the control on the generator set or remotely within 40 feet of the generator set. If mounted on the generator, the control shall be able to be mounted in any of 4 orientations for ease of viewing.
3. Hardware Requirements:
   a. The control shall have a key operated run-off/reset-auto three-position

selector switch.

b. A controller mounted latch type emergency stop push button must be supplied.
c. It shall be possible to adjust alternator output voltage at the control.
d. Five indicating lights:
    1) system ready – green
    2) not in auto – yellow
    3) programming mode – yellow
    4) system warning – yellow
    5) system shutdown - red
e. Lighted display with two lines of 20 alphanumeric characters for messages. Panel lights shall be supplied as standard.
f. Sixteen position snap action sealed keypad for menu selection and data entry.
g. For ease of use, an operating guide shall be on the controller faceplate.
h. An audible alarm shall be supplied in the control.

4. Control Functional Requirements:
    a. Field programmable time delay for engine start. Adjustment range, 0-5 minutes in 1 second increments.
    b. Field programmable time delay engine cooldown. Adjustment range, 0-10 minutes in 1 second increments.
    c. It shall be possible to start the generator and run it at an idle speed during warm-up. The idle time shall be user adjustable. Engine cooldown at idle shall also be available.
    d. Real time clock and calendar for time stamping of events.
    e. Output with adjustable time for an ether injection starting system. Adjustment range, 0-10 seconds.
    f. Output for shedding of loads if the generator reaches a user programmable percentage of its kW rating. Load shed shall also be enabled if the generator output frequency falls below 59 Hz (60 Hz system) or 49 Hz (50 Hz system).
    g. Programmable cyclic cranking that allows up to six crank cycles and up to 45 seconds of crank time per crank cycle.
    h. The capability to reduce controller current battery draw, for applications where no continuous battery charging is available, shall be provided. The controller vacuum fluorescent display should automatically be turned off after 5 minutes of no controller activity.
    i. The controller firmware shall provide alternator protection for overload and short circuit matched to each individual alternator and duty cycle.
    j. A ± 0.25% digital voltage regulator shall be incorporated into the controller software. No separate voltage regulator is acceptable. The digital voltage regulator shall be applicable on single or three phase systems.
    k. It must be possible to exercise the generator by programming a running time into the controller.
5. Generator System Monitoring Requirements:
    a. All monitored functions must be viewable on the digital display.
    b. The following generator functions shall be monitored.
        1) all output voltages – single phase, three phase, line to line, and line to neutral, 0.25% accuracy
        2) all single phase and three phase currents, 0.25% accuracy

3) output frequency, 0.25% accuracy
4) power factor by phase with leading/lagging indication
5) total instantaneous kilowatt loading and kilowatts per phase, 0.5% accuracy
6) kVARS total and per phase, 0.5% accuracy
7) kVA total and per phase, 0.5% accuracy
8) kW hours
9) a display of percent generator duty level – actual kW loading divided by the kW rating

c. Engine parameters listed below shall be monitored:
1) coolant temperature both in English and metric units
2) oil pressure in English and metric units
3) battery voltage
4) rpm
5) lube oil temperature
6) lube oil level
7) crankcase pressure
8) coolant level
9) coolant pressure
10) fuel pressure
11) fuel temperature
12) fuel rate
13) fuel used during the last run
14) ambient temperature

d. Operational records since system start up shall be stored in the controller.
1) run time hours
2) run time loaded
3) run time unloaded
4) number of starts
5) factory test date
6) last run data including date, duration, and whether loaded or unloaded
7) kW hours

e. The following operational records shall also be available in a resetable form for maintenance purposes.
1) run time hours
2) run time loaded
3) run time unloaded
4) kilowatt hours
5) days of operation
6) number of starts
7) start date after reset

f. The controller shall store the last one hundred generator system events with date and time of the event.

g. For maintenance and service purposes, the following information shall be stored in the control and displayed on demand:
1) manufacturer’s model and serial number
2) battery voltage
3) generator set kilowatt rating
4) rated current

5) system voltage
6) system frequency
7) number of phases

6. The control must be capable of detecting the following conditions, indicate if the condition will shutdown the generator or provide a warning, and annunciate the situation, using words and phrases, on the digital display.
   a. Will cause system shutdown:
      1) air damper tripped (if used)
      2) customer programmed digital auxiliary input ON (any of the 21 inputs available)
      3) customer programmed analog auxiliary input out of bounds
      4) emergency stop
      5) high coolant temperature
      6) high oil temperature
      7) controller internal fault
      8) locked rotor – fail to rotate
      9) low coolant level
      10) low oil pressure
      11) master switch error
      12) NFPA common alarm
      13) overcrank
      14) overspeed with user adjustable level, range 65-70 Hz on 60 Hz systems and 55-70 Hz on 50 Hz systems
      15) generator overvoltage with user adjustable level, range 105% to 135%
      16) overfrequency with user adjustable level, range 102% to 140%
      17) underfrequency with user adjustable level, range 80% to 90%
      18) generator undervoltage with user adjustable level, range 70% to 95%
      19) coolant temperature signal loss
      20) oil pressure gauge signal loss
   b. Will cause a warning but leave the generator running:
      1) battery charger failure
      2) customer programmed digital auxiliary input on (any of the 21 inputs available)
      3) customer programmed analog auxiliary input on
      4) power system supplying load
      5) ground fault detected – detection by others
      6) high battery voltage – level must be user adjustable
      7) range 29-33 volts for 24-volt systems
      8) high coolant temperature
      9) load shed
      10) loss of AC sensing
      11) underfrequency
      12) low battery voltage – level must be user adjustable, range 20-25 volts for 24-volt systems.
      13) low coolant temperature
      14) low fuel level or pressure
      15) low oil pressure
      16) NFPA common alarms
      17) overcurrent

18) speed sensor fault
19) weak battery
20) alternator protection activated

7. Inputs and Outputs:
   a. Inputs
      1) There shall be 21 dry contact inputs that can be user configured to shutdown the generator or provide a warning.
      2) There shall be 7 user programmable analog inputs for monitoring and control.
      3) Each analog input can accept 0-5 volt analog signals.
      4) Resolution must be 1 part in 10,000.
      5) Each input can be programmed to provide up to 4 trip values – 2 warnings and 2 shutdowns.
      6) It must be possible to view the analog value on the display.
      7) It shall be possible to define each user configured input using words or phases that will be viewable on the digital display.
      8) Additional standard inputs required:
         a) Input for an external ground fault detector. Digital display must show "ground fault" upon detection of a ground fault.
         b) Reset of system faults.
         c) Remote two wire start.
         d) Remote emergency stop
      9) Idle mode enable
   b. Outputs:
      1) All NFPA 10 Level 1 outputs shall be available.
      2) There shall be thirty outputs available for interfacing to other equipment:
         a) Any of these outputs shall be able to be user configured from a list of over 25 functions and faults.
         b) These outputs shall drive optional dry contacts.
         c) At a minimum, configure the following dry contact outputs:
            1) Generator Common Alarm
            2) Generator Running
            3) Fuel Low
      3) A programmable user defined common fault output with over 40 selections shall be available.
8. System Programming:
   a. It must be possible to disable programming so the system can only be monitored.
   b. It shall be possible to program the control with the controller keypad or using a personal computer.
   c. Programming access is to be enabled only at the controller and shall be password protected.
   d. The following shall be programmable from the controller keypad:
      1) Time delay settings:
         a) generator run time (0 to 72 hours) – exercise
         b) load shed
         c) engine start
         d) engine cooldown
         e) overvoltage and undervoltage delays

f) staring aid
g) crank on and crank pause time
h) idle time
i) lead/lag

2) Trip point settings:
a) high battery voltage
b) low battery voltage
c) overspeed
d) underfrequency
e) overfrequency
f) overvoltage
g) undervoltage
h) load shed

9. Communications:
   a. The controller shall communicate to the ECM for control, monitoring, and diagnostics.
   b. The controller shall be furnished with Modbus RTU and Modbus TCP communication protocols.
   c. A Modbus master will be able to monitor controller data.
   d. A Modbus master will be able to alter parameters.
   e. The Modbus master must be capable of starting and stopping the generator.
   f. A gateway shall be furnished to provide Ethernet I/P communication to the plant SCADA system. The gateway shall be configured by the supplier of the generator package.

E. Automatic Starting System:
   1. The electric starting system for the unit shall include single, 12 volt d-c starting motors.
   2. The generator set shall be provided a quantity of two AGM batteries that meets the engine manufactures' specifications for the ambient conditions specified in Part 1 Project Conditions and shall comply with the NFPA requirements for engine cranking cycles. Each battery shall be rated according to SAE Standards J-537 with a minimum cold cranking amp of 1110 amps and a minimum reserve capacity of 380 minutes at 80°F. The battery will contain two handles to aid in lifting and the case must be constructed of polypropylene to resist breakage and extend service life. AGM battery technology utilize an Absorbed Glass Mat and protects the battery's internal components by acting like a shock absorber and blocking vibration and other possible damaging movement.
   3. Battery rack and battery cables capable of holding the manufacturer's recommended batteries shall be supplied.
   4. Redundant battery requirements double the standard configuration.
   5. The battery charger to be 6-Ampere automatic float and equalize battery charger with +/-1% constant voltage regulation from no load to full load over 1+/-10% AC input line variation, current limited during engine cranking and short circuit conditions, temperature compensated for ambient temperatures from –40°C to +60°C, 5% accurate voltmeter and ammeter, fused, reverse polarity and transient protected.

2.03 WEATHERPROOF, WALK-IN, LEVEL 2 SOUND ATTENUATED ENCLOSURE

A. The generator set shall be supplied with a Level 2 Sound Attenuated Enclosure, providing a sound reduction of 78.2 dB(A) while the generator is operating at 100% load at 7 meters (23 feet) using acoustic insulation and acoustic-lined inlet hoods, and using acoustic insulation and acoustic-lined inlet hoods, constructed from a minimum of 0.125 inch thick formed heavy duty aluminum panels. The acoustic insulation used shall meet UL 94 HF1 flammability classification. The enclosure shall be manufactured from bolted panels to facilitate service, future modifications, or field replacement. The enclosure shall use external vertical air inlet and outlet hoods with 90 degree angles to discharge air up and reduce noise. The enclosure shall have an integral rodent guard and skid end caps and shall have bracing to meet 291 kph (181 mph) wind loading.

B. The enclosure components and skid shall be cleaned with a two-stage alkaline cleaning process to remove grease, grit, and grime from parts. Components shall then be subjected to a Zirconium-based conversion coating process to prepare the metal for electro-coat (e-coat) adhesion. All enclosure parts shall receive a 100% epoxy primer electro-coat (e-coat) with high-edge protection. Following the e-coat process, the parts shall be finish coated with powder baked paint for superior finish, durability, and appearance with a Power Armor ™ industrial finish that provides heavy duty durability in harsh conditions, and is fade-, scratch- and corrosion-resistant.

C. The enclosure shall surpass a 3,000 hour salt spray corrosion test per ASTM B-1117.

D. Enclosures shall be finished in color selected by the Owner during Shop Drawing review.

E. The enclosures shall allow the generator set to operate at full load in an ambient temperature of 45°C with no additional derating of the electrical output of the generator set. The enclosure will account for no more than a 5°C derating of the electrical output of the generator set.

F. Enclosures shall be equipped with sufficient side and end doors to allow access for operation, inspection, and service of the unit and all options. Minimum requirements are two doors per side. When the generator set controller faces the rear of the generator set, an additional rear facing door is required. Access to the controller and main line circuit breaker shall meet the requirements of the National Electric Code.

G. Doors shall be fitted with hinges, hardware, and the doors shall be removable.

H. Doors shall be equipped with lockable latches. Locks shall be keyed alike. Door locks shall be recessed to minimize potential of damage to door/enclosure.

I. A duct between the radiator and air outlet shall be provided to prevent re-circulation of hot air.

J. The complete exhaust system shall be internal to the enclosure.

K. The critical silencer shall be fitted with a tailpipe and rain cap.

L. The generator set enclosure shall be furnished with two-(2) DC lights powered by the starting battery on a fused circuit with a 0-60 minute “No-Lock-On” timer.

M. Basic Electrical Panel –The generator set enclosure shall be furnished with a load center 120/208/240VAC three phase, 100 amp max w/ main and 12 branch circuits. (1) switch control, (3) AC lights vapor tight and gasketed, and (2) duplex GFI receptacles.

N. Enclosure Heater- The enclosure shall be supplied with a 5 kW, thermostatically controlled heater wired to the enclosure's distribution panel. Rated at 17100 Btu. Shall include adjustable louvers offering down flow and horizontal air tuning, built-in thermostat with automatic fan delay controls.

O. The generator set enclosure shall be furnished with the battery charger wired into the load center.

P. The generator set enclosure shall be furnished with the block heater wired into the load center.

2.05 FUEL STORAGE SYSTEM

A. Sub Base Fuel Supply Tank
   1. The sub base fuel supply tank shall be Underwriters laboratories Listed, UL142 with a fuel capacity of 7,500 gallons. The sub base tank shall be the mounting foundation for the generator. It will be the responsibility of the installing Contractor to obtain installation permits from the authority having jurisdiction as well as conveying to the system supplier and the specifying party any special requirements not identified within this written specification.
   2. The sub base tank shall be a secondary containment double wall design. Both the primary and secondary tanks must be pressure tested for leaks. Closed top diked designs with open or covered secondary containment area are not acceptable. The design of the tank and enclosure shall be designed to contain fuel during filling in accordance with International Fire Code requirements.
   3. Primary tank construction is to be 10-gauge steel, rectangular with fully welded corners and structural internal baffles on 30” centers. The primary tank shall be subject to an air tight production pressure test at a minimum of 3-psi as per UL142 guidelines. The primary tank is fully enclosed within the secondary containment tank with 1” annular space on all sides, top and bottom. The secondary containment tank is to be fully welded around the primary tank and subject to the same production pressure test as the primary tank. The entire bottom of the secondary containment tank shall have a one half-inch air space to the concrete foundation mounting pad surface when installed.
   4. If the tank’s capacity requires the sub base footprint to be larger than the generator base, the sub base tank shall have a tube steel structure spanning the width of the sub base tank for support of the generator and installed equipment. This structure will be attached only to the sub base outer rails for weight transfer to the foundation pad. All exposed sub base beyond the generator footprint shall be covered with aluminum diamond tread floor plate. The sub base outer rails shall have provisions for overhead lifting with a crane rated for the complete system’s dry weight. The system manufacturer is to include a lifting diagram detailing lift point dimensions and weights.

5. All tank fittings shall be threaded npt with all required venting devices installed and steel plugs in all spare ports. Tank fittings are to include:
    a. Supply and return engine connections with bottom siphon tubes sized per the engine manufacturer's recommendations. Provide fuel/water separator on supply piping to engine.
    b. Continuous level measurement with 4-20 mADC output signal.
    c. Tank fill with padlockable fill cap.
    d. Primary tank normal vent with a minimum 5" riser pipe.
    e. Primary tank emergency vent sized per NFPA 30 using the tanks wetted surface area.
    f. Secondary containment tank emergency vent.
    g. 2" spare port with plug.
    h. Dry contact leak detection float switch located in the lowest point in the secondary containment annular space.
    i. Direct reading mechanical level gauge located adjacent the fill port.
    j. Ports required to accommodate specified leak/level detection equipment.
        1). The sub base tank underside is to be painted with an alkaline resistant undercoating material. All exterior coating shall be high gloss black, two-part polyurethane topcoat with epoxy primer.
        2) It will be the responsibility of the installing contractor to supply all fuel needed for system testing and filling the tank when testing is complete.
        3) A solenoid operated fuel shutoff valve shall be provided on the fuel connection between the fuel tank and the generator, in compliance with NFPA 30.
        4) All piping, fittings, installation, etc., shall conform to the International Fire Code, and NFPA 30.

PART 3 - EXECUTION

3.01 GENERATOR SET INSTALLATION / APPLICATION / ERECTION

A. The design and construction of the electric generator set shall be such that they are neat and clean in appearance, and that normal adjustments and maintenance can be effected without use of special tools. See Drawings for generator installation details.

B. An adequate supply of the proper lubricant shall be provided to perform one oil change. In addition, spare elements shall be provided for fuel, oil, and air filters, for one complete change. The engine shall be filled with all necessary liquids required for operation. The fuel tank shall be full of fuel at project completion.

C. The Contractor shall furnish and install insulation suitable for use at temperatures up to 1,500 degrees Fahrenheit on the engine generator set exhaust piping and silencer to prevent heat buildup in the room, provide noise reduction, and optimize operator safety. The insulation shall be custom made to fit the actual layout at the job site and the insulating media shall consist of 2 inch molded calcium silicate as manufactured by Celotemp, or equal. The calcium silicate shall be mitered to fit contours and fittings with all voids filled with high temperature insulating cement (asbestos free). Pipe and fitting insulation shall have a finish of 0.016 inch smooth aluminum sheeting held in

place by stainless steel bands.

3.02 WEATHERPROOF ENCLOSURE

A. The generator and housing shall be furnished as a complete integrated package. Only fuel piping connections and electrical power and control wiring terminations shall be required in the field by the Contractor.

B. All necessary exhaust piping and duct connections shall be provided between the generator and housing. Flexible connections shall be made at exhaust and radiator. Provide rain cap on end of exhaust pipe.

3.03 PAINTING

A. Equipment:
   1. The generator, diesel engine, and radiator shall be painted the engine manufacture's standard color. The color of the weatherproof housing shall be selected by the Owner during Shop Drawing review.

END OF SECTION 26 32 13

SECTION 26 50 00
LIGHTING

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The specific characteristics of the light fixtures to be furnished and installed shall be as detailed in the light fixture schedule on the Contract Drawings. Should a fixture of a different type or manufacturer than that specified be submitted for the Engineer's review, it will be compared to that specified on: construction, dimensions, and photometrics. Failure to compare equally to what was specified will be grounds for rejection.

B. The Contractor shall be prepared to submit sample equipment for appraisal when requested by the Engineer, and shall assume all transportation costs involved in the shipment and return of samples. All sample fixtures submitted shall be provided with lamps and shall be wired with cord and plug, to facilitate lighting for appraisal.

PART 2 - PRODUCTS

2.01 LUMINAIRES

A. All fixtures shall be delivered complete with suspension and mounting accessories, diffusers, reflectors, etc., all wired and assembled. All accessory wiring shall be furnished and installed as shown on the Contract Drawings.

B. All outside luminaires shall be a type that will prevent insect accumulation inside the luminaire.

C. Exterior luminaires shall be weatherproof and rustproof.

PART 3 - EXECUTION

3.01 INSTALLATION/APPLICATION/ERECTION

A. General

a. The Contractor shall furnish all light fixtures, lighting equipment, components, hangers, etc., as shown on the Contract Drawings and shall install them at the locations shown on the Contract Drawings.
b. All fixture wiring shall be in conformance with the latest revision of the NEC and UL standards.
c. Lamps of the proper type, wattage and voltage rating shall be delivered to the project in the original cartons and installed in the fixtures just prior to the completion of the project, with spare lamps as listed on the Contract Drawings.

B. Luminaires

a. Minimum wire size shall be AWG No. 10 for runs over 75 feet.
b. All fixtures shall be left in a clean condition, free of dirt and defects, before acceptance by the Engineer.

C. Lighting Standards

a. Galvanized steel, weathering steel, or aluminum light poles shall not be painted.
b. When standards (poles) arrive on the job site, the protective wrapping should be removed immediately, especially if stored outside. If not removed, rain or other sources of water moistening the wrapping may cause stains (barber pole effect) on the pole finish. Such stains shall be cause for rejection.
c. A concrete foundation shall be provided for each pole as detailed on the Contract Drawing. The poles will be mounted utilizing anchor bolts set in the concrete. The anchor bolts should have galvanized or plated threads and should be furnished with the pole by the manufacturer. This is particularly important since they are Engineered as part of the pole structural system.
d. When anchor bolts are positioned prior to pouring concrete, spacing and projection must be verified with pole manufacturer's recommendations. A plastic or plywood template should be fabricated from the manufacturer's instructions to use when setting the anchor bolts. Anchor bolts that are not installed plumb and in the correct locations shall be removed and replaced. The Contractor shall not be allowed to bend the anchor bolts back to plumb after concrete is set.
e. Leveling nuts shall be utilized for the mounting of poles to foundations. A nut should be screwed down on each bolt until it meets the concrete, then the nuts must be adjusted until they are level.
f. The pole should be carefully lowered onto the anchor bolts and allowed to rest on the leveling nuts. Flat washers followed by lockwashers should be placed on the anchor bolts and the top nut installed. Minor adjustments on the leveling nuts may be necessary to plumb the pole before the top nuts are tightened down. Special care should be taken to tighten the top nuts to the torque level recommended by the pole manufacturer. All nuts and washers shall be galvanized or plated.
g. Concrete grout of the nonshrink type must be installed between the base of the pole and the concrete foundation. The grout should be puddled around the edge of the pole base and firmly packed int he space between the pole and foundation. A short piece of small diameter pipe must be installed to make a drain hole through the grout to the pole interior.
h. Aluminum poles must have the bottom of the base painted with Koppers bitumastic No. 50 or equal substitute product before grouting so that the aluminum does not come in contact with the concrete.
i. Poles shall not be modified or drilled on the job site.
j. Under no circumstances should a ground wire be wrapped around an anchor bolt underneath an anchor bolt nut.
k. Do not set poles without light fixtures installed, as poles are more likely to vibrate and become damaged.
l. Manufacturer's installation instructions should be followed as well as those

instructions contained herein. Should a discrepancy exist, promptly contact the Engineer for clarification.

m. Bases shall have 1" chamfer all around and rubbed smooth to a point below grade.
n. Anchor bolt covers shall also be provided and installed.

END OF SECTION – 26 50 00

SECTION 31 20 11
EARTHWORK (SHORT FORM)

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies the requirements for furnishing all equipment, materials, labor and techniques for earthwork including excavation, fill, backfill and site restoration utilizing fertilizer, seed and/or sod.

1.2 DEFINITIONS:

A. Unsuitable Materials:

1. Fills: Topsoil, frozen materials; construction materials and materials subject to decomposition; clods of clay and stones larger than 75 mm (3 inches); organic materials, including silts, which are unstable; and inorganic materials, including silts, too wet to be stable.
2. Existing Subgrade (except footings): Same materials as above paragraph, that are not capable of direct support of slabs, pavement, and similar items, with the possible exception of improvement by compaction, proofrolling, or similar methods of improvement.
3. Existing Subgrade (footings only): Same as Paragraph 1, but no fill or backfill. If materials differ from reference borings and design requirements, excavate to acceptable strata subject to COR's approval.

B. Earthwork: Earthwork operations required within the new construction area. It also includes earthwork required for auxiliary structures, sewer and other trenchwork throughout the job site.

C. Degree of Compaction: Degree of compaction is expressed as a percentage of maximum density obtained by the test procedure presented in AASHTO T 99.

D. The term fill means fill or backfill as appropriate.

1.3 RELATED WORK:

A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.

B. Protection of existing utilities, fire protection services, existing equipment, roads, and pavements: Section 01 00 00, GENERAL REQUIREMENTS.

C. SUBSURFACE INVESTIGATION: SECTION 01 00 00, GENERAL REQUIREMENTS, ARTICLE, PHYSICAL DATA.1.4 CLASSIFICATION OF EXCAVATION:

A. Unclassified Excavation: Removal and disposal of pavements and other man-made obstructions visible on the surface; utilities, and other items including underground structures indicated to be demolished and removed; together with any type of materials regardless of character of material and obstructions encountered.

1.7 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Contractor shall submit procedure and location for disposal of unused satisfactory material. Proposed source of borrow material. Notification of encountering rock in the project. Advance notice on the opening of excavation or borrow areas. Advance notice on shoulder construction for rigid pavements.

C. Furnish to Geotechnical Engineer / Owner, soil samples, suitable for laboratory tests, of proposed off site or on site fill material.

D. Qualifications of the commercial testing laboratory or Contractor's Testing facility shall be submitted.

E. Copies of all testing lab reports

1.8 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. American Nursery and Landscape Association (ANLA):

2004..... American Standard for Nursery Stock

C. American Association of State Highway and Transportation Officials (AASHTO):

T99-10 ..... Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305 mm (12 inch) Drop

T180-10..... Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg [10 lb] Rammer and a 457 mm (18 inch) Drop

D. American Society for Testing and Materials (ASTM):

C33-03 ..... Concrete Aggregate

D698-e1..... Laboratory Compaction Characteristics of Soil Using Standard Effort

D1140-00 ..... Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve

D1556-00 ..... Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

D1557-09 ..... Laboratory Compaction Characteristics of Soil Using Modified Effort

D2167-94 (2001)..... Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method

D2487-06 ..... Standard Classification of Soil for Engineering Purposes (Unified Soil Classification System)

D6938-10 ..... Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

E. Standard Specifications of Kentucy Transportation Cabinet 2012 Standard Spec with Supp Spec April 2016

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Fills: Materials approved from on site and off site sources having a minimum dry density of 1760 kg/m3 (110 pcf), a maximum Plasticity Index of 6, and a maximum Liquid Limit of 30.

B. Granular Fill:

1. Under concrete slab, granular fill shall consist of clean, poorly graded crushed rock, crushed gravel, or uncrushed gravel placed beneath a building slab with or without a vapor barrier to cut off the capillary flow of pore water to the area immediately below. Fine aggregate grading shall conform to ASTM C33 with a maximum of 3 percent by weight passing ASTM D1140, coarse aggregate Size 57.
2. Bedding for sanitary and storm sewer pipe, crushed stone or gravel graded from 13 mm (1/2 inch) to 4.75 mm (No. 4).

C. Fertilizer: (5-10-5) delivered to site in unopened containers that clearly display the manufacturer's label, indicating the analysis of the contents.

D. Seed: Grass mixture comparable to existing turf delivered to site in unopened containers that clearly display the manufacturer's label, indicating the analysis of the contents.

E. Sod: Comparable species with existing turf. Use State Certified or State Approved sod when available. Deliver sod to site immediately after cutting and in a moist condition. Thickness of cut must be 19 mm to 32 mm (3/4 inch to 1 1/4 inches) excluding top growth. There shall be no broken pads and torn or uneven ends.

F. Requirements for Offsite Soils: Offsite soils brought in for use as backfill shall be tested for TPH, BTEX and full TCLP including ignitability, corrosivity and reactivity. Backfill shall contain less than 100 parts per million (ppm) of total hydrocarbons (TPH) and less than 10 ppm of the sum of Benzene, Toleune, Ethyl Benzene, and Xylene (BTEX) and shall not fail the TCLP test. TPH concentrations shall be determined by using EPA 600/4-79/020 Method 418.1. BTEX concentrations shall be determined by using EPA SW-846.3-3a Method5030/8020. TCLP shall be performed in accordance with EPA SW-846.3-3a Method 1311. Provide Borrow Site Testing for TPH, BTEX and TCLP from a composite sample of material from the borrow site, with at least one test from each borrow site. Material shall not be brought on site until tests have been approved by the COR.

G. Buried Warning and Identification Tape: metallic core or metallic-faced warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specific below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape

length. Warning and identification to read, “CAUTION, BURIED (intended service) LINE BELOW” or similar wording. Color and printing shall be permanent, Unaffected by moisture or soil. Warning tape color codes: Red: Electric; Yellow: Gas; Oil, Dangerous Materials; Orange: Telephone and Other Communications; Blue: Water Systems; Green: Sewer; White: Steam Systems; Gray: Compressed Air.

H. Warning Tape for Metallic Piping: Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.076 mm (0.003 inch). Tape shall have a minimum strength of 10.3 MPa (1500 psi) lengthwise, and 8.6 MPa (1250 psi) crosswise, with a maximum 350 percent elongation.

I. Detectable Warning Tape for Non-Metallic Piping: Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.102 mm (0.004 inch). Tape shall have a minimum strength of 10.3 MPa (1500 psi) lengthwise and 8.6 MPa (1250 psi) crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 0.9 m (3 feet) deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

J. Detection Wire for Non-Metallic Piping: Detection wire shall be Insulated single strand, solid copper with a minimum of 12 AWG.

PART 3 - EXECUTION

3.1 SITE PREPARATION:

A. Clearing: Clearing within the limits of earthwork operations as shown within the drawings. Work includes removal of trees, shrubs, fences, foundations, incidental structures, paving, debris, trash and any other obstructions.

B. Grubbing: Remove stumps and roots 75 mm (3 inches) and larger diameter. Undisturbed sound stumps, roots up to 75 mm (3 inches) diameter, and nonperishable solid objects which will be a minimum of 900 mm (3 feet) below subgrade or finished embankment may be left.

C. Trees and Shrubs: Trees and shrubs, not shown for removal, may be removed from the areas within 4500 mm (15 feet) of new construction and 2250 mm (7’-6”) of utility. Remove materials from the property. Trees and shrubs, shown to be transplanted, shall be dug with a ball of earth and burlapped in accordance with the latest issue of the, "American Standard for Nursery Stock", of the American Association of Nurserymen, Inc. Transplant trees and shrubs to a permanent or temporary position within two hours after digging. Maintain trees and shrubs held in temporary locations by watering as necessary and feeding semi-annually with liquid fertilizer with a minimum analysis of 5 percent nitrogen, 10 percent phosphorus and 5 percent potash. Maintain plants moved to permanent positions as specified for plants in temporary locations until the conclusion of the contract. Box, and otherwise protect from damage, existing trees and shrubs which are not shown to be removed in the construction area. Repair immediately

damage to existing trees and shrubs by trimming, cleaning and painting damaged areas, including the roots, in accordance with standard industry horticultural practice for the geographic area and plant species. Building materials shall not be stored closer to trees and shrubs that are to remain, than the farthest extension of their limbs.

D. Stripping Topsoil: Unless otherwise indicated on the drawings, the limits of earthwork operations shall extend anywhere the existing grade is filled or cut or where construction operations have compacted or otherwise disturbed the existing grade or turf. Strip topsoil as defined herein, or as indicated in the geotechnical report, from within the limits of earthwork operations as specified above unless specifically indicated or specified elsewhere in the specifications or shown on the drawings. Topsoil shall be fertile, friable, natural topsoil of loamy character and characteristic of the locality. Topsoil shall be capable of growing healthy horticultural crops of grasses. Stockpile topsoil and protect as directed by the GC. Eliminate foreign material, such as weeds, roots, stones, subsoil, frozen clods, and similar foreign materials, larger than 0.014 m3 (1/2 cubic foot) in volume, from soil as it is stockpiled. Retain topsoil on the station. Remove foreign materials larger than 50 mm (2 inches) in any dimension from topsoil used in final grading. Topsoil work, such as stripping, stockpiling, and similar topsoil work, shall not, under any circumstances, be carried out when the soil is wet so that the tilth of the soil will be destroyed.
   1. Cemetery Projects: Recommend that the top soil be tested for chemicals, pesticides and fertilizers if topsoil is to be removed from lands formerly utilized as farmland, to verify suitability for use as topsoil in the cemetery where new lawn areas are to be established.
   2. Concrete Slabs and Paving: Score deeply or saw cut to insure a neat, straight cut, sections of existing concrete slabs and paving to be removed where excavation or trenching occurs. Extend pavement section to be removed a minimum of 300 mm (12 inches) on each side of widest part of trench excavation and insure final score lines are approximately parallel unless otherwise indicated. Remove material from the property.

E. Disposal: All materials removed from the property shall be disposed of at a legally approved site, for the specific materials, and all removals shall be in accordance with all applicable Federal, State and local regulations. No burning of materials is permitted onsite.

3.2 EXCAVATION:

A. Shoring, Sheeting and Bracing: Shore, brace, or slope to its angle of repose banks of excavations to protect workmen, banks, adjacent paving, structures, and utilities, in compliance with **OSHA requirements**.
   1. Extend shoring and bracing to the bottom of the excavation. Shore excavations that are carried below the elevations of adjacent existing foundations.
   2. If the bearing of any foundation is disturbed by excavating, improper shoring or removal of shoring, placing of backfill, and similar operations, provide a concrete fill support in

compliance with Specification Section 31 20 11.33D #4 under disturbed foundations, as directed by GC, at no additional cost to the utility. Do not remove shoring until permanent work in excavation has been inspected and approved by GC.

B. Excavation Drainage: Operate pumping equipment, and/or provide other materials, means and equipment as required, to keep excavations free of water and subgrades dry, firm, and undisturbed until approval of permanent work has been received from COR. Approval by the COR is also required before placement of the permanent work on all subgrades. When subgrade for foundations has been disturbed by water, remove the disturbed material to firm undisturbed material after the water is brought under control. Replace disturbed subgrade in trenches by mechanically tamped sand or gravel. When removed disturbed material is located where it is not possible to install and properly compact disturbed subgrade material with mechanically compacted sand or gravel, the GC and engineer should be contacted to consider the use of flowable fill. Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 0.9 m (3 feet) of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, the water level shall be maintained continuously, at least 0.47572 m (1.5 feet) below the working level. Operate dewatering system continuously until construction work below existing water levels is complete. Submit performance records weekly. Measure and record performance of dewatering system at same time each day by use of observation wells or piezometers installed in conjunction with the dewatering system. Relieve hydrostatic head in pervious zones below subgrade elevation in layered soils to prevent uplift.

C. Blasting: **Blasting shall not be permitted.**

D. Building Earthwork:
   1. Excavation shall be accomplished as required by drawings and specifications.
   2. Excavate foundation excavations to solid undisturbed subgrade.
   3. Remove loose or soft material to solid bottom.
   4. Fill excess cut under footings or foundations with 25 MPa (3000 psi) concrete, poured separately from the footings.
   3. Do not tamp earth for backfilling in footing bottoms, except as specified.

E. Trench Earthwork:
   1. Utility trenches (except sanitary and storm sewer – see specific spec):

a. Excavate to a width as necessary for sheeting and bracing and proper performance of the work.
b. Grade bottom of trenches with bell-holes, scooped-out to provide a uniform bearing.
c. Support piping on suitable undisturbed earth unless a mechanical support is shown. Unstable material removed from the bottom of the trench or excavation shall be replaced with select granular material placed in layers not exceeding 150 mm (6 inches) loose thickness.
d. The length of open trench in advance of pipe laying shall not be greater than pipe work performed on that day or authorized by the client.
e. Provide buried utility lines with utility identification tape. Bury tape 300 mm (12 inches) below finished grade; under pavements and slabs, bury tape 150 mm (6 inches) below top of subgrade
f. Bury detection wire directly above non-metallic piping at a distance not to exceed 300 mm (12 inches) above the top of pipe. The wire shall extend continuously and unbroken, from manhole to manhole. The ends of the wire shall terminate inside the manholes at each end of the pipe, with a minimum of 0.9 m (3 feet) of wire, coiled, remaining accessible in each manhole. The wire shall remain insulated over its entire length. The wire shall enter manholes between the top of the corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal. For force mains, the wire shall terminate in the valve pit at the pump station end of the pipe.
g. Bedding shall be of the type and thickness shown. Initial backfill material shall be placed and compacted with approved tampers to a height of at least one foot above the utility pipe or conduit. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe. Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Backfill to top of pipe shall be compacted to 95 percent of ASTM D 698maximum density. Plastic piping shall have bedding to spring line of pipe. Provide materials as follows:
    1) Class I: Angular, 6 to 40 mm (0.25 to 1.5 inches), graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shells.
    2) Class II: Coarse sands and gravels with maximum particle size of 40 mm (1.5 inches), including various graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D 2487.

3) Clean, coarse-grained sand classified by ASTM D 2487 for bedding.

4) Clean, coarsely graded natural gravel, crushed stone or a combination thereof or having a classification of GW or GP in accordance with ASTM D 2487 for bedding and backfill. Maximum particle size shall not exceed 75 mm (3 inches).

2. Sanitary and storm sewer trenches:
   a. Trench width below a point 150 mm (6 inches) above top of the pipe shall be 600 mm (24 inches) for up to and including 300 mm (12 inches) diameter and four-thirds diameter of pipe plus 200 mm (8 inches) for pipe larger than 300 mm (l2 inches). Width of trench above that level shall be as necessary for sheeting and bracing and proper performance of the work.
   b. The bottom quadrant of the pipe shall be bedded on suitable undisturbed soil or granular fill. Unstable material removed from the bottom of the trench or excavation shall be replaced with select granular material placed in layers not exceeding 150 mm (6 inches) loose thickness.
      1) Undisturbed: Bell holes shall be no larger than necessary for jointing. Backfill up to a point 300 mm (12 inches) above top of pipe shall be clean earth placed and tamped by hand.
      2) Granular Fill: Depth of fill shall be a minimum of 75 mm (3 inches) plus one-sixth of pipe diameter below the pipe of 300 mm (12 inches) above top of pipe. Place and tamp fill material by hand.
   c. Place and compact as specified the remainder of backfill using acceptable excavated materials. Do not use unsuitable materials.
   d. Use granular fill for bedding where rock or rocky materials are excavated.
   e. Provide buried utility lines with utility identification tape. Bury tape 300 mm (12 inches) below finished grade; under pavements and slabs, bury tape 150 mm (6 inches) below top of subgrade
   f. Bury detection wire directly above non-metallic piping at a distance not to exceed 300 mm (12 inches) above the top of pipe. The wire shall extend continuously and unbroken, from manhole to manhole. The ends of the wire shall terminate inside the manholes at each end of the pipe, with a minimum of 0.9 m (3 feet) of wire, coiled, remaining accessible in each manhole. The wire shall remain insulated over its entire length. The wire shall enter manholes between the top of the corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal. For force mains, the wire shall terminate in the valve pit at the pump station end of the pipe.
   g. Bedding shall be of the type and thickness shown. Initial backfill material shall be placed and compacted with approved tampers to a height of at least one foot above

the utility pipe or conduit. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe. Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Backfill to top of pipe shall be compacted to 95 percent of ASTM D698 maximum density. Plastic piping shall have bedding to spring line of pipe. Provide materials as follows:

1) Class I: Angular, 6 to 40 mm (0.25 to 1.5 inches), graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shells.
2) Class II: Coarse sands and gravels with maximum particle size of 40 mm (1.5 inches), including various graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D2487.
3) Clean, coarse-grained sand classified by ASTIM D 2487 with greater than 4%; amount passing No 200 Sieve Soil Types SW and SP are included in this class.
4) Clean, coarsely graded natural gravel, crushed stone or a combination thereof or having a classification of GW or GP in accordance with ASTM D 2487 for bedding and backfill. Maximum particle size shall not exceed 75 mm (3 inches).

F. Site Earthwork: Excavation shall be accomplished as required by drawings and specifications. Remove subgrade materials that are determined by the Geotechnical Engineer as unsuitable, and replace with acceptable material. If there is a question as to whether material is unsuitable or not, the Contractor shall obtain samples of the material, under the direction of the client, and the materials shall be examined by an independent testing laboratory for soil classification to determine whether it is unsuitable or not. Testing of the soil shall be performed by the Clients Testing Laboratory. When unsuitable material is encountered and removed, the contract price and time will be adjusted in accordance with Articles, DIFFERING SITE CONDITIONS, CHANGES and CHANGES-SUPPLEMENT of the GENERAL CONDITIONS as applicable. Adjustments to be based on meters (yardage) in cut section only.

G. Finished elevation of subgrade shall be as follows:
   1. Pavement Areas - bottom of the pavement or base course as applicable.
   2. Planting and Lawn Areas - 100 mm (4 inches) below the finished grade, unless otherwise specified or indicated on the drawings.

3.3 FILLING AND BACKFILLING:

A. General: Do not fill or backfill until all debris, unsatisfactory soil materials, obstructions, and deleterious materials have been removed from the excavation. Proof-roll exposed subgrades with a fully loaded dump truck. Use excavated materials or borrow for fill and backfill, as

applicable. Do not use unsuitable excavated materials. Do not backfill until foundation walls have been completed above grade and adequately braced, waterproofing or damp proofing applied, and pipes coming in contact with backfill have been installed, and inspected and approved by COR.

B. Proof-rolling Existing Subgrade: - Proof rolling shall be done on an exposed subgrade free of surface water (wet conditions resulting from rainfall) which would promote degradation of an otherwise acceptable subgrade. After stripping, proof roll the existing subgrade of the ramp with six passes of a dump truck loaded with 6 cubic meters (4 cubic yards) of soil 13.6 meter tons (15 tons). Operate the truck in a systematic manner to ensure the number of passes over all areas, and at speeds between 4 to 5.5 km/hour (2 ½ to 3 ½ mph). When proof rolling, one-half of the passes made with the roller shall be in a direction perpendicular to the other passes. Notify the COR a minimum of 3 days prior to proof rolling. Proof rolling shall be performed in the presence of the Geotechnical Engineer. Rutting or pumping of material shall be undercut as directed by the client to a depth of 457.2 mm (18 inches) and replaced with lean clay fill select earthen material.

C. Placing: Place material in horizontal layers not exceeding 200 mm (8 inches) in loose depth and then compacted. Do not place material on surfaces that are muddy, frozen, or contain frost.

D. Compaction: Use approved equipment (hand or mechanical) well suited to the type of material being compacted. Do not operate mechanized vibratory compaction equipment within 3000 mm (10 feet) of new or existing building walls without the prior approval of the client. Moisten or aerate material as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used. Compact each layer until there is no evidence of further compaction to not less than 95 percent of the maximum density determined in accordance with the following test method AASHTO T99. Backfill adjacent to any and all types of structures shall be placed and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials to prevent wedging action or eccentric loading upon or against the structure.

E. Borrow Material: Borrow material shall be selected to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Borrow material shall be obtained from the borrow areas from approved private sources. Unless otherwise provided in the contract, the Contractor shall obtain from the owners the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling. Borrow material from approved sources. Unless specifically provided, no borrow shall be obtained within the limits of the project site without prior written

approval. Necessary clearing, grubbing, and satisfactory drainage of borrow pits and the disposal of debris thereon shall be considered related operations to the borrow excavation.

F. Opening and Drainage of Excavation and Borrow Pits: The Contractor shall notify the GC sufficiently in advance of the opening of any excavation or borrow pit to permit elevations and measurements of the undisturbed ground surface to be taken. Except as otherwise permitted, borrow pits and other excavation areas shall be excavated providing adequate drainage. Overburden and other spoil material shall be transported to designated spoil areas or otherwise disposed of as directed. Borrow pits shall be neatly trimmed and drained after the excavation is completed. The Contractor shall ensure that excavation of any area, operation of borrow pits, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

3.4 GRADING:

A. General: Uniformly grade the areas within the limits of this section, including adjacent transition areas. Smooth the finished surface within specified tolerance. Provide uniform levels or slopes between points where elevations are indicated, or between such points and existing finished grades. Provide a smooth transition between abrupt changes in slope.

B. Cut rough or sloping rock to level beds for foundations. In unfinished areas fill low spots and level off with coarse sand or fine gravel.

C. Slope backfill outside the building away from the building walls for a minimum distance of 3048 mm (10 feet)at a minimum five percent (5%) slope.

D. The finished grade shall be 150 mm (6 inches) below bottom line of windows or other building wall openings unless greater depth is shown.

E. Place crushed stone or gravel fill under concrete slabs on grade tamped and leveled. The thickness of the fill shall be 150 mm (6 inches), unless otherwise indicated.

F. Finish subgrade in a condition acceptable to the client at least one day in advance of the paving operations. Maintain finished subgrade in a smooth and compacted condition until the succeeding operation has been accomplished. Scarify, compact, and grade the subgrade prior to further construction when approved compacted subgrade is disturbed by contractor's subsequent operations or adverse weather.

G. Grading for Paved Areas: Provide final grades for both subgrade and base course to +/- 6 mm (0.25 inches) of indicated grades.

3.5 LAWN AREAS:

A. General: Harrow and till to a depth of 100 mm (4 inches), new or existing lawn areas to remain, which are disturbed during construction. Establish existing or design grades by dragging or similar operations. Do not carry out lawn areas earthwork out when the soil is wet so that the tilth of the soil will be destroyed. Plant bed must be approved by client before seeding or sodding operation begins.

B. Finished Grading: Begin finish grading after rough grading has had sufficient time for settlement. Scarify subgrade surface in lawn areas to a depth of 100 mm (4 inches). Apply topsoil so that after normal compaction, dragging and raking operations (to bring surface to indicated finish grades) there will be a minimum of 100 mm (4 inches) of topsoil over all lawn areas; make smooth, even surface and true grades, which will not allow water to stand at any point. Shape top and bottom of banks to form reverse curves in section; make junctions with undisturbed areas to conform to existing topography. Solid lines within grading limits indicate finished contours. Existing contours indicated by broken lines are believed approximately correct but are not guaranteed.

C. Fertilizing: Incorporate fertilizer into the soil to a depth of 100 mm (4 inches) at a rate of 12 kg/100 m2 (25 pounds per 1000 square feet).

D. Seeding: Seed at a rate of 2 kg/100 m2 (4 pounds per 1000 square feet) and accomplished only during periods when uniform distribution may be assured. Lightly rake seed into bed immediately after seeding. Roll seeded area immediately with a roller not to exceed 225 kg/m (150 pounds per foot) of roller width.

E. Sodding: Topsoil shall be firmed by rolling and during periods of high temperature the topsoil shall be watered lightly immediately prior to laying sod. Sod strips shall be tightly butted at the ends and staggered in a running bond fashion. Placement on slopes shall be from the bottom to top of slope with sod strips running across slope. Secure sodded slopes by pegging or other approved methods. Roll sodded area with a roller not to exceed 225 kg/m (150 pounds per foot) of the roller width to improve contact of sod with the soil.

F. Watering: The client is responsible for having adequate water available at the site. As sodding is completed in any one section, the entire sodded area shall be thoroughly irrigated by the contractor, to a sufficient depth, that the underside of the new sod pad and soil, immediately below sod, is thoroughly wet.

3.6 DISPOSAL OF UNSUITABLE AND EXCESS EXCAVATED MATERIAL:

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the property.

B. Disposal: Transport surplus satisfactory soil to designated storage areas on the property. Stockpile or spread soil as directed by GC.

1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the property.

C. Place excess excavated materials suitable for fill and/or backfill on site where directed.

D. Remove from site and dispose of any excess excavated materials after all fill and backfill operations have been completed.

E. Segregate all excavated contaminated soil designated by the client from all other excavated soils, and stockpile on site on two 0.15 mm (6 mil) polyethylene sheets with a polyethylene

cover. A designated area shall be selected for this purpose. Dispose of excavated contaminated material in accordance with State and Local requirements. (No contaminated soils exist within project area as far as Civil Engineers current Knowledge)

3.7 CLEAN-UP:

A. Upon completion of earthwork operations, clean areas within contract limits, remove tools, and equipment. Provide site clear, clean, free of debris, and suitable for subsequent construction operations. Remove debris, rubbish, and excess material from the property.

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SECTION 31 23 16.26

ROCK REMOVAL

PART 1 GENERAL

1.1 WORK INCLUDED

A. The Contractor shall excavate rock, if encountered, as required to perform the required work, and shall dispose of the excavated material, and shall furnish acceptable material for backfill in place of the excavated rock.

B. In general, rock in pipe trenches shall be excavated so as to be not less than 6 inches from the pipe after it has been laid.

PART 2 PRODUCTS

2.1 MATERIALS

A. Rock definition: Solid mineral material that can be removed with a power shovel.

PART 3 EXECUTION

3.1 PAYMENT

Rock excavation shall be bid as Unclassified and will not be paid for separately.

END OF SECTION

SECTION 31 23 19
DEWATERING

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies performance of dewatering required to lower and control ground water table levels and hydrostatic pressures to permit excavation, backfill, and construction to be performed in the dry. Control of surface water shall be considered as part of the work under this specification.

1.2 SUMMARY:

A. The work to be completed by the Contractor includes, but is not necessarily limited to the following:
   1. Implementation of the Erosion and Sedimentation Control Plan.
   2. Dewater excavations, including seepage and precipitation.

B. The Contractor shall be responsible for providing all materials, equipment, labor, and services necessary for care of water and erosion control. Excavation work shall not begin before the Erosion and Sedimentation Control Plan is in place.

1.3 REQUIREMENT:

A. Dewatering system shall be of sufficient size and capacity necessary to lower and maintain ground water table to an elevation at least (1 foot) below lowest foundation subgrade or bottom of pipe trench and to allow material to be excavated, and concrete placed, in a reasonably dry condition. Materials to be removed shall be sufficiently dry to permit excavation to grades shown and to stabilize excavation slopes where sheeting is not required. Operate dewatering system continuously until backfill work has been completed.

B. Reduce hydrostatic head below any excavation to the extent that water level in the construction area is a minimum of 300 mm (1 foot) below prevailing excavation surface.

C. Prevent loss of fines, seepage, boils, quick conditions or softening of foundation strata.

D. Maintain stability of sides and bottom of excavation.

E. Construction operations are performed in the dry.

F. Control of surface and subsurface water is part of dewatering requirements. Maintain adequate control so that:

1. The stability of excavated and constructed slopes are not adversely affected by saturated soil, including water entering prepared subbase and subgrades where underlying materials are not free draining or are subject to swelling or freeze-thaw action.
2. Erosion is controlled.
3. Flooding of excavations or damage to structures does not occur.
4. Surface water drains away from excavations.
5. Excavations are protected from becoming wet from surface water, or insure excavations are dry before additional work is undertaken.

G. Permitting Requirements: The contractor shall comply with and obtain the required State and County permits where the work is performed.

1.4 RELATED WORK:

A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.B. Submittal requirements as specified in Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

C. Protection of existing utilities, fire protection services, existing equipment, roads, and pavements: Section 01 00 00, GENERAL REQUIREMENTS.

D. Subsurface Investigation: Section 01 00 00, GENERAL REQUIREMENTS, Article 1.11, PHYSICAL DATA.

1.5 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Drawings and Design Data:
1. Submit drawings and data showing the method to be employed in dewatering excavated areas 30 days before commencement of excavation.
2. Material shall include: location, depth and size of wellpoints, headers, sumps, ditches, size and location of discharge lines, capacities of pumps and standby units, and detailed description of dewatering methods to be employed to convey the water from site to adequate disposal.
3. Include a written report outlining control procedures to be adopted if dewatering problem arises.
4. Capacities of pumps, prime movers, and standby equipment.
5. Design calculations proving adequacy of system and selected equipment. The dewatering system shall be designed using accepted and professional methods of design and engineering consistent with the best modern practice. The dewatering system shall include the deep wells, wellpoints, and other equipment, appurtenances, and related earthwork necessary to perform the function.
6. Detailed description of dewatering procedure and maintenance method.

7. Materials submitted shall be in a format acceptable for inclusion in required permit applications to any and all regulatory agencies for which permits for discharge water from the dewatering system are required due to the discharge reaching regulated bodies of water.

C. Inspection Reports.

D. All required permits.

PART 2 – PRODUCTS- NOT USED

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install a dewatering system to lower and control ground surface water in order to permit excavation, construction of structure, and placement of backfill materials to be performed under dry conditions. Make the dewatering system adequate to pre-drain the water-bearing strata above and below the bottom of structure foundations, utilities and other excavations.

B. In addition, reduce hydrostatic pressure head in water-bearing strata below structure foundations, utility lines, and other excavations, to extent that water levels in construction area are a minimum of (1 foot) below prevailing excavation surface at all times.

3.2 OPERATION:

A. Prior to any excavation below the ground water table, place system into operation to lower water table as required and operate it continuously 24 hours a day, 7 days a week until utilities and structures have been satisfactorily constructed, which includes the placement of backfill materials and dewatering is no longer required.

B. Place an adequate weight of backfill material to prevent buoyancy prior to discontinuing operation of the system.

3.3 WATER DISPOSAL:

A. Dispose of water removed from the excavations in such a manner as:

1. Will not endanger portions of work under construction or completed.
2. Will cause no inconvenience to Government or to others working near site.
3. Will comply with the stipulations of required permits for disposal of water.
4. Will Control Runoff: The Contractor shall be responsible for control of runoff in all work areas including but not limited to: excavations, access roads, parking areas, laydown, and staging areas. The Contractor shall provide, operate, and maintain all ditches, basins, sumps, culverts, site grading, and pumping facilities to divert, collect, and remove all water from the work areas. All water shall be removed from the immediate work areas and shall be disposed of in accordance with applicable permits.

B. Excavation Dewatering:

1. The Contractor shall be responsible for providing all facilities required to divert, collect, control, and remove water from all construction work areas and excavations.

2. Drainage features shall have sufficient capacity to avoid flooding of work areas.
3. Drainage features shall be so arranged and altered as required to avoid degradation of the final excavated surface(s).
4. The Contractor shall utilize all necessary erosion and sediment control measures as described herein to avoid construction related degradation of the natural water quality.

C. Dewatering equipment shall be provided to remove and dispose of all surface and ground water entering excavations, trenches, or other parts of the work during construction. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the structure to be built, or the pipe to be installed therein, is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result.

3.4 STANDBY EQUIPMENT:

A. Provide complete standby equipment, installed and available for immediate operation, as may be required to adequately maintain de-watering on a continuous basis and in the event that all or any part of the system may become inadequate or fail.

3.5 CORRECTIVE ACTION:

A. If dewatering requirements are not satisfied due to inadequacy or failure of the dewatering system (loosening of the foundation strata, or instability of slopes, or damage to foundations or structures), perform work necessary for reinstatement of foundation soil and damaged structure or damages to work in place resulting from such inadequacy or failure by Contractor, at no additional cost to Government.

3.6 DAMAGES:

A. Immediately repair damages to adjacent facilities caused by dewatering operations.

3.7 REMOVAL:

A. Insure compliance with all conditions of regulating permits and provide such information to the GC. Obtain written approval from GC before discontinuing operation of dewatering system.

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SECTION 31 23 33

TRENCHING AND BACKFILLING

PART 1 GENERAL

1.1 WORK INCLUDED

The Contractor shall make excavations in such widths and depths as will give suitable room for below grade vaults, pump stations, etc., laying pipe to the lines, grades and elevations, furnish, place and compact all backfill materials specified herein or denoted on the Drawings. The materials, equipment, labor, etc., required herein are to be considered as part of the requirements and costs for installing the various pipes, structures and other items they are incidental to.

1.2 RELATED WORK

A. Section 31 23 16 – Excavation.

B. Section 33 14 16 – Site Water Utility Distribution Piping

C. Section 33 31 13 – Sanitary Sewerage Piping

PART 2 PRODUCTS

2.1 MATERIALS

A. Crushed stone material shall conform with the requirements of the applicable sections of the Kentucky Bureau of Highways Standard Specifications and shall consist of clean, hard, and durable particles or fragments, free from dirt, vegetation or objectionable materials.

B. Two classes of crushed stone material are used in this Section. The type of material in each class is as follows:
   1. Class I - No. 9 Aggregate.
   2. Class II - Dense Graded Aggregate (DGA).

PART 3 EXECUTION

3.1 EXCAVATION OF TRENCHES

A. Unless otherwise directed by the Engineer, trenches are to be excavated in open cuts.
   1. Where pipe is to be laid in gravel bedding or concrete cradle, the trench may be excavated by machinery to, or just below, the designated subgrade, provided that the material remaining at the bottom of the trench is no more than slightly disturbed.

2. Where pipe is to be laid directly on the trench bottom, the lower part of trenches in earth shall not be excavated to subgrade by machinery. However, just before the pipe is to be placed, the last of the material to be excavated shall be removed by means of hand tools to form a flat or shaped bottom, true to grade, so that the pipe will have a uniform and continuous bearing and support on firm and undisturbed material between joints except for limited areas where the use of pipe slings may have disturbed the bottom.

B. Trenches shall be sufficient width to provide working space on each side of the pipe and to permit proper backfilling around the pipe.
   1. The Contractor shall remove only as much of any existing pavement as is necessary for the prosecution of the Work. The pavement shall be cut with pneumatic tools, without extra compensation to the Contractor, to prevent damage to the remaining road surface. Where pavement is removed in large pieces, it shall be disposed of before proceeding with the excavation.

C. All excavated materials shall be placed a safe distance back from the edge of the trench.

D. Unless specifically directed otherwise by the Engineer, not more than 500 feet of trench shall be opened ahead of the pipe laying work of any one crew, and not more than 500 feet of open ditch shall be left behind the pipe laying work of any one crew. Watchmen or barricades, lanterns and other such signs and signals as may be necessary to warn the public of the dangers in connection with open trenches, excavations and other obstructions, shall be provided by and at the expense of the Contractor.

E. When so required, or when directed by the Engineer, only one-half of street crossings and road crossings shall be excavated before placing temporary bridges over the side excavated, for the convenience of the traveling public. All backfilled ditches shall be maintained in such manner that they will offer no hazard to the passage of traffic. The convenience of the traveling public and the property owners abutting the improvements shall be taken into consideration. All public or private drives shall be promptly backfilled or bridged at the direction of the Engineer.

F. Trench excavation shall include the removal of earth, rock, pavement, or other materials encountered in the excavating to the depth and extent shown or indicated on the Drawings.

3.2 WATER PIPE BEDDING

A. Piping for water mains shall be supported as follows:
   1. The trench bottom for water main piping shall be stable, continuous, relatively smooth and free of frozen material, clodded dirt, foreign material and rock or granular material larger than 1/2 inch in diameter. The foundation for water main piping shall be prepared so that the entire load of the backfill on top of the pipe will be carried uniformly on the barrel of the pipe. Any uneven areas in the trench bottom shall be shaved-off or filled-in with Class I granular bedding. When the trench is made through rock, the bottom shall be lowered to provide 6 inches

of clearance around the pipe. Class I granular bedding shall be used to bring the trench bottom to grade.

B. After each pipe has been brought to grade, aligned, and placed in final position, earth material for water main piping shall be deposited and densified under the pipe haunches and on each side of the pipe up to the spring line of the pipe to prevent lateral displacement and hold the pipe in proper position during subsequent pipe jointing, bedding, and backfilling operations.

C. In wet, yielding and mucky locations where pipe is in danger of sinking below grade or floating out of grade or line, or where backfill materials are of such a fluid nature that such movements of pipe might take place during the placing of the backfill, the pipe must be weighted or secured permanently in place by such means as will prove effective.

D. Where an unstable (i.e., water, mud, etc.) trench bottom is encountered, stabilization of the trench bottom is required. This is to be accomplished by undercutting the trench depth and replacing to grade with a foundation of crushed stone aggregate.

E. The depth of the foundation is dependent upon the severity of the trench bottom. The size of stone aggregate used in the foundation will be determined by the condition of the unstable material. Once the trench bottom has been stabilized, the required Class I bedding material can be placed.

F. It should be noted that no pipe shall be laid on solid or blasted rock.

G Pipe bedding as required in Paragraphs A, B, and D of this Section is **not** considered a separate pay item.

3.3 WATER PIPE BACKFILLING

A. Initial Backfill:
   1. This backfill is defined as that material which is placed over the pipe from the spring line to a point 6 inches above the top of the pipe. For water main piping, initial backfill material shall be earth material free of rocks, acceptable to the Engineer or with Class I material when a condition exists mentioned in Paragraph A, 3. below.
   2. Material used, whether earth or Class I, in the initial backfilling is **not** a separate pay item. Payment for the material is included in the unit price per linear foot of water main.
   3. In areas where large quantities of rock are excavated and the available excavated earth in the immediate vicinity is insufficient for placing the required amount of backfill over the top of the pipe as set forth in Paragraph A.1, the Contractor shall either haul in earth or order Class I material for backfilling over the pipe. Neither the hauling and placement of earth nor the ordering and placement of Class I material to fulfill the backfill requirements set forth herein is considered a separate pay item.

B. Final Backfill:
   1. There are two cases where the method of final backfilling varies. The various cases and their trench situations are as follows:
      a. Case I - Areas not subject to vehicular traffic.
      b. Case II - Paved areas including streets, drives, parking areas, and walks.
   2. In all cases, walking or working on the completed pipelines, except as may be necessary in backfilling, will not be permitted until the trench has been backfilled to a point 6 inches above the top of the pipe. The method of final backfilling for each of the above cases is as follows:
      a. Case I - The trench shall be backfilled from a point 6 inches above the top of the pipe to a point 8 inches below the surface of the ground with earth material free from large rock (over one-half cubic foot in volume), acceptable to the Engineer. The remainder of the trench shall be backfilled with earth material reasonably free of any rocks.
      b. Case II - The trench shall be backfilled from a point 6 inches above the top of the pipe to a point 12 inches below the existing pavement surface with Class I (No. 9 crushed stone aggregate) material. The backfill shall be mechanically tamped in approximately 6-inch layers to obtain the maximum possible compaction. The remaining backfill shall be Class II (dense graded aggregate) material mechanically tamped to maximum possible compaction. The trench may be left with a slight mound if permitted by the Engineer. Where required by state or local regulations, a bituminous binder coarse detailed on the Drawings and specified in Section 02510 shall be incorporated in the final backfill.
   3. Earth and Class I material used in final backfill is not a separate pay item. Payment shall be included in the price of water main.
   4. Class II material used in final backfill shall be included in the unit price of the pipe.

C. A sufficient amount of Class II material shall be stockpiled to insure immediate replacement by the Contractor of any settled areas. No extra payment will be made for the filling in of settled or washed areas by the Contractor.

D. Excavated materials from trenches, in excess of quantity required for trench backfill, shall be disposed of by the Contractor. It shall be the responsibility of the Contractor to obtain location or permits for its disposal, unless specific waste areas have been designated on the Drawings or noted in these Specifications. The cost of disposal of excess excavated materials, as set forth herein, no additional compensation being allowed for hauling or overhaul.

3.6 PLACEMENT OF IDENTIFICATION TAPE

A. The placement of detectable underground marking tape shall be installed over all utility lines. Care shall be taken to insure that the buried marking tape is not broken when installed and shall be Lineguard brand encased aluminum foil, Type III. The identification tape is manufactured by Lineguard, Inc., P.O. Box 426, Wheaton, IL 60187.

B. The identification tape shall bear the printed identification of the utility line below it, such as "Caution - Buried Below". Tape shall be reverse printed; surface printing will not be acceptable. The tape shall be visible in all types and colors of soil and provide maximum color contrast to the soil. The tape shall meet the APWA color code, and shall be 2 inches in width. Colors are: yellow - gas, green - sewer, red - electric, blue - water, orange - telephone, brown - force main.

C. The tape shall be the last equipment installed in the trench so as to be first out. The tape shall be buried 18 inches below top of grade. After trench backfilling, the tape shall be placed in the backfill and allowed to settle into place with the backfill. The tape may be plowed in after final settlement, installed with a tool during the trench backfilling process, unrolled before final restoration or installed in any other way acceptable to the Owner or Engineer.

3.7 COPPER TRACING WIRE

Copper tracing wire shall be provided for all not metallic pipe. The copper tracing wire shall be #12 gauge solid insulated copper tracer wire taped at 5-foot intervals. Wire shall be continuous between and terminate at valve boxes, manholes, and fire hydrants. Any splices shall be soldered and fitted with Raco, or approved equal insulated water-tight boot.

END OF SECTION

SECTION 32 05 23
CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Subbase for concrete pavements.
   2. Curbs, gutters, and combination curbs and gutters, wheel stops.
   3. Pedestrian Pavement: Walks, wheelchair and curb ramps
   4. Vehicular Pavement: driveways,

1.2 RELATED REQUIREMENTS

A. Field Testing: Section 01 45 29, TESTING LABORATORY SERVICES.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.
B. American Association of State Highway and Transportation Officials (AASHTO):
   1. M147-65-UL-04 - Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.
   2. M233-86 - Boiled Linseed Oil Mixture for Treatment of Portland Cement Concrete.
C. American Concrete Institute (ACI):
   1. 305R-10 - Guide to Hot Weather Concreting.
   2. 306R-10 - Guide to Cold Weather Concreting.
D. American National Standards Institute (ANSI):
   1. B101.3 - Wet DOCF of Common Hard Surface Floor Materials (Including Action and Limit Thresholds for the Suitable Assessment of the Measured Values).
E. ASTM International (ASTM):
   1. A615/A615M-16 - Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
   2. A996/A996M-15 - Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
   3. A1064/A1064M-16 - Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
   4. C33/C33M-16 - Concrete Aggregates.
   5. C94/C94M-16 - Ready Mixed Concrete.
   6. C143/C143M-15a - Slump of Hydraulic Cement Concrete.
   7. C150/C150M-16 - Portland Cement.
   8. C171-16 - Sheet Materials for Curing Concrete.
   9. C260/C260M-10a - Air Entraining Admixtures for Concrete.
   10. C309-11 - Liquid Membrane Forming Compounds for Curing Concrete.
   11. C494/C494M-15a - Chemical Admixtures for Concrete.

12. C618-15 - Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
13. C979/C979M-16 - Pigments for Integrally Colored Concrete.
14. C989/C989M-14 - Slag Cement for Use in Concrete and Mortars.
15. C1240-15 - Silica Fume Used in Cementitious Mixtures.
16. D1751-04(2013)e1 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
17. D5893/D5893M-10 - Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.
18. D6690-15 – Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

1.4 PREINSTALLATION MEETINGS

A. Conduct preinstallation meeting at project site minimum 30 days before beginning Work of this section.

1.5 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Submittal Drawings:
   1. Show size, configuration, and fabrication and installation details.
   2. Show reinforcing.
C. Test reports: Certify products comply with specifications.
   1. Concrete materials.
   2. Select subbase materials.
   3. Field test reports.
D. Certificates: Certify products comply with specifications.
   1. Expansion joint filler.
   2. Reinforcement.
   3. Curing materials.
   4. Concrete protective coating.
E. Qualifications: Substantiate qualifications comply with specifications.
   1. Installer with project experience list.
   2. Land surveyor licensed in the state of Kentucky.
F. Concrete mix design.
G. Select subbase job-mix design.
H. Proposed hot and cold weather concreting methods.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Regularly installs specified products.
   2. Installed specified products with satisfactory service on five similar installations.

3. Project Experience List: Provide contact names and addresses for completed projects.

B. Land Surveyor: Professional land surveyor or engineer registered to provide land surveys in jurisdiction where project is located.

C. Preconstruction Testing:

1. Engage independent testing laboratory to perform tests and submit reports.
2. Deliver samples to laboratory in number and quantity required for testing.
3. Concrete mix design.

1.7 DELIVERY

A. Deliver steel reinforcement to prevent damage.

B. Before installation, return or dispose of distorted or damaged steel reinforcement.

C. Bulk Products: Deliver bulk products away from buildings, utilities, pavement, and existing turf and planted areas. Maintain dry bulk product storage away from contaminants.

1.8 STORAGE AND HANDLING

A. Store products indoors in dry, weathertight facility.

B. Protect products from damage during handling and construction operations.

1.9 FIELD CONDITIONS

A. Hot Weather Concreting Procedures: ACI 305R.

B. Cold Weather Concreting Procedures: ACI 306R.

1. Use non-corrosive, non-chloride accelerator admixture.
2. Do not use calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions.

1.10 WARRANTY

A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Portland Cement: ASTM C150 white portland cement

B. Coarse Aggregate: ASTM C33/C33M; to suit application.

C. Fine Aggregate: ASTM C33/C33M.

D. Mixing Water: Fresh, clean, and potable.

E. Air Entraining Admixture: ASTM C260/C260M.

F. Chemical Admixtures: ASTM C494/C494M.

G. Reinforcing Steel: ASTM A615/A615M Grade 420 (60) deformed.

H. Welded Wire Fabric: ASTM A1064/A1064M, plain; Grade 385 (56); sized as indicated.

I. Expansion Joint Filler: ASTM D1751.

J. Sheet Materials for Curing Concrete: ASTM C171.

K. Color Pigment: ASTM C979/C979M, colored and white powder pigments.

2.2 SELECT SUBBASE

A. Subbase: AASHTO M147; Grade B

B. Select crushed stone, DGA of acceptable gradations: Materials within three to five percent, plus or minus, of specified gradation, or as recommended by the geotechnical engineer and approved by the Contracting Officer's Representative.

2.3 FORMS

A. Forms: Wood, plywood, metal, or other materials, approved by Contracting Officer's Representative, of grade or type suitable to obtain type of finish specified.

B. Plywood: Exterior grade, free of defects and patches on contact surface.

C. Lumber: Sound, grade-marked, S4S stress graded softwood, minimum 50 mm (2 inches) thick, free from warp, twist, loose knots, splits, or other defects.

D. Form Coating: As recommended by Architect/Engineer.

E. Provide forms suitable in cross-section, depth, and strength to resist springing during depositing and consolidating concrete.

F. Do not use forms varying from straight line more than 3 mm in 3000 mm (1/8 inch in 10 feet), horizontally and vertically.

G. Provide flexible or curved forms for forming radii.

2.4 CONCRETE CURING MATERIALS

A. Concrete curing materials, conform to one of the following:

1. Burlap: Minimum 233 g/sq. m (7 ounces/sq. yd.) dry.
2. Sheet Materials for Curing Concrete: ASTM C171.
3. Curing Compound: ASTM C309, Type 1 clear liquid membrane forming type, without paraffin or petroleum.

2.5 CONCRETE MIXES

A. Design concrete mixes according to ASTM C94/C94M, Option C.

B. Concrete Type: Air-entrained. 6 percent plus or minus 2 percent

TABLE I - CONCRETE TYPES

Concrete Type	Minimum 28 Day Compressive Strength f'c MPa (psi)	Non-Air-Entrained	Air-Entrained

		Min. Cement kg/cu. m (lbs./cu. yd.)	Max. Water Cement Ratio	Min. Cement kg/cu. m (lbs./cu. yd.)	Max. Water Cement Ratio
A	35 (5000)1,3	375 (630)	0.45	385 (650)	0.40
B	30 (4000)1,3	325 (550)	0.55	340 (570)	0.50
C	25 (3000)1,3	280 (470)	0.65	290 (490)	0.55
D	25 (3000)1,2	300 (500)	*	310 (520)	*

Footnotes:

1. If trial mixes are used, achieve compressive strength 8.3 MPa (1,200 psi) in excess of f'c. For concrete strengths greater than 35 MPa (5,000 psi), achieve compressive strength 9.7 MPa (1,400 psi) in excess of f'c.
2. For Concrete Exposed to High Sulfate Content Soils: Maximum water cement ratio is 0.44.
3. Laboratory Determined according to ACI 211.1 for normal weight concrete.

C. Maximum Slump: ASTM C143/C143M. See Table II.

TABLE II - MAXIMUM SLUMP

APPLICATION	MAXIMUM SLUMP
Curb & Gutter	75 mm (3 inches)
Pedestrian Pavement	75 mm (3 inches)
Vehicular Pavement	50 mm (2 inches) Machine Finished 100 mm (4 inches) Hand Finished
Equipment Pad	75 to 100 mm (3 to 4 inches)

2.6 ACCESSORIES

A. Equipment and Tools: Obtain Contracting Officer's Representative's, approval of equipment and tools needed for handling materials and performing work before work begins.

B. Maintain equipment and tools in satisfactory working condition.

C. Sealants:
   1. Concrete Paving Expansion Joints: ASTM D5893/D5893M, Type SL, single component, self-leveling, silicone joint sealant.
   2. Concrete Paving Joints: ASTM D6690, Type IV, hot-applied, single component joint sealant.

D. Concrete Protective Coating: AASHTO M233 linseed oil mixture.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.
B. Protect existing construction and completed work from damage.
C. Prepare, construct, and finish subgrade. See Section 31 20 00, EARTHWORK.
D. Maintain subgrade in smooth, compacted condition, in conformance with the required section and established grade until the succeeding operation has been accomplished.

3.2 SELECT SUBBASE

A. Placing:
   1. Place subbase material on prepared subgrade in uniform layer to required contour and grades, and to maximum 200 mm (8 inches) loose depth.
   2. When required compacted thickness exceeds 150 mm (6 inches), place subbase material in equal thickness layers.
   3. When subbase elevation is 13 mm (1/2 inch) or more below required grade, excavate subbase minimum 75 mm (3 inches) deep. Place and compact subbase to required grade.

B. Compaction:
   1. Perform compaction with approved hand or mechanical equipment well suited to the material being compacted.
   2. Maintain subbase at optimum moisture content for compaction.
   3. Compact each subbase layer to minimum 95 percent or 100 percent of maximum density as specified in Section 31 20 00, EARTHWORK.

C. Subbase Tolerances:
   1. Variation from Indicated Grade: Maximum 9 mm (3/8 inch).
   2. Variation from Indicated Thickness: Maximum 13 mm (1/2 inch).

D. Protection:
   1. Protect subbase from damage until concrete is placed.
   2. Reconstruct damaged subbase before placing concrete.

3.3 SETTING FORMS

A. Form Substrate:
   1. Compact form substrate to uniformly support forms along entire length.

2. Correct substrate imperfections and variations by cutting, filling, and compacting.

B. Form Setting:
   1. Set forms to indicated line and grade with tight joints. Rigidly brace forms preventing movement.
   2. Remove forms when removal will not damage concrete and when required for finishing.
   3. Clean and oil forms before each use.
   4. Correct forms, when required, immediately before placing concrete.

C. Land Surveyor: Establish control, alignment, and grade for forms and slip forming machine operations.

D. Notify Contracting Officer's Representative immediately when discrepancies exist between field conditions and drawings.

E. Correct discrepancies greater than 25 mm (1 inch) before placing concrete.

F. Form Tolerances:
   1. Variation from Indicated Line: Maximum 6 mm (1/4 inch).
   2. Variation from Indicated Grade: Maximum 3 mm in 3000 mm (1/8 inch in 10 feet).

3.4 PLACING REINFORCEMENT

A. Keep reinforcement clean from contamination preventing concrete bond.

B. Install reinforcement shown on drawings.

C. Support and securely tie reinforcing steel to prevent displacement during concrete placement.

D. Obtain GC’s Representative’s reinforcement placement approval before placing concrete.

3.5 JOINTS - GENERAL

A. Place joints, where shown on approved submittal Drawings.

B. Conform to details shown.

C. Install joints perpendicular to finished concrete surface.

D. Make joints straight and continuous from edge to edge of pavement.

3.6 CONSTRUCTION JOINTS

A. Locate longitudinal and transverse construction joints between slabs of vehicular pavement as shown on approved submittal Drawings.

B. Place transverse construction joints of type shown, where indicated, and whenever concrete placement is suspended for more than 30 minutes.

C. Provide butt-type joint with dowels in curb and gutter at planned joint locations.

3.7 CONTRACTION JOINTS

A. Tool or cut joints to width, depth, and radius edge shown on drawings using grooving tool, jointer, or saw.

B. Construct joints in curbs and gutters by inserting 3 mm (1/8 inch) steel plates conforming to curb and gutter cross sections.

C. Keep plates in place until concrete can hold its shape.
D. Finish joint edges with edging tool.
E. Score pedestrian pavement with grooving tool or jointer.

3.8 EXPANSION JOINTS

A. Form expansion joints with expansion joint filler of thickness shown on drawings.
B. Locate joints around perimeter of structures and features abutting site work concrete.
C. Create complete, uniform separation between structure and site work concrete.
D. Place expansion joints a maximum of 40' apart. and tooled joints on 10' centers or half distance / on center; of distances below 20' and above 10'
E. Extend expansion joint material full depth of concrete with top edge of joint filler below finished concrete surface where sealant is indicated on Drawings.
F. Cut and shape material matching cross section.
G. Anchor with approved devices to prevent displacing during placing and finishing operations.
H. Round joint edges with edging tool.

3.9 PLACING CONCRETE - GENERAL

A. Preparation before Placing Concrete:
    1. Obtain Contracting Officer's Representative approval.
    2. Remove debris and other foreign material.
    3. Uniformly moisten substrate, without standing water.
B. Convey concrete from mixer to final location without segregation or loss of ingredients. Deposit concrete to minimize handling.
C. During placement, consolidate concrete by spading or vibrating to minimize voids, honeycomb, and rock pockets.
D. Vibrate concrete against forms and along joints.
E. Avoid excess vibration and handling causing segregation.
F. Place concrete continuously between joints without bulkheads.
G. Install construction joint in concrete placement suspended for more than 30 minutes.
H. Replace concrete with cracks, chips, bird baths, and other defects to nearest joints, approved by Contracting Officer's Representative.

3.10 PLACING CONCRETE FOR CURB AND GUTTER, PEDESTRIAN PAVEMENT, AND EQUIPMENT PADS

A. Place concrete in one layer conforming to cross section shown on Drawings after consolidating and finishing.
B. Deposit concrete near joints without disturbing joints. Do not place concrete directly onto joint assemblies.
C. Strike concrete surface to proper section ready for consolidation.

D. Consolidate concrete by tamping and spading or with approved mechanical finishing equipment.
E. Finish concrete surface with wood or metal float.
F. Construct concrete pads and pavements with sufficient slope to drain, preventing standing water.

3.11 PLACING CONCRETE FOR VEHICULAR PAVEMENT

A. Deposit concrete as close as possible to its final position.
B. Place concrete continuously between construction joints without cold joints.
C. Strike and consolidate concrete with finishing machine, vibrating screed, or by hand-finishing.
D. Finish concrete surface to elevation and crown shown on drawings.
E. Deposit concrete near joints without disturbing joints. Do not place concrete directly onto joint assemblies.
F. Obtain GC's Representative's approval before placing adjacent lanes.
G. Curb-Forming Machines: Curb-forming machines for constructing integral curbs, curbs and gutter will be approved based on trial use on the project. When equipment produces unsatisfactory results, discontinue use of the equipment at any time during construction and accomplish work by hand method construction. Remove unsatisfactory work and reconstruct full length between regularly scheduled joints. Dispose of removed portions off the project site.

3.12 FORM REMOVAL

A. Keep forms in place minimum 12 hours after concrete placement. Remove forms without damaging concrete.
B. Do not use bars or heavy tools against concrete to remove forms. Repair damage concrete found after form removal.

3.13 CONCRETE FINISHING - GENERAL

A. Follow operation sequence below, unless otherwise indicated on Drawings:
B. Consolidating, floating, striking, troweling, texturing, and joint edging.
C. Use edging tool with 6 mm (1/4 inch) radius, unless otherwise shown on Drawings
D. Keep finishing equipment and tools clean and suitable for use.

3.14 CONCRETE FINISHING - PEDESTRIAN PAVEMENT

A. Walks, Grade Slabs, Wheelchair Curb Ramps,
B. Finish concrete surfaces with metal float, troweled smooth, and finished with a broom moistened with clear water.
C. Finish slab edges and formed transverse joints with edger.
D. Broom surfaces transverse to traffic direction.
E. Use brooming to eliminate flat surface produced by edger.

F. Produce uniform corrugations, maximum 1.5 mm (1/16 inch) deep profile.
G. Provide surface uniform in color and free of surface blemishes, form marks, and tool marks.
H. Paving Tolerances:
    1. Variation from Indicated Plane: Maximum 5 mm in 3000 mm (3/16 inch in 10 feet).
    2. Variation from Indicated Thickness: Maximum 6 mm (1/4 inch).
I. Replace paving within joint boundary when paving exceeds specified tolerances.
J. Step Treads, Risers and Sidewalls: Finish as specified for pedestrian pavement, except as follows:
    1. Remove riser forms sequentially, starting with top riser.
    2. Rub riser face with wood or concrete rubbing block and water. Remove blemishes, form marks, and tool marks. Use outside edger to round nosing; use inside edger to finish bottom of riser.
    3. Apply uniform brush finish to treads, risers, and sidewall.
    4. Apply stiff brush finish to treads to provide slip resistant surface complying with ANSI B101.3.
K. Step Tolerance:
    1. Variation from Indicated Plane: Maximum 5 mm in 3000 mm (3/16 inch in 10 feet).

3.15 CONCRETE FINISHING - VEHICULAR PAVEMENT

A. Align finish surfaces where new and existing pavements abut.
B. Longitudinally float pavement surface to profile and grade indicated on drawings.
C. Straighten surface removing irregularities and maintaining specified tolerances while concrete is plastic.
D. Finish pavement edges and joints with edging tool.
E. Broom finish concrete surface after bleed water dissipates and before concrete hardens.
F. Broom surface transverse to traffic direction.
G. Use brooming to eliminate flat surface produced by edger.
H. Produce uniform corrugations, maximum 3 mm (1/8 inch) deep profile.
I. Pavement Tolerances:
    1. Variation from Indicated Plane: Maximum 6 mm in 3000 mm (1/4 inch in 10 feet) tested parallel and perpendicular to traffic direction at maximum 1500 mm (5 feet) intervals.
    2. Variation from Indicated Thickness: Maximum 6 mm (1/4 inch).
J. Replace paving within joint boundary when paving exceeds specified tolerances.

3.16 CONCRETE FINISHING - CURBS AND GUTTERS

A. Round edges of gutter and top of curb with edging tool.
B. Gutter and Curb Top:

1. Float surfaces and finish with smooth wood or metal float until true to grade and section and uniform color.

C. Finish surfaces, while still plastic, longitudinally with bristle brush.

D. Curb Face:

1. Remove curb form and immediately rub curb face with wood or concrete rubbing block removing blemishes, form marks, and tool marks and providing uniform color.

E. Brush curb face, while still plastic, matching gutter and curb top.

F. Curb and Gutter Tolerances: Except at grade changes or curves.

G. Variation from Indicated Plane and Grade:

1. Gutter: Maximum 3 mm in 3000 mm (1/8 inch in 10 feet).
2. Curb Top and Face: Maximum 6 mm in 3000 mm (1/4 inch in 10 feet).
3. Replace curbs and gutters within joint boundary when curbs and gutters exceed specified tolerances.

H. Correct depressions causing standing water.

3.17 CONCRETE FINISHING - EQUIPMENT PADS

A. Strike pad surface to elevation shown on Drawings.

B. Provide smooth, dense float finish, free from depressions or irregularities.

C. Finish pad edges with edger.

D. After removing forms, rub pad edge faces with wood or concrete rubbing block, removing blemishes, form marks, and tool marks and providing uniform color.

E. Pad Tolerances:

1. Variation from Indicated Plane: Maximum 3 mm in 3000 mm (1/8 inch in 10 feet).
2. Variation from Indicated Elevation: Maximum 6 mm (1/4 inch).
3. Variation from Indicated Thickness: Maximum 6 mm (1/4 inch).

F. Replace pads when pads exceed specified tolerances.

3.18 SPECIAL FINISHES

A. NA

3.19 CONCRETE CURING

A. Concrete Protection:

1. Protect unhardened concrete from rain and flowing water.
2. Provide sufficient curing and protection materials available and ready for use before concrete placement begins.
3. Protect concrete to prevent pavement cracking from ambient temperature changes during curing period.
4. Replace pavement damaged by curing method allowing concrete cracking.
5. Employ another curing method as directed by Contracting Officer's Representative.

B. Cure concrete for minimum 7 days by one of the following methods appropriate to weather conditions preventing moisture loss and rapid temperature change:
    1. Burlap Mat: Provide minimum two layers kept saturated with water during curing period. Overlap Mats at least 150 mm (6 inches).
    2. Sheet Materials:
        a. Wet exposed concrete surface with fine water spray and cover with sheet materials.
        b Overlap sheets minimum 300 mm (12 inches).
        c. Securely anchor sheet materials preventing displacement.
    3. Curing Compound:
        a. Protect joints indicated to receive sealants preventing contamination from curing compound.
        b. Insert moistened paper or fiber rope into joint or cover joint with waterproof paper.
    4. Apply curing compound before concrete dries.
    5. Apply curing compound in two coats at right angles to each other.
    6. Application Rate: Maximum 5 sq. m/L (200 sq. ft./gallon), both coats.
    7. Immediately reapply curing compound to surfaces damaged during curing period.

3.20 CONCRETE PROTECTIVE COATING

A. Apply protective coating of linseed oil mixture to exposed-to-view concrete surfaces, drainage structures, and features that project through, into, or against concrete exterior improvements to protect the concrete against deicing materials.
B. Complete backfilling and curing operation before applying protective coating.
C. Dry and thoroughly clean concrete before each application.
D. Apply two coats, with maximum coverage of 11 sq. m/L (50 sq. yds./gal.); first coat, and maximum 16 sq. m/L (70 sq. yds./gal.); second coat, except apply commercially prepared mixture according to manufacturer's instructions.
E. Protect coated surfaces from vehicular and pedestrian traffic until dry.
F. Do not heat protective coating, and do not expose protective coating to open flame, sparks, or fire adjacent to open containers or applicators. Do not apply material at temperatures lower than 10 degrees C (50 degrees F).

3.21 FIELD QUALITY CONTROL

A. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.
    1. Compaction.
    2. Pavement subgrade.
    3. Curb, gutter, and sidewalk.
    4. Concrete:

5. Delivery samples.
6. Field samples.
7. Slip Resistance: Steps and pedestrian paving.

3.22 CLEANING

A. After completing curing:
   1. Remove burlap and sheet curing materials.
   2. Sweep concrete clean, removing foreign matter from the joints.
   3. Seal joints as specified.

3.23 PROTECTION

A. Protect exterior improvements from traffic and construction operations.
B. Prohibit traffic on paving for minimum seven days after placement, or longer as directed by Contracting Officer's Representative.
C. Remove protective materials immediately before acceptance.
D. Repair damage.
E. Replace concrete containing excessive cracking, fractures, spalling, and other defects within joint boundary, when directed by Contracting Officer's Representative, and at no additional cost to the Government.

- - - E N D - - -

SECTION 32 12 16

ASPHALT PAVING

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.

B. SUMMARY

1. Section Includes:
    a. Cold milling of existing asphalt pavement.
    b. Hot-mix asphalt patching.
    c. Hot-mix asphalt paving.
    d. Hot-mix asphalt overlay
    e. Asphalt surface treatments.

1.2 INSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference project Site.

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
2. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
3. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

1.3 SUBMITTALS

A. Product Data: For each type of product.

1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
2. Job-Mix Designs: For each job mix proposed for the Work.

C. Samples for Verification: For the following product, in manufacturer's standard sizes unless otherwise indicated:

1. Paving Fabric: 12 by 12 inches (300 by 300 mm) minimum

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by the Kentucky Transportation Cabinet.

B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.

C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements set forth by the Kentucky Transportation Cabinet for asphalt paving work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.5 PROJECT CONDITIONS

A. PART 1 Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
   1. Prime Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
   2. Tack Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
   3. Slurry Coat: Comply with weather limitations in ASTM D 3910.
   4. Asphalt Base Course: Minimum surface temperature of 40 deg F (4.4 deg C) and rising at time of placement.
   5. Asphalt Surface Course: Minimum surface temperature of 60 deg F (15.6 deg C) at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.
B. Coarse Aggregate: ASTM D 692/D 692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
C. Fine Aggregate: ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
   1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.
D. Mineral Filler: ASTM D 242/D 242M, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO M 320, PG 64-22
B. Tack Coat: ASTM D 977 emulsified asphalt, or ASTM D 2397 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

2.3 AUXILIARY MATERIALS

A. Herbicide: Commercial chemical for weed control, registered by the EPA, and not classified as "restricted use" for locations and conditions of application. Provide in granular, liquid, or wet able powder form.

2.4 MIXES

A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by the Kentucky Transportation Cabinet; designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types".

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.
B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
   1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).
   2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
   3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 COLD MILLING

A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.
   1. Mill to a depth of 2 inches (51 mm).
   2. Mill to a uniform finished surface free of excessive gouges, grooves, and ridges.
   3. Do not allow milled materials to accumulate on-site.

3.3 PATCHING

A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade
B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseat concrete pieces firmly
C. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).
   1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
   2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surface

3.4 SURFACE PREPARATION.

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

C. tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.5 PAVING GEOTEXTILE INSTALLATION – NOT USED

3.6 PLACING HOT-MIX ASPHALT

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted

1. Spread mix at a minimum temperature of 250 deg F (121 deg C).
2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches (25 to 38 mm) from strip to strip to ensure proper compaction of mix along longitudinal joints.
2. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.7 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).

4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

3.8 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
   1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).
B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density.
   1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent or greater than 96 percent.
D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.9 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
   1. Base Course: Plus or minus ½ inch (13 mm).
   2. Surface Course: Plus ¼ inch (6 mm), no minus.
B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:
   1. Base Course: 1/4 inch (6 mm)

2. Surface Course: 1/8 inch (3 mm)
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm.)

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Utility will engage a qualified testing agency to perform tests and inspection.

B. Replace and compact hot-mix asphalt where core tests were taken.

C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.11 DISPOSAL

A. General: Handle asphalt-paving waste according to approved waste management plan required in Section 017419 "Construction Waste Management and Disposal

- - - END - - -

SECTION 32 14 40

STONE PAVING

PART 1 GENERAL

1.1 WORK INCLUDED

Crushed stone paving course, compacted.

1.2 REFERENCES

ASTM C33 - Aggregate for Concrete.

1.3 TESTS

Gradation of stone materials will be performed in accordance with ASTM C33.

PART 2 - PRODUCTS

2.1 MATERIALS

Crushed stone shall conform to ASTM C33, Type No. 57, Type No. 2, and No. 610.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify compacted subgrade.

B. Verify gradients and elevations of base are correct.

C. Beginning of installation means acceptance of existing conditions.

3.2 PLACING STONE PAVING

A. Spread stone material over prepared base to a total compacted thickness of 12 inches.

B. Place stone in 6-inch layers and compact.

C. Level surfaces to elevations and gradients indicated.

D. Add small quantities of sand to stone mix as appropriate to assist compaction.

E. Adequately compact placed stone materials.

F. Add water to assist compaction. With an excess water condition, rework topping and aerate to reduce moisture content.

END OF SECTION

SECTION 32 31 53

PERIMETER SECURITY FENCES AND GATES

PART 1 – GENERAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. DIVISION 01 - GENERAL REQUIREMENTS: Drawings, quality, product and performance requirements, general and supplemental conditions apply as applicable to the project and project documents.

1.2 SUMMARY

A. This Section includes industrial/commercial chain link fence and gates specifications:
   1. Galvanized steel coated chain link fabric
   2. Galvanized steel framework and fittings
   3. Gates: swing and cantilever slide
   4. Barbed wire
   5. Installation
B. Related Sections:
   1. 01 33 23 Shop Drawings, product data
   2. 01 43 13 Manufacturers Qualifications
   3. 03 30 53 Miscellaneous Cast in Place Concrete
   4. 25 50 00 Integrated Automation [pertinent to gate operator access control]
   5. 26 01 02 Electrical distribution [relating to gate operators]
   6. 31 22 19 Finish Grading

1.3 REFERENCES

A. ASTM A121 Specification for Metallic-Coated Carbon Steel Barbed Wire

B. ASTM A392 Specification for Zinc-Coated Steel Chain-Link Fence Fabric

C. ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

D. ASTM F552 Standard Terminology Relating to Chain Link Fencing

F. ASTM F567 Standard Practice for Installation of Chain Link Fence

G. ASTM F626 Specification for Fence Fittings

H. ASTM F900 Specification for Industrial and Commercial Swing Gates

I. ASTM F1043 Specification for Strength and Protective Coatings of Steel Industrial Chain Link Fence Framework

J. ASTM F1083 Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures

K. ASTM F1184 Specification for Industrial and Commercial Horizontal Slide Gates

L. ASTM F2200 Specification for Automated Vehicular Gate Construction

M. UL325 Automatic operators: Door, Drapery, Gate, Louver and Window

1.4 SUBMITTALS

A. Shop drawings: Site plan showing layout of fence location with dimensions, location of gates and opening size, cleared area, elevation of fence, gates, footings and details of attachments. Comply with the provisions of Section 01 33 23.

B. Material samples: When required, provide representative samples of chain link fabric, framework and fittings. <Specify size and number of samples>

C. Specification Changes: May not be made after the date of bid.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Framework, posts, rails, fabric, and fittings for chain link fence system:

1. **MERCHANTS METALS®** www.merchantsmetals.com
Tech-Info@merchantsmetals.com

Phone: (888) 260-1600 Fax: (888) 261-3600

2.2 CHAIN LINK FABRIC

A. Steel Chain Link Fabric: [Height or heights indicated on drawings] <Select from table below and insert ASTM serial designation, mesh size, wire gauge, coating specification, including class and color when applicable, top/bottom selvage >

1. Zinc-Coated Steel Fabric: ASTM A392 hot dipped galvanized before weaving **(GBW)** or after weaving **(GAW).**

a. Class 1 - 1.2 oz/ft^2 (366 g/m^2)

b. Class 2 - 2.0 oz/ft² (610 g/m²) <available 9 and 6 gauge>

2. Fabric Selection Table: Steel chain link mesh sizes and gauges produced in one piece widths 3 feet (910 mm) to 12 feet (3660 mm)

Mesh Size In. (mm)	**6 gauge core** 0.192 in.	**9 gauge core** 0.148 in.	**11 gauge core** 0.120 in.	**11 1/2 gauge core** 0.113 in.	**12 Gauge core** 0.105 in.	**Notes**
	4.88 mm	3.76 mm	3.05 mm	2.87 mm	2.67 mm	N/A = Not applicable for
2 (50)	yes	yes	yes	N/A	N/A	industrial/commercial
1 ¾ (44)	yes	yes	yes	N/A	N/A	applications
1 (25)	N/M	yes	yes	N/A	N/A	N/M = Not manufactured
5/8 (16)	N/M	yes	yes	yes	yes*	*12 ga. only per F668
1/2 (13)	N/M	yes	yes	yes	yes*	
3/8 (10)	N/M	N/M	yes	yes	yes*	
	2170 lbf	1290 lbf	850 lbf	750 lbf	650 lbf	Wire Break Strength
	(9650 N)	(5740 N)	(3780 N)	(3340 N)	(2895 N)	

3. Fabric selvage:

Standard fabric selvage for 2 in (50 mm) mesh 72 in. (1.8 m) high and

higher is knuckle finish at one end, twist at the other, [K&T]. < Specify K&K for added safety for play and park applications>

Fabric less than 72 in (1.8 m), knuckle finish top and bottom, K&K. [Manufacturing and installation issues dictate all mesh sizes less than 2 in. (50 mm) have a knuckle selvage for both top and bottom, K&K.]

2.3 ROUND STEEL PIPE FENCE FRAMEWORK [Specify option A. or B.]

A. Round steel pipe and rail: Schedule 40 standard weight pipe, in accordance with ASTM F1083, 1.8 oz/ ft^2 (550 g/m^2) hot dip galvanized zinc exterior and 1.8 oz/ft^2 (550 g/m^2) hot dip galvanized zinc interior coating.
   Regular Grade: Minimum steel yield strength 30,000 psi (205 MPa)
   High Strength Grade: Minimum yield strength 50,000 psi (344 MPa)
   [Specify Grade: Regular or High Strength]
   1. Line post <Insert outside diameter, zinc coating, weight >
   2. End, Corner, Pull post <Insert outside diameter, zinc coating, weight >
   3. Top, brace, bottom and intermediate rails, 1.660 in. (42.2 mm) OD: <Insert outside diameter, zinc coating, weight>

B. Round steel pipe and rail: Cold-rolled electric-resistance welded pipe in accordance with ASTM F1043 Materials Design Group IC **(LG-40)**, minimum steel yield strength 50,000 psi (344 MPa). Type B external coating, hot dip galvanized zinc 0.9 oz/ ft^2 (305 g/m^2) with a clear polymeric overcoat, Type D interior 90% zinc-rich coating having a minimum thickness of 0.30 mils (0.0076 mm).
   1. Line post
   2. End, Corner, Pull post
   3. Top, brace, bottom and intermediate rails, 1.660 in. (42.2 mm) OD:

C. Typical post and rail size for normal Commercial / Industrial applications

Item	Fence Height	Outside *Diameter* Inches (mm)	*F1083 Schedule 40 Weight lb/ft (kg/m)	F1043-IC (LG-40) Weight lb/ft (kg/m)
Line post	up to 6 ft. (1.8 m)	1.900 (48.3)	2.72 (4.0)	2.28 (3.39)
	over 6 to 8 ft. (1.8 to 2.4 m)	2.375 (60.3)	3.65 (5.4)	3.12 (4.64)
	over 8 to 12 ft. (2.4 to 3.7 m)	2.875 (73.0)	5.79 (8.6)	4.64 (6.91)
	over 12 to 16 ft. (3.7 to 4.9 m)	4.000 (101.6)	9.11 (13.6)	6.56 (9.78)
Terminal post	up to 6 ft. (1.8 m)	2.375 (60.3)	3.65 (5.4)	3.12 (4.64)
	over 6 to 8 ft. (1.8 to 2.4 m)	2.875 (73.0)	5.79 (8.6)	4.64 (6.91)
	over 8 to 12 ft. (2.4 to 3.7 m)	4.000 (101.6)	9.11 (13.6)	6.56 (9.78)
	over 12 to 16 ft. (3.7 to 4.9 m)	6.625 (168.3)	18.97 (28.2)	Not available
		8.625 (219.1)	28.58 (42.5)	Not available
Rails		1.660 (42.2)	2.27 (3.4)	1.84 (2.74)

*Regular Grade F1083 Schedule 40

Framework Wind Load Caution:

Fences containing windscreens or privacy slats (Priva-Max®) and fences greater than 8 feet (2.4 m) in height using, 1 in. (25 mm) mesh or smaller - recommend a wind load force analysis for post selection and post spacing. See Chain Link Manufactures Institute – Wind Load Guide CLFMI: WLG 2445. A interactive Wind load Fence Post Calculator is available at www.wheatland.com]

2.4 TENSION WIRE

A. Metallic Coated Steel Marcelled Tension Wire: 7 gauge core (0.177 in.) (4.50 mm) marcelled wire complying with ASTM A824 [Match coating type to that of the chain link fabric] <Insert metallic coating Type and class when applicable>

1. Type II Zinc-Coated, ASTM A817 Class 4 - 1.2 oz/ft² (366 g/m²)
2. Type II Zinc-Coated, ASTM A817 Class 5 - 2.0 oz/ft² (610 g/m²)

2.5 BARBED WIRE

A. Metallic Coated Steel Barbed Wire: Comply with ASTM A121, Design Number 12-4-5-14R, double 12-½ gauge (0.099 in.) (2.51 mm) twisted strand wire, with 4 point 14 gauge (0.080 in.) (2.03 mm) round barbs spaced 5 inches (127 mm) on center. Match coating type to that of the chain link fabric. 12-4-5-14R is specifically designed for chain link fence applications.
1. Coating Type Z - Zinc-coated: Strand wire coating Type Z, Class 3, 0.80 oz/ft² (254 g/m²), barb coating 0.70 oz/ft² (215g/m²).

2.6 FITTINGS

A. Tension and Brace Bands: Galvanized pressed steel complying with ASTM F626, minimum steel thickness of 12 gauge (0.105 in.) (2.67 mm), minimum width of 3/4 in. (19 mm) and minimum zinc coating of 1.20 oz/ft² (366 g/m²). Secure bands with 5/16 in. (7.94 mm) galvanized steel carriage bolts.

B. Terminal Post Caps, Line Post Loop Tops, Rail and Brace Ends, Boulevard Clamps, Rail Sleeves: In compliance to ASTM F626, pressed steel galvanized after fabrication having a minimum zinc coating of 1.20 oz/ft² (366 g/m²).

C. Truss Rod Assembly: In compliance with ASTM F626, 3/8 in. (9.53 mm) or 5/16” (7.94 mm) diameter steel truss rod with a pressed steel tightener, minimum zinc coating of 1.2 oz/ft² (366 g/m²), assembly capable of withstanding a tension of 2,000 lbs. (970 kg).

D. Tension Bars: In compliance with ASTM F626. Galvanized steel one-piece length 2 in. (50 mm) less than the fabric height. Minimum zinc coating 1.2 oz. /ft² (366 g/m²). *[Bars for 2 in. (50 mm) and 1 ¾ in. (44 mm) mesh shall have a minimum cross section of 3/16 in. (4.8 mm) by 3/4 in. (19 mm)]

*[Bars for 1 in. (25 mm) mesh shall have a cross section of 1/4 in. (6.4 mm) by 3/8 in. (9.5 mm)]

*[Small mesh 3/8 in. (10 mm), 1/2 in. (13 mm) and 5/8 in. (16 mm) shall be attached (sandwiched) to the terminal post using a galvanized steel strap having a minimum cross section of 2 in. (51 mm) by 3/16 in. (4.8 mm) with holes spaced 15 in. (381 mm) on center to accommodate 5/16 in. (7.9 mm) carriage bolts which are to be bolted thru the strap the mesh and thru the terminal post.]

E. Barbed Wire Arms: In compliance with ASTM F626, pressed steel galvanized after fabrication, minimum zinc coating of 1.20 oz. /ft² (366 g/m²), capable of supporting a vertical 250 lb (113 kg) load. [Type I – three strand 45 degree (0.785 rad) arm] [Type II – three strand vertical arm] [Type III – "V" shaped six strand arm]

2.7 TIE WIRE and HOG RINGS

A. Basic commercial / industrial applications - specify 9 gauge core aluminum alloy ties and hog rings per ASTM F626.
B. Added security or fence containing privacy **(Priva-Max®)** slats specify 9 gauge core (0.148) (3.76 mm) steel Galvanized Before Weave (GBW) with preformed power fastened wire ties and preformed hog rings having minimum zinc coating 1.20 oz/ft² (366 g/m²) per ASTM F626.

2.9 SWING GATES

A. Swing Gates: Galvanized steel pipe welded fabrication in compliance with ASTM F900. Gate frame members 1.900 in. OD (48.3 mm) <Insert pipe specification> [ASTM F 1083 schedule 40 galvanized steel pipe] or [ASTM F1043 Group IC **(LG-40)** galvanized steel pipe] Frame members spaced no greater than 8 ft. (2440 mm) apart vertically and horizontally. Welded joints protected by applying zinc-rich paint in accordance with ASTM Practice A780. Positive locking gate latch, pressed steel galvanized after fabrication. Galvanized malleable iron or heavy gauge pressed steel post and frame hinges. Provide lockable drop bar and gate holdbacks with double gates. Gateposts per ASTM F1083 schedule 40 galvanized steel pipe. <Select the gatepost diameter from table 2.9 B

B. Gateposts: Regular Grade ASTM F1083 Schedule 40 pipe

Gate fabric height up to and including 6 ft. (1.2m)		
Gate leaf width	**Post Outside Diameter**	**Weight**
up to 4 ft. (1.2 m)	2.375 in. (60.3 mm)	3.65 lb/ft (5.4 kg/m)
over 4 ft. to 10 ft. (1.2 to 3.05 m)	2.875 in. (73.0 mm)	5.79 lb/ft (8.6 kg/m)
over 10 ft. to 18 ft. (3.05 to 5.5 m)	4.000 in. (101.6 mm)	9.11 lb/ft (13.6 kg/m)
Gate fabric height over 6 ft. to 12 ft. (1.2 to 2.4m)		
Gate leaf width		
up to 6 ft. (1.8 m)	2.875 in. (73.0 mm)	5.79 lb/ft (8.6 kg/m)
over 6 ft. to 12 ft. (1.8 to 3.7 m)	4.000 in. (101.6 mm)	9.11 lb/ft (13.6 kg/m)
over 12 ft. to 18 ft. (2.4 to 5.5 m)	6.625 in. (168.3 mm)	18.97 lb/ft (28.2 kg/m)
over 18 ft. to 24 ft. (5.5 to 7.3 m)	8.625 in. (219.1 mm)	28.58 lb/ft (42.5 kg/m)

2.10 HORIZONTAL SLIDE GATES

A. Cantilever Slide Gates: **SECURE-TRAC®** Made in accordance with ASTM F 1184 Type II Class 2, and in compliance with UL-325, and ASTM 2200. (No substitution) Gate to be made of Aluminum Alloy 6005A-T61. All square members are 2" sq. weighing 0.94 lb/FT (139 kg/m). Complete frame welded to top one piece track and 4" x 2" bottom rail weighing 1.71 lbs./ft. (2.54 kg/m) Supply 2 truck assemblies that are swivel type having lubricated and scaled ball bearing wheels that will align in the track during all

normal operations of the gate.

Standard Opening	Standard Support Overhang
11'-0" (3354 mm) through 14'-0" (4267 mm)	7'-6" (2286 mm)
15'-0" (4572 mm) through 22'-0" (6706 mm)	10'-0" (3048 mm)
23'-0" (7010 mm) through 30'-0" (9144 mm)	12'-0" (3857 mm)
31'-0" (9449 mm) through 40'-0" (12192 mm)	16'-0" (4876 mm)

Gates 31'0" (9449 mm) through 40'0" (12192 mm) dual top tracks and two additional truck assemblies. For gates over 40’0” (12192 mm), contact Merchants Metals for custom drawings and specs.

B. Chain Link 2” Fabric: Galvanized After Weaving

C. Finish - choose one: Natural Aluminum or Polymer coated horizontal slide gates and posts shall match the coating type and color as that specified for the fence framework, available colors - black, green, or brown.

D. Gateposts, 4” O.D. (101.6 mm) schedule 40 weighing 9.11 lb/ft (13.6 kg/m). Single gates with single tracks require 3 gate posts. (1 latch post and 2 support posts) Single gates with dual tracks require 5 gate posts. (1 latch and 2 dual support posts) Double gates require twice the number of support posts but do not have a latch post.

E. Electrically operated horizontal slide gates must be manufactured and installed to comply with the safety requirements of ASTM F2200 and UL 325.

2.11 CONCRETE

Concrete for post footings shall have a 28-day compressive strength of 3,000 psi

PART 3 EXECUTION

3.1 CLEARING FENCE LINE

Clearing: Surveying, clearing, grubbing, grading and removal of debris for the fence line or any required clear areas adjacent to the fence shall be included in the earthwork contractor’s contract under the provisions of Division 31 – Earthwork. The contract drawings indicate the extent of the area to be cleared and grubbed.

3.2 FRAMEWORK INSTALLATION

A. Posts: Posts shall be set plumb in concrete footings in accordance with ASTM F567. Minimum footing depth, 24 in. (609.6 mm) plus an additional 3 in. (76.2 mm) depth for each 1 ft. (305 mm) increase in the fence height over 4 ft. (1220 mm). Minimum footing diameter four times the largest cross section of the post up to a 4.00" (101.6 mm) dimension and three times the largest cross section of post greater than a 4.00" (101.6 mm) dimension. Top of concrete footing to be at grade crowned to shed water away from the post or 6 inches (152 mm) below grade crowned to shed water away from the post. Line posts installed at intervals not exceeding 10 ft. (3.05 m) on center.

B. Top rail: When specified, install 21 ft. (6.4 m) lengths of rail continuous thru the line post or barb arm loop top. Splice rail using top rail sleeves minimum 6 in. (152 mm) long. Rail shall be secured to the terminal post by a brace band and rail end. Bottom rail or intermediate rail shall be field cut and secured to the line posts using boulevard clamps or brace band with rail end. <Fences 12 feet (3.66 m) high or higher require mid rail>

C. Terminal posts: End, corner, pull and gate posts shall be braced and trussed for fence 6 ft. (1.8 m) and higher and for fences 5 ft. (1.5 m) in height not having a top rail. The horizontal brace rail and diagonal truss rod shall be installed in accordance with ASTM F567.

D. Tension wire: Shall be installed 4 in. (101.6 mm) up from the bottom of the fabric. Fences without top rail shall have a tension wire installed 4 in. (101.6 mm) down from the top of the fabric. Tension wire to be stretched taut, independently and prior to the fabric, between the terminal posts and secured to the terminal post using a brace band. Secure the tension wire to each line post with a tie wire. <Install the top tension wire through the barb arm loop for fences having barbed wire and no top rail.>

3.3 CHAIN LINK FABRIC INSTALLATION

Chain Link Fabric: Install fabric to [outside or inside] of the framework maintaining a ground clearance of no more than 2 inches (50 mm). Attach fabric to the terminal post by threading the tension bar through the fabric; secure the tension bar to the terminal post with tension bands and 5/16 in. (7.94 mm) carriage bolts spaced no greater than 12 inches (304.8mm) on center. Small mesh fabric less than 1 in. (25 mm), attach to terminal post by sandwiching the mesh between the post and a vertical 2 in. wide (50mm) by 3/16 in. (4.76 mm) galvanized steel strap using carriage bolts, bolted thru the bar, mesh and post spaced 15 in. (381 mm) on center. Chain link fabric to be stretched taut free of sag. Fabric to be secured to the line post with tie wires spaced no greater than 12 inches (304.8 mm) on center and to horizontal rail spaced no greater than18 inches (457.2 mm) on center. [Aluminum alloy tie wire shall be installed following ASTM F567: Wrap the tie around the post or rail and attached to a fabric wire picket on each side of the post or rail by twisting the tie wire around the fabric wire picket two full turns, cut off excess wire and bend over to prevent injury.] [Preformed 9 gauge power-fastened wire ties shall be installed following ASTM F626:

Wrap the tie a full 360° around the post or rail and fabric wire picket, using a variable speed drill, twist the two ends together three full turns, cut off any excess wire and bend over to prevent injury.] Secure the fabric to the tension wire by crimping hogs rings around a fabric wire picket and tension wire.

3.4 BARBED WIRE INSTALLATION

Barbed Wire: Stretched taut between terminal posts and secured in the slots provided on the line post barb arms. Attach each strand of barbed wire to the terminal post using a brace band. <Indicate type of barb arm, Type I, II or III and direction [inward] [outward] for installation of Type I arm. >

3.5 GATE INSTALLATION

A. Swing Gates: Installation of swing gates and gateposts in compliance with ASTM F 567. Direction of swing shall be [inward or outward.] Gates shall be plumb in the closed position having a bottom clearance of 3 in. (76 mm), grade permitting. Hinge and latch offset opening space shall be no greater than 3 in. (76 mm) in the closed position. Double gate drop bar receivers shall be set in a concrete footing minimum 6 in. (152 mm) diameter 24 in. (609.6 mm) deep. Gate leaf holdbacks shall be installed for all double gates. Electrically operated gates must be manufactured and installed in compliance with ASTM F2200 and UL 325.

B. Horizontal Slide Gates: Install according to manufacturer's instructions and in accordance with ASTM F567. Gates shall be plum in the closed position, installed to slide with an initial pull force no greater than 40 lbs. (18.14 kg). Double gate drop bar receivers to be installed in a concrete footing as required by site conditions and codes. Ground clearance shall be 3 in. (76 mm), grade permitting. Electrically operated gate installation must conform to ASTM F2200 and UL 325.

3.6 NUTS AND BOLTS

Bolts: Carriage bolts used for fittings shall be installed with the head on the secure side of the fence. All bolts shall be peened over to prevent removal of the nut.

3.7 ELECTRICAL GROUNDING

Grounding: Grounding of the fence and gates is not the responsibility of the fence contractor and not included in the fencing scope of work for this contract. Grounding, when required, shall be specified and included in Contract Section 33 79 00 Site Grounding. A licensed electrical contractor shall install grounding when required.

3.8 CLEAN UP

Clean Up: The area of the fence line shall be left neat and free of any debris caused by the installation of the fence.

END OF SECTION 32 31 13

SECTION 32 92 19

SEEDING AND SODDING

PART 1 GENERAL

1.1 CLEAN-UP

Upon completion of the Project, the Contractor shall remove all debris and surplus construction materials resulting from his work. The Contractor shall grade the ground along each side of the pipe trenches and/or structures in a uniform and neat manner leaving the construction area in a shape as near as possible to the original ground line, or as shown on the Drawings.

1.2 DELIVERY, STORAGE AND HANDLING

A. Sod: Time delivery so that sod will be placed within 24 hours after stripping. Protect sod against drying and breaking of roller strips

B. Time of Sodding: Sodding operation shall be conducted any time when weather conditions are suitable and the ground is dry enough and not frozen.

PART 2 PRODUCTS

2.1 SEED

Grass seed shall be mixed and guaranteed by the supplier to consist of the following:

Annual Rye	30 percent
Kentucky Bluegrass	35 percent
Falcon Fescue	35 percent

2.2 TOPSOIL

Topsoil shall be material stripped and stored under work of Section 02110 and shall be used for all work under this Section. If the quantity of stored topsoil is inadequate or if none has been salvaged from the Project site, the Contractor shall furnish at his own expense sufficient topsoil to properly install all work as specified herein. Topsoil shall be original surface loam obtained from well drained areas from which topsoil has not been removed previously, either by erosion, clearing and removal of tress or mechanical means. It shall not contain subsoil material and shall be clean and free of clay lumps, roots, stones or similar substances more than 2 inches in any dimension, debris, discarded fragments of building materials or weeds and weed seeds.

2.3 SOIL IMPROVEMENTS

A. Commercial fertilizers shall be of analyses specified, or as recommended by the Agricultural Extension Service for treatment of topsoil in the area from which

removed, 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 guaranteed analysis. Any fertilizer which becomes caked or otherwise damaged, making it unsuitable for use, will not be accepted.

B. Lime, if recommended for soil treatment by the Agricultural Extension Service, shall be ground limestone (Dolomite) containing not less than 85 percent of total carbonates, and shall be ground to such a fineness that 50 percent will pass through a 100-mesh sieve, and 90 percent will pass through a 20-mesh sieve. Coarser material shall be acceptable provided that required rates of application are increased proportionally on the basis of quantities passing the 100-mesh sieve.

2.4 SOD

Sod shall be well-rooted, nursery grown on a mat, 100 percent Rebel Fescue or approved mix of similar fescues (KY 31 not acceptable) completely free of noxious weeds and grasses. It shall be mowed to a height not to exceed 2" before lifting and shall be uniform thickness, with not over 1-1/4 inches or less than 1-inch of soil shall be approved by the Owner before planting.

PART 3 EXECUTION

3.1 SEEDING AND SODDING

A. After installation of the Project, topsoil shall be spread evenly to a minimum 4-inch depth and lightly compacted. No topsoil shall be spread in a frozen or muddy condition.
   1. Any stored topsoil remaining after work is in place shall be disposed of by the Contractor as directed by the Engineer.

B. Soil improvement shall be made if and as recommended by the Agricultural Extension Service prior to seeding.
   1. Ground limestone, if required, shall be applied at the recommended rates per square yard and shall be thoroughly mixed into the topsoil.
   2. Fertilizers, if required shall be of analysis and rates per square yard as recommended in the topsoil analysis and shall be mixed lightly in the top few inches of topsoil.

C. 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 a uniformly fine texture. Areas shall be seeded evenly with a mechanical spreader at a rate of 2 pounds per 1,000 square feet, lightly raked and watered with a fine spray.

D. After seed has been distributed, the Contractor shall cover areas that are likely to washout with straw to a depth of 1-1/2 inches.

E. Seeded areas shall be protected and maintained by watering, regular mowing and

reseeding as may be necessary to produce a uniform stand of grass. Maintenance shall continue throughout the 1 year guarantee period until a dense, uniform turf is established.

F. Before any sod is laid, all soft spots and inequalities in grade shall be corrected. Fertilizer spread shall be raked in. Sod shall be laid so that no voids occur, tamped or rolled and then watered thoroughly. The complete sodded surface shall be true to finished grade, even and firm at all points.
   1. Sod on slopes steeper than 2 1/2 to 1 shall be held in place by wooden pins about 1 inch square and about 6 inches long, driven through the sod into the soil until they are flush with the top of the sod or by other Owner approved methods of holding the sod in place. Stakes shall be spaced along the centerline of a strip of sod at intervals of approximately 3 feet.
   2. During dry periods, sod must be watered as it is laid.
   3. The Contractor shall sod all lawn areas as shown on the Drawings.

G. Sodded areas shall be watered and mowed regularly and replanted until all sod is in place and ready for inspection. Maintenance shall continue until acceptance of the project and for at least thirty (30) days after installation of the sod.

H. All paved streets, roads, sidewalks, curbs, fences, stonewalls, lawns, etc., disturbed during construction shall be restored, repaired, or replaced to as good a condition as existed prior to construction. All materials and workmanship shall conform to standard practices and specifications of the Owner and/or the Kentucky Department of Highways, whichever applies.

I. The Contractor shall remove from the site all equipment, unused materials and other items at his expense. The construction site shall be left in a neat, orderly condition, clear of all unsightly items, before the Work is finally accepted.

J. The Owner shall be responsible for all required maintenance after the planting if formally accepted.

3.2 INSPECTION FOR ACCEPTANCE

A. Inspection of the work of this Section to determine completion of the Contractor's work shall be made by the Owner upon receipt of written notice requesting such inspection submitted by the Contractor at least ten (10) days prior to the anticipated date of inspection.

B. Acceptance: After inspection, the Contractor will be notified in writing by the Owner of acceptance of all work of this Section, or the Contractor will be notified in writing if there are any deficiencies from the requirements for completion of the work. Replacement, maintenance and repair work remaining to be done shall be subject to Reinspection before acceptance. All seeded and sodded areas and all plants shall be alive and in a healthy and vigorous condition at the time of the final inspection.

END OF SECTION

SECTION 33 05 61

CONCRETE MANHOLES

PART 1 GENERAL

1.1 WORK INCLUDED

A. The Contractor shall furnish all labor, material, and equipment necessary to construct manholes for sanitary sewers, including steps, frames and covers, together with all appurtenances as shown and detailed on the Drawings and specified herein. Manhole materials shall be precast concrete.

1.2 RELATED WORK

A. Section 31 23 16 – Excavation.

B. Section 33 31 13 – Sanitary Sewerage Piping.

1.3 DEFINITIONS

A. Standard Manhole: A standard manhole is defined as any manhole that is greater than 4 feet in depth, as measured from the invert of the manhole base at its center to the bottom of the manhole frame.

B. Shallow Manhole: A shallow manhole is defined as any manhole that is 4 feet or less in depth, as measured in the preceding sentence.

PART 2 PRODUCTS

2.1 CONCRETE MANHOLES - GENERAL

A. Manholes shall conform in shape, size, dimensions, materials, and other respects to the details indicated on the Drawings or bound in the Specifications.

B. All concrete manholes shall have precast reinforced concrete developed bases. No other type of base will be allowed. Invert channels shall be factory constructed when the base is made. Sloping invert channels shall be constructed whenever the difference between the inlet and outlet elevation is 2 feet or less.

C. The concrete manhole walls (barrels and cones) shall be precast concrete sections. The top of the cone shall be built of reinforced concrete adjustment rings to permit adjustment of the frame to meet the finished surface. Minimum strength of the concrete for the precast sections shall be 4,000 psi at the time of shipment.

D. For concrete manholes, the inverts of the developed bases shall conform accurately to the size of the adjoining pipes. Side inverts shall be curved and main inverts (where direction changes) shall be laid out in smooth curves of the longest possible radius which is tangent, within the manhole, to the centerlines of adjoining pipelines.

E. For concrete manholes, the cast-iron frames and covers shall be the standard frame and cover as indicated on the Drawings and specified hereinafter in this Section.

F. Manholes shall be manufactured by S&M Precast, Forterra, Oldcastle Precast, or equal.

2.2 PRECAST CONCRETE SECTIONS

A. Precast concrete sections and appurtenances shall conform to the ASTM Standard Specifications for Precast Reinforced Concrete Manhole Sections, Designation C478, latest revision, with the following exceptions and additional requirements.

B. The base section shall be monolithic for 4-foot diameter manholes. Manholes with diameter of 5 feet or larger shall have base slab.

C. The wall sections shall be not less than 5 inches thick.

D. Type II cement shall be used except as otherwise permitted.

E. Joints between sections shall be made watertight through the use of rubber 0-ring gaskets or rubber profile gaskets such as Forsheda 138. Gaskets shall conform to the ASTM Standard C-443, latest revision. Rope mastic or butyl mastic sealant will not be allowed except as noted in Article 2.02 F.

F. Butyl mastic sealant shall be installed between the cone section, any adjusting sections or rings, and casting.

2.3 CONCRETE MANHOLE - FRAMES AND COVERS

A. The Contractor shall furnish all ductile or cast iron manhole frames and covers conforming to the details shown on the Drawings, or as herein before specified.

B. The castings shall be of good quality, strong, tough, evengrained ductile or cast iron, smooth, free from scale, lumps, blisters, sandholes, and defects of every nature which would render them unfit for the service for which they are intended. Contact surfaces of covers and frame seats shall be machined to prevent rocking of covers.

C. All casting shall be thoroughly cleaned and subject to a careful hammer inspection.

D. Castings shall be at least Class 25 conforming to the ASTM Standard Specifications for Gray Iron Casting, Designation A48, latest revision, or of proven equal strength.

E. Unless otherwise specified, manhole covers shall be 22-3/4 inches in diameter. Manhole covers shall set neatly in the rings, with contact edges machined for even bearings and tops flush with ring edge. They shall have sufficient corrugations to prevent slipperiness. The covers shall have two (2) pick holes about 1-1/4 inches wide and 1/2 inches deep with 3/8-inch undercut all around. Covers shall not be perforated. Frames and covers shall be J.R. Hoe and Sons MC-350, Rexel RE 62 MA RD, or equal.

F. All covers shall be marked in large letters "SANITARY SEWER" in the center.

2.4 MANHOLE STEPS (CONCRETE MANHOLES)

A. Manholes steps shall be the polypropylene plastic type reinforced with a deformed steel rod. The steps shall be of the size and configuration as shown on the Drawings. Steps shall line up over the downstream invert of the manhole. The steps shall be embedded into the manhole wall a minimum of 3-3/8 inches. Steps shall be uniformly spaced at 12-inch to 16-inch intervals.

2.5 PREMOLDED ELASTOMERIC-SEALED JOINTS

A. All holes for pipe connections in concrete barrels and bases shall have a factory-installed flexible rubber gasket to prevent infiltration. The manhole boots shall conform to the latest revision of ASTM-C973. The boots shall be Contour Seal or Kor-N-Seal made by National Pollution Control Systems, Inc., Nashua, NH; A-Lok Manhole Pipe Seal made by A-Lok Corporation, Trenton, NJ; or equal.

2.6 DROP CONNECTIONS

A drop pipe shall be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24 inches, the invert shall be filleted to prevent solids deposition.

Drop manholes shall be constructed with an outside drop connection. The entire outside drop connection shall be encased in concrete.

PART 3 EXECUTION

3.1 FABRICATION - PRECAST SECTIONS

A. Manhole sections shall contain manhole steps accurately positioned and embedded in the concrete when the section is cast.

B. Sections shall be cured in an enclosed curing area and shall attain a strength of 4,000 psi prior to shipment.

C. No more than two (2) lift holes or inserts may be cast or drilled in each section.

D. Flat slab tops shall have a minimum thickness of 6 inches and reinforcement in accordance with ASTM C478.

E. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the precast sections.

F. Acceptance of the sections will be on the basis of material tests and inspection of the completed product and test cylinders if requested by the Engineer.

G. Cones shall be precast sections of similar construction.

3.2 SETTING PRECAST MANHOLE SECTIONS

A. Precast-reinforced concrete manhole sections shall be set so as to be vertical and with sections and steps in true alignment.

B. Rubber gaskets shall be installed in all manhole joints in accordance with the manufacturer's recommendations.

C. All holes in sections used for their handling shall be thoroughly plugged with rubber plugs made specifically for this purpose.

3.3 ADJUSTING MANHOLE FRAMES AND COVERS TO GRADE

A. Except where shown on the Drawings, the top of the precast concrete eccentric cone of a standard manhole or the top of the flat slab of a shallow manhole shall terminate 4 inches below existing grade in an unpaved non-traffic area except in a residential yard and 13 inches below existing grade in a paved or unpaved traffic area and in a residential yard. The remainder of the manhole shall be adjusted to the required grade as described hereinafter in paragraphs B and C of this article.

B. When a manhole is located in an unpaved non-traffic area other than in a residential yard, the frame and cover shall be adjusted to an elevation 3 inches to 5 inches above the existing grade at the center of the cover. If field changes have resulted in the installed manhole invert elevation to be lower than the invert elevation shown on the Drawings, the adjustment to an elevation of 3 inches to 5 inches above existing grade shall be accomplished by the use of precast concrete rings. If field changes have resulted in the completed manhole invert to be greater than the invert shown on the Drawings and the cover higher than 5 inches above existing grade, then the top of the eccentric cone, when used, or the top of the barrel section, when used, shall be trimmed down so that the manhole cover, after installation, is no greater than 5 inches above existing grade at the center of the cover. The area around the adjusted frame and cover shall be filled with the required material, sloping it away from the cover at a grade of 1 inch per foot.

C. When a manhole is located in a bituminous, concrete, or crushed stone traffic area, or

in a residential yard, the frame and cover shall be adjusted to the grade of the surrounding area by the use of precast concrete rings. The adjusted cover shall conform to the elevation and slope of the surrounding area. If field changes have resulted in the installed manhole invert elevation to be so much higher than the invert elevation shown on the Drawings that the top of the eccentric cone, when used, or the top of the flat slab, when used, is less than the thickness of the frame and cover 7 inches from the grade of the surrounding area, then the top of the cone or barrel section shall be trimmed down enough to permit the cover, after installation, to conform to the elevation and slope of the surrounding area. After installation, the inside and outside surfaces of the brick shall receive a waterproofing bitumastic coating.

1. The Contractor shall coordinate elevations of manhole covers in paved streets with the Owner. If resurfacing of the street in which sewers are laid is expected within twelve (12) months, covers shall be set 1-1/2 inches above the existing pavement surface in anticipation of the resurfacing operations.

3.4 ADJUSTING SECTIONS

A. Only clean adjusting sections shall be used. Each adjusting section shall be laid in a bead of butyl mastic sealant and shall be thoroughly bonded.

3.5 SETTING MANHOLE FRAMES AND COVERS

A. Manhole frames shall be set with the tops conforming to the required elevations set forth herein before. Frames shall be set concentric with the top of the concrete and in a full bead of butyl mastic sealant so that the space between the top of the masonry and the bottom flange of the frame shall be completely watertight.

B. Manhole covers shall be left in place in the frames on completion of other work at the manholes.

3.6 VACUUM TESTING OF MANHOLES

A. Manholes shall be tested after installation with all connections in place.
   1. Lift holes, if any, shall be plugged with an approved, non-shrinkable grout prior to testing.
   2. Drop connections shall be installed prior to testing.
   3. The vacuum test shall include testing of the seal between the cast iron frame and the concrete cone, slab or grade rings.
   4. The manholes shall be backfilled and finished to design grade.

B. Testing Procedure:
   1. Temporarily plug, with the plugs being braced to prevent the plugs or pipes from being drawn into the manhole, all pipes entering the manhole at least eight inches into the sewer pipe(s). The plug must be inflated at a location past the manhole/pipe gasket.
   2. The test head shall be placed inside the frame at the top of the manhole and inflated, in accordance with the manufacturer’s recommendations.

3. A vacuum of 10 inches of mercury shall be drawn on the manhole. The valve on the vacuum line to the manhole shall be shut and the vacuum line disconnected.
4. The pressure gauge shall be liquid filled, having a 3.5 inch diameter face with a reading from zero to thirty inches of mercury.
5. The manhole shall be considered to pass the vacuum test if it holds at least 9 inches of mercury for the following time durations:

Time (Minutes)

Manhole Depth	4' Dia.	5' Dia.	6' Dia.
20 feet or less	1	2	3
20.1 to 30 feet	2	3	4

6. If a manhole fails the vacuum test, the manhole shall be repaired with a non-shrinkable grout or other suitable material based on the material of which the manhole is constructed and retested, as stated above.
7. All temporary plugs and braces shall be removed after each test.

END OF SECTION

SECTION 33 40 00

STORM SEWER UTILITIES

PART 1 - GENERAL

PART 2 - DESCRIPTION

This section specifies materials and procedures for construction of outside, underground storm sewer systems that are complete and ready for operation. This includes piping, structures and all other incidentals.

PART 3 - RELATED WORK

A. Concrete Work, Reinforcing, Placement and Finishing: Section 03 30 00, CAST-IN-PLACE CONCRETE.

B. General plumbing, protection of Materials and Equipment, and quality assurance: Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

C. Fabrication of Steel Ladders: Section 05 50 00, METAL FABRICATIONS.

D. Materials and Testing Report Submittals: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

E. Erosion and Sediment Control: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

PART 4 - DEFINITIONS

A. PE: Polyethylene plastic – HDPE N-12, A2000 or equal

B. PVC: Polyvinyl chloride plastic

C. RCP: Reinforced Concrete Pipe

PART 5 - ABBREVIATIONS

A. HDPE: High-density polyethylene

B. PE: Polyethylene

PART 6 - DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Handle manholes, catch basins, and stormwater inlets according to manufacturer's written rigging instructions.

PART 7 - COORDINATION

A. Coordinate exterior utility lines and connections as shown on the drawings.

PART 8 - QUALITY ASSURANCE:

A. Products Criteria:

1. When two or more units of the same type or class of materials or equipment are required, these units shall be products of one manufacturer.

2. A nameplate bearing manufacturer's name or trademark, including model number, shall be securely affixed in a conspicuous place on equipment. In addition, the model number shall

be either cast integrally with equipment, stamped, or otherwise permanently marked on each item of equipment.

PART 9 - SUBMITTALS

A. Manufacturers' Literature and Data shall be submitted, as one package, for pipes, fittings and appurtenances, including jointing materials, hydrants, valves and other miscellaneous items.

PART 10 - APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

C139-10	Concrete Masonry Units for Construction of Catch Basins and Manholes
C150/C150M-11	Portland Cement
C443-10	Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
C478-09	Precast Reinforced Concrete Manhole Sections
C506-10b	Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
C857-07	Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
C891-09	Installation of Underground Precast Concrete Utility Structures
C913-08	Precast Concrete Water and Wastewater Structures
C923-08	Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals
C990-09	Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
C1103-03(2009)	Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
C1173-08	Flexible Transition Couplings for Underground Piping Systems
C1433-10	Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
C1479-10	Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations
D448-08	Sizes of Aggregate for Road and Bridge Construction
D698-07e1	Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3))

D1056-07	Flexible Cellular Materials—Sponge or Expanded Rubber
D1785-06	Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
D2321-11	Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
D2774-08	Underground Installation of Thermoplastic Pressure Piping
D3034-08	Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
D3350-10	Polyethylene Plastics Pipe and Fittings Materials
D4101-11	Polypropylene Injection and Extrusion Materials
D5926-09	Poly (Vinyl Chloride) (PVC) Gaskets for Drain, Waste, and Vent (DWV), Sewer, Sanitary, and Storm Plumbing Systems
F477-10	Elastomeric Seals (Gaskets) for Joining Plastic Pipe
F679-08	Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
F714-10	Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
F794-03(2009)	Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
F891-10	Coextruded Poly (Vinyl Chloride) (PVC) Plastic Pipe With a Cellular Core
F894-07	Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
F949-10	Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings
F1417-11	Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air
F1668-08	Construction Procedures for Buried Plastic Pipe

C. American Association of State Highway and Transportation Officials (AASHTO):

M198-10	Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
M252-09	Corrugated Polyethylene Drainage Pipe

M294-10	Corrugated Polyethylene Pipe, 12 to 60 In. (300 to 1500 mm) Diameter

D. American Water Works Association(AWWA):

C110-08	Ductile-Iron and Gray-Iron Fittings
C219-11	Bolted, Sleeve-Type Couplings for Plain-End Pipe
C600-10	Installation of Ductile iron Mains and Their Appurtenances
C900-07	Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution
M23-2nd ed	PVC Pipe ”Design And Installation”

E. American Society of Mechanical Engineers (ASME):

A112.36.2M-1991	Cleanouts

F. American Concrete Institute (ACI):

318-05	Structural Commentary and Commentary
350/350M-06	Environmental Engineering Concrete Structures and Commentary

G. National Stone, Sand and Gravel Association (NSSGA): Quarried Stone for Erosion and Sediment Control

PART 11 - WARRANTY

The Contractor shall remedy any defect due to faulty material or workmanship and pay for any damage to other work resulting therefrom within a period of one year from final acceptance. Further, the Contractor will furnish all manufacturers’ and suppliers’ written guarantees and warranties covering materials and equipment furnished under this Contract.

PART 12 - PRODUCTS

PART 13 - FACTORY-ASSEMBLED PRODUCTS

A. Standardization of components shall be maximized to reduce spare part requirements. The Contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly.

PART 14 - STEEL PIPE AND FITTINGS – SECTION OMITTED

PART 15 - ALUMINUM PIPE AND FITTINGS – SECTION OMITTED

PART 16 - ABS PIPE AND FITTINGS– SECTION OMITTED

PART 17 - PE PIPE AND FITTINGS

1. **PE PIPE AND FITTINGS**

   a. Corrugated PE Drainage Pipe and Fittings NPS 3 to NPS 10: AASHTO M 252M, Type S, with smooth waterway for coupling joints.
      1) Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.
      2) Soiltight Couplings: AASHTO M 252M, corrugated, matching tube and fittings.

   a. Corrugated PE Pipe and Fittings NPS 12 to NPS 60: AASHTO M 294M, Type S, with smooth waterway for coupling joints.
      1) Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.
      2) Soiltight Couplings: AASHTO M 294M, corrugated, matching pipe and fittings.

2. **PVC PIPE AND FITTINGS**

   A. PVC CELLULAR-CORE PIPING:

   1) PVC Cellular-Core Pipe and Fittings: ASTM F 891, Sewer and Drain Series, PS 50 minimum stiffness, PVC cellular-core pipe with plain ends for solvent-cemented joints.
   2) Fittings: ASTM D 3034, SDR 35, PVC socket-type fittings.
   1) PVC Corrugated Sewer Piping:
   2) Pipe: ASTM F 949, PVC, corrugated pipe with bell-and-spigot ends for gasketed joints.
   3) Fittings: ASTM F 949, PVC molded or fabricated, socket type.
   4) Gaskets: ASTM F 477, elastomeric seals.

   A. PVC GRAVITY SEWER PIPING:

   1) Pipe and Fittings: ASTM F 679, T-1 wall thickness, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.

PART 2 - CONCRETE PIPE AND FITTINGS – SECTION OMITTED

PART 3 - NONPRESSURE TRANSITION COUPLINGS

A. Comply with ASTM C1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground non-pressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials

1. For concrete pipes: ASTM C443, rubber.
2. For plastic pipes: ASTM F477, elastomeric seal or ASTM D5926, PVC.
3. For dissimilar pipes: ASTM D5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded, Flexible Couplings: Couplings shall be an elastomeric sleeve with corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Shielded, flexible couplings shall be elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

E. Ring-Type, flexible couplings shall be elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

PART 4 - PRESSURE PIPE COUPLINGS – SECTION OMITTED

PART 5 - EXPANSION JOINTS AND DEFLECTION FITTINGS - SECTION OMITTED

PART 6 - BACKWATER VALVES – SECTION OMITTED

PART 7 - CLEANOUTS– SECTION OMITTED

PART 8 - DRAINS

A. Cast-Iron Area Drains: ASME A112.6.3, gray-iron round body with anchor flange and round secured grate. Include bottom outlet with inside calk or spigot connection, of sizes indicated.

1. Top-Loading Classification(s): Medium and Heavy Duty

B. Cast-Iron Trench Drains: ASME A112.6.3, 6 inch (150 mm) wide top surface, rectangular body with anchor flange or other anchoring device, and rectangular secured grate. Include units of total length indicated and quantity of bottom outlets with inside calk or spigot connections, of sizes indicated.

1. Top-Loading Classification(s): Medium and Heavy Duty

C. PE DRAINS: - 12” (305 mm) Inline Drains – Manufactured 12” Circular Body Inline drain: ASTM D 3034, SDR 35, PVC socket-type fittings. - with Cast Iron Ring with hinged lid.

D. Steel Trench Drains: - SECTION OMITTED

PART 9 - ENCASEMENT FOR PIPING – SECTION OMITTED

PART 10 - MANHOLES AND CATCH BASINS

A. Standard Precast Concrete Manholes:

1. Description: ASTM C478 (ASTM C478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches (1200 mm) minimum unless otherwise indicated.

3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
4. Base Section: 6 inch (150 mm) minimum thickness for floor slab and 4-inch (102 mm) minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
5. Riser Sections: 4 inch (102 mm) minimum thickness, and lengths to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C990 (ASTM C990M), bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C923 (ASTM C923M), cast or fitted into manhole walls, for each pipe connection.
9. Steps: If total depth from floor of manhole to finished grade is greater than 60 inches (1500 mm). Individual FRP steps or FRP ladder. Individual FRP steps; FRP ladder; or ASTM A615, deformed, 1/2 inch (13 mm) steel reinforcing rods encased in ASTM D4101, width of 16 inches (400 mm) minimum, spaced at 12 to 16 inch (300 to 400 mm) intervals.
10. Adjusting Rings: Reinforced-concrete rings, 6 to 9 inch (150 to 225 mm) total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Designed Precast Concrete Manholes:
1. Description: ASTM C913; designed for A-16 (AASHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for sealant joints.
2. Ballast: Increase thickness of one or more precast concrete sections or add concrete to manhole as required to prevent flotation.
3. Joint Sealant: ASTM C990 (ASTM C990M), bitumen or butyl rubber.
4. Resilient Pipe Connectors: ASTM C923 (ASTM C923M), cast or fitted into manhole walls, for each pipe connection.
5. Steps: If total depth from floor of manhole to finished grade is greater than 60 inches (1500 mm). Individual FRP steps or FRP ladder. Individual FRP steps; FRP ladder; or ASTM A615, deformed, 1/2 inch (13 mm) steel reinforcing rods encased in ASTM D4101 a width of 16 inches (400 mm) minimum, spaced at 12 to 16 inch (300 to 400 mm) intervals.
6. Adjusting Rings: Reinforced-concrete rings, 6 to 9 inch (150 to 225 mm) total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

PART 11 - CONCRETE FOR MANHOLES AND CATCH BASINS

A. General: Cast-in-place concrete according to ACI 318, ACI 350/350R, and the following:
1. Cement: ASTM C150, Type II.
2. Fine Aggregate: ASTM C33, sand.

3. Coarse Aggregate: ASTM C33, crushed gravel.
4. Water: Potable.

B. Concrete Design Mix: 4000 psi (27.6 MPa) minimum, compressive strength in 28 days.
1. Reinforcing Fabric: ASTM A185, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A615, Grade 60 (420 MPa) deformed steel.

C. Manhole Channels and Benches: Channels shall be the main line pipe material. Include benches in all manholes and catch basins.
1. Channels: Main line pipe material or concrete invert. Height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope. Invert Slope: Same slope as the main line pipe. Bench to be concrete, sloped to drain into channel. Minimum of 6 inch slope from main line pipe to wall sides

PART 12 - PE SYSTEM- SECTION OMMITTED

PART 13 - PIPE OUTLETS- SECTION OMMITTED

PART 14 - HEADWALLS – NA SECTION OMMITTED

PART 15 - RESILIENT CONNECTORS AND DOWNSPOUT BOOTS FOR BUILDING ROOF DRAINS

A. Resilient connectors and downspout boots: reuse existing downspout boots,

PART 16 - WARNING TAPE

A. Standard, 4-Mil polyethylene 3 inch (76 mm) wide tape detectable type, purple with black letters, and imprinted with “CAUTION BURIED STORM SEWER BELOW”.

PART 17 - EXECUTION

PART 18 - PIPE BEDDING

A. The bedding surface of the pipe shall provide a firm foundation of uniform density throughout the entire length of pipe. Concrete pipe requirements are such that when no bedding class is specified, concrete pipe shall be bedded in a soil foundation accurately shaped and rounded to conform with the lowest one-fourth of the outside portion of circular pipe. When necessary, the bedding shall be tamped. Bell holes and depressions for joints shall not be more than the length, depth, and width required for properly making the particular type of joint. Plastic pipe bedding requirements shall meet the requirements of ASTM D2321. Bedding, haunching and initial backfill shall be either Class IB or Class II material. Corrugated metal pipe bedding requirements shall conform to ASTM A798.

PART 19 - PIPING INSTALLATION

A. Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping with 12” minimum cover in landscape areas and 100% cover in future patio and or paved areas, as shown on the Drawings.

C. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

1. Do not lay pipe on unstable material, in wet trench or when trench and weather conditions are unsuitable for the work.
2. Support pipe on compacted bedding material. Excavate bell holes only large enough to properly make the joint.
3. Inspect pipes and fittings, for defects before installation. Defective materials shall be plainly marked and removed from the site. Cut pipe shall have smooth regular ends at right angles to axis of pipe.
4. Clean interior of all pipe thoroughly before installation. When work is not in progress, open ends of pipe shall be closed securely to prevent entrance of storm water, dirt or other substances.
5. Lower pipe into trench carefully and bring to proper line, grade, and joint. After jointing, interior of each pipe shall be thoroughly wiped or swabbed to remove any dirt, trash or excess jointing materials.
6. Do not walk on pipe in trenches until covered by layers of shading to a depth of 12 inches (300 mm) over the crown of the pipe.
7. Warning tape shall be continuously placed 12 inches (300 mm) above storm sewer piping.

D. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

E. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

F. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

G. Install gravity-flow, nonpressure drainage piping according to the following:

1. Install piping pitched down in direction of flow.
2. Install PE corrugated sewer piping according to ASTM D2321 with gasketed joints.
3. Install PVC cellular-core piping, PVC sewer piping, and PVC profile gravity sewer piping, according to ASTM D2321 and ASTM F1668.

PART 20 - REGRADING

A. Raise or lower existing manholes and structures frames and covers in regraded areas to finish grade. Carefully remove, clean and salvage cast iron frames and covers. Adjust the elevation of the top of the manhole or structure as detailed on the drawings. Reset cast iron frame and

cover, grouting below and around the frame. Install concrete collar around reset frame and cover as specified for new construction.

B. During periods when work is progressing on adjusting manholes or structures cover elevations, the Contractor shall install a temporary cover above the bench of the structure or manhole. The temporary cover shall be installed above the high flow elevation within the structure, and shall prevent debris from entering the wastewater stream.

PART 21 - CONNECTIONS TO EXISTING MANHOLES

A. Make pipe connections and alterations to existing manholes so that finished work will conform as nearly as practicable to the applicable requirements specified for new manholes, including concrete and masonry work, cutting, and shaping.

PART 22 - DRAIN INSTALLATION

A. Install type of drains in locations indicated.

1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
2. Use Extra-Heavy-Duty, top-loading classification cleanouts in road area.

B. Embed drains in 4 inch (102 mm) minimum concrete around bottom and sides.

C. Set drain frames and covers with tops flush with pavement or finish grade surface.

PART 23 - MANHOLE INSTALLATION

A. Install manholes, complete with appurtenances and accessories indicated. Install precast concrete manhole sections with sealants according to ASTM C891.

B. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches (76 mm) above finished surface elsewhere unless otherwise indicated.

C. Circular Structures:

1. Precast concrete segmental blocks shall lay true and plumb. All horizontal and vertical joints shall be completely filled with mortar. Parge interior and exterior of structure with 1/2 inch (15 mm) or cement mortar applied with a trowel and finished to an even glazed surface.
2. Precast reinforced concrete rings shall be installed true and plumb. The joints between rings and between rings and the base and top shall be sealed with a preform flexible gasket material specifically manufactured for this type of application. Adjust the length of the rings so that the eccentric conical top section will be at the required elevation. Cutting the conical top section is not acceptable.
3. Precast reinforced concrete manhole risers and tops. Install as specified for precast reinforced concrete rings.

D. Rectangular Structures:

1. Precast concrete structures shall be placed on a 8 inch (200 mm) reinforced concrete pad, or be provided with a precast concrete base section. Structures provided with a base section shall be set on an 8 inch (200 mm) thick aggregate base course compacted to a minimum of

95 percent of the maximum density as determined by ASTM D698. Set precast section true and plumb. Seal all joints with preform flexible gasket material.

2. Do not build structures when air temperature is 32 deg F (0 deg C), or below.
3. Invert channels shall be smooth and semicircular in shape conforming to inside of adjacent sewer section. Make changes in direction of flow with a smooth curve of as large a radius as size of structure will permit. Make changes in size and grade of channels gradually and evenly. Construct invert channels by one of the listed methods:
   a. Forming directly in concrete base of structure.
   b. Building up with brick and mortar.
4. Floor of structure outside the channels shall be smooth and slope toward channels not less than 1 to 12 or more than 1 to 6. Bottom slab and benches shall be concrete.
5. The wall that supports access rungs or ladder shall be 90 deg vertical from the floor of structure to manhole cover.
6. Install steps and ladders per the manufacturer’s recommendations. Steps and ladders shall not move or flex when used. All loose steps and ladders shall be replaced by the Contractor.
7. Install manhole frames and covers on a mortar bed, and flush with the finish pavement. Frames and covers shall not move when subject to vehicular traffic. Install a concrete collar around the frame to protect the frame from moving until the adjacent pavement is placed. In unpaved areas, the rim elevation shall be 2 inches (50 mm) above the adjacent finish grade. Install an 8 inch (203 mm) thick, by 12 inch (300 mm) concrete collar around the perimeter of the frame. Slope the top of the collar away from the frame.

PART 24 - CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

PART 25 - STORMWATER DISPOSAL SYSTEM INSTALLATION

A. Chamber Systems: Excavate trenches of width and depth, and install system and backfill according to chamber manufacturer's written instructions. (see plans) Include storage and leaching chambers, filtering material, and filter mat.

Piping Systems: Excavate trenches of width and depth, and install piping system, filter fabric, and backfill, according to piping manufacturer's written instructions.

PART 26 - STORMWATER INLET AND OUTLET INSTALLATION- NA

PART 27 - CONNECTIONS

A. Connect gravity-flow drainage piping in building's storm building drains specified in Division 22 Section FACILITY STORM DRAINAGE PIPING.

B. Encase entire connection fitting, plus 6 inch (150 mm) overlap, with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).

C. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping.
2. Make branch connections from side into existing piping, NPS 4 to NPS 20 (DN 100 to DN 500). Remove section of existing pipe, install wye fitting into existing piping.
3. Make branch connections from side into existing piping, NPS 21 (DN 525) or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches (76 mm) of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, use epoxy-bonding compound as interface between new and existing concrete and piping materials.
4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

D. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
a. Unshielded flexible couplings for same or minor difference OD pipes.
b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
2. Use pressure-type pipe couplings for force-main joints.

PART 28 - CLOSING ABANDONED STORM DRAINAGE SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
1. Close open ends of piping with at least 8 inch (203 mm) thick, brick masonry bulkheads.
2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:
1. Remove manhole or structure and close open ends of remaining piping.
2. Remove top of manhole or structure down to at least 36 inches (915 mm) below final grade. Fill to within 12 inches (300 mm) of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.

C. Backfill to grade according to Division 31 Section EARTH MOVING.

PART 29 - IDENTIFICATION

A. Install green warning tape directly over piping and at outside edge of underground structures.

PART 30 - FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Prior to final acceptance, provide a video record of all piping from the building to the municipal connection to show the lines are free from obstructions, properly sloped and joined.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:
    a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    d. Infiltration: Water leakage into piping.
    e. Exfiltration: Water leakage from or around piping.
3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

PART 31 - TESTING OF STORM SEWERS:

A. Submit separate report for each test.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours advance notice.
4. Submit separate report for each test.

C. Leaks and loss in test pressure constitute defects that must be repaired. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

PART 32 - CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with water.

--- E N D ---

SECTION 33 71 49
OVERHEAD HIGH VOLTAGE POWER DISTRIBUTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. This specification covers the requirements for aerial electrical transmission and distribution systems.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Electrical Section 26 05 04, Basic Electrical Materials & Methods for general requirements relating to electrical work performed under this Contract.

B. See Electrical Section 26 12 13, Liquid Filled Substation Transformers for requirements relating to electrical work associated with substation transformers.

C. See Electrical Section 26 05 13, Medium Voltage Power Distribution.

D. See Electrical Section 26 05 26, Primary Grounding for grounding of aerial electrical distribution systems.

1.3 SUBMITTALS

A. Catalog cuts, brochures, circulars, specifications, product data, and printed information in sufficient detail and scope to verify compliance with the requirements of the contract documents shall be submitted.

B. A complete itemized listing of equipment and materials proposed for incorporation into the work shall be submitted. Each entry shall include the item number, the quantity of items proposed, and the name of the manufacturer of the item.

C. Detail drawings consisting of equipment drawings, illustrations, schedules, instructions, diagrams and other information necessary to define the installation and enable the A/E to check conformity with the requirements of the Contract Drawings shall be submitted. Detail drawings shall as a minimum include:
   1. Dead-end structures and components.
   2. Calculations for steel poles and foundations.
   3. Pole top switches.
   4. Conductors.
   5. Insulators.
   6. Surge arrestors.

   If departures from the Contract Drawings are deemed necessary by the Contractor, complete details of such departures shall be submitted with the detail drawings. Accepted departures shall be made at no additional cost to the Owner.

D. Detail drawings shall show how components are assembled, function together and how they will be installed on the project. Data and drawings for component parts of an item or system shall be coordinated and submitted as a unit. Data and drawings shall be coordinated and included in a single submission. Detail drawings shall consist of the following:
   1. Detail drawings showing physical arrangement, construction details, connections, finishes, materials used in fabrication, provisions for conduit or busway entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, and equipment weight. Drawings shall be drawn to scale and/or dimensioned. Optional items shall be clearly identified as included or excluded.
   2. Drawings shall include anchor bolt details and patterns, assembly and erection details, and structural members, connections, and equipment mounting details.
   3. Internal wiring diagrams of equipment showing wiring as actually provided for this project. External wiring connections shall be clearly identified.

E. Design calculations for dead-end structures. The calculations shall show all conductor loading, accounting for ice and wind and deflection. Calculations shall also include static loading and seismic criteria. Calculations shall be based on the following information:
   1. 3,000 lb, NESC heaving loading, per phase and static, factored.
   2. Conductor size of 477 ACSR
   3. Shield wire size #1/0 ACSR
   3. Horizontal line angle of 25 degrees
   4. Deflection not to exceed 6 inches at 60 degree F at 600 lbs.

F. A proposed field test plan shall be submitted 30 days prior to testing the installed system. No field test shall be performed until the test plan is accepted. The test plan shall consist of complete field test procedures including tests to be performed, test equipment required, and tolerance limits. 6 copies of the information described below in 8-1/2" x 11" binders having a minimum of 5 rings, and including a separate section for each test. Sections shall be separated by heavy plastic dividers with tabs.
   1. A list of equipment used, with calibration certifications.
   2. A copy of measurements taken.
   3. The dates of testing.
   4. The equipment and values to be verified.
   5. The condition specified for the test.
   6. The test results, signed and dated.
   7. A description of adjustments made.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Devices and equipment shall be visually inspected by the Contractor when received and prior to acceptance from conveyance. Stored items shall be protected from the environment in accordance with the manufacturer's published instructions. Damaged items shall be replaced. Metal poles shall be handled and stored in accordance with the manufacturer's instructions.

1.5 EXTRA MATERIALS

A. One additional spare fuse or fuse element for each furnished fuse or fuse element shall be delivered to the Owner when the electrical system is accepted. Two complete sets of all special tools required for maintenance shall be provided, complete with a suitable tool box. Special tools are those that only the manufacturer provides, for special purposes (to access compartments, or operate, adjust, or maintain special parts).

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Dead-end and take-off structures shall be Valmont, or equal.

B. High voltage switches shall be as manufactured by S&C, or equal.

C. Surge arrestors shall be as manufactured by ABB, or equal.

2.2 GENERAL REQUIREMENTS

A. Products shall conform to the following requirements. Items of the same classification shall be identical, including equipment, assemblies, parts, and components.

2.3 STANDARD PRODUCT

A. Material and equipment shall be the standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

2.4 NAMEPLATES

A. General
   1. Each major component shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a nameplate securely attached to the equipment. Equipment containing liquid-dielectrics shall have the type of dielectric on the nameplate. Nameplates shall be made of non-corrosive metal. As a minimum, nameplates shall be provided for circuit breakers, capacitors, meters and switches.

2.5 CORROSION PROTECTION

A. Aluminum Materials
   1. Aluminum shall not be used in contact with earth or concrete. Where aluminum conductors are connected to dissimilar metal, fittings conforming to UL Standards shall be used.

B. Ferrous Metal Materials
   1. Hardware

Ferrous metal hardware shall be hot-dip galvanized in accordance with ASTM Standards.

2. Equipment
   Equipment and component items which are not hot-dip galvanized or porcelain enamel finished, shall be provided with corrosion-resistant finishes which shall withstand 120 hours of exposure to the salt spray test specified in ASTM Standards without loss of paint or release of adhesion of the paint primer coat to the metal surface in excess of 1/16 inch from the test mark. Cut edges or otherwise damaged surfaces of hot-dip galvanized sheet steel or mill galvanized sheet steel shall be coated with a zinc rich paint conforming to the manufacturer's standard.
3. Structures
   Preparation and fabrication for galvanized structures shall be in accordance with ASTM A-385. Galvanized members shall meet ASTM A-123. Safeguards against embrittlement shall be in accordance with ASTM A-143. Galvalnized coating thickness shall be measured using ASTM E-376 for Magnetic Coating Thickness Gauge.
4. Finishing
   Painting required for surfaces not otherwise specified and finish painting of items only primed at the factory shall be field painted as specified in Division 9.

2.6 CONDUCTORS, CONNECTORS, AND SPLICES

A. Aluminum-Composition Conductors
   1. Aluminum-conductor-steel-reinforced, ACSR, shall comply with ASTM Standards.

B. Connectors and Splices
   1. Connectors and splices shall be of copper alloys for copper conductors, aluminum alloys for aluminum-composition conductors, and a type designed to minimize galvanic corrosion for copper to aluminum-composition conductors.

2.7 HIGH-VOLTAGE LINES

A. Bare High-Voltage Lines

   1. Bare medium-voltage line conductors shall be aluminum-conductor-steel-reinforced, ASCR. Conductor types shall not be mixed on any project, unless specifically indicated. Conductors larger than No. 2 AWG shall be stranded.

2.8 POLES, STRUCTURES, AND HARDWARE

A. Poles shall be of lengths and classes/strengths indicated and as required for the calculated loading.

B. Structures materials shall meet ASTM A-36, A-53 Gr. B, A-500 Gr. B, A-572, A-588, A-595, A-633 Gr. E, and A-871. Anchor bolts for structures shall confirm to ASTM A-36 bar with A-563 Gr. A nuts, and A-615 Gr. 75 deformed bar with A-194 Gr. H nuts. Connection bolts shall meet ASTM A-325 Types I and III with Anco locknuts and A-354 Gr. BC with Anco locknuts.

C. Structures shall be fabricated with tolerances in accordance with AISC, and AWS D1.1. Stress critical structures shall meet the requirements of AWS D1.1, Section 9. Deflection critical structures shall meet the requirements of AWS D1.1, Section 8.

D. Structure welds for shaft/baseplate of shaft/splice plate shall be 100% joint penetration for all stress critical structures. All circumferential welds between shaft sections shall be 100% joint penetration. Longitudinal welds other than at a slip joint shall be 60% joint penetration in all materials ¾" thick or less, or 80% joint penetration in all materials thicker than ¾", and shall be 100% joint penetration for a minimum length of six inches from any base plate/splice weld or any circumferential weld requiring 100% joint penetration. Longitudinal welds in slip joints at the female section shall be 100% joint penetration for a minimum length equal to the slip joint design length plus six inches. The weld at the male section shall be 100% joint penetration for a minimum length of 6 inches.

E. Steel Poles
   1. Steel poles shall be designed to withstand the loads specified in IEEE C2 multiplied by the appropriate overload capacity factors, shall be hot-dip galvanized and shall not be painted. Poles shall have tapered tubular members, either round in cross-section or polygonal, and comply with strength calculations performed by a registered professional engineer. Calculations shall be submitted for review. Pole shafts shall be one piece. Poles shall be welded construction with no bolts, rivets, or other means of fastening except as specifically accepted. Pole markings shall be approximately 3 to 4 feet above grade and shall include manufacturer, year of manufacture, top and bottom diameters, length, and a loading tree. Attachment requirements shall be provided as indicated, including grounding provisions. Climbing facilities are not required. Bases shall be of the anchor-bolt-mounted type.

F. Pole Line Hardware
   1. Zinc-coated hardware shall comply with ANSI C135.1, ANSI C135.2, ANSI C135.4, ANSI C135.14, ANSI C135.17, ANSI C135.22, and ANSI C135.33. Steel hardware shall comply with ASTM A 575 and ASTM A 576. Hardware shall be hot-dip galvanized in accordance with ASTM A 153. Pole-line hardware shall be hot-dip galvanized steel. Washers shall be installed under boltheads and nuts on wood surfaces and elsewhere as required. Washers used on through-bolts and double-arming bolts shall be approximately 2 1/4 inches square and 3/16 inches thick. The diameter of holes in washers shall be the correct standard size for the bolt on which a washer is used. Washers for use under heads of carriage-bolts shall be of the proper size to fit over square shanks of bolts. Eye bolts, bolt eyes, eyenuts, strain-load plates, lag screws, guy clamps, fasteners, hooks, shims, and clevises shall be used wherever required to support and to protect poles, brackets, crossarms, guy wires, and insulators.

2.9 INSULATORS

A. Insulators shall comply with NEMA HV 2 for general requirements. Suspension insulators shall be used at corners, angles, dead-ends, other areas where line insulators do not provide adequate strength, and as indicated. Mechanical strength of suspension insulators and hardware shall exceed the rated breaking strength of the

attached conductors.

B. High-Voltage Line Insulators
   1. High-voltage line insulators shall comply with ANSI C29.2, ANSI C29.5, and ANSI C29.6 as applicable. Ratings shall not be lower than the ANSI classes indicated in the following table. Construction shall be a fiberglass rod, ferrous end fittings, and weathersheds constructed of silicone alloy rubber. Dead end insulators shall be designed to up to 15,000 lbs tension without failure.

Voltage Level	Suspension
Up to 5 kV	One 52-1
6 kV to 15 kV	Two 52-2
16 kV to 25 kV	Two 52-3 or 4
26 kV to 35 kV	Three 52-3 or 4
69 kV	Six 52-6

2.10 FUSES AND SWITCHES, HIGH-VOLTAGE

A. Fuse Cutouts
   1. High-voltage fuses and cutouts shall comply with NEMA SG 2 and shall be of the nonloadbreak open type construction and of the heavy -duty type. Open-link cut-outs are not acceptable. Fuses shall be dropout type. Fuse ratings shall be as indicated. Fuse cutouts shall be equipped with mounting brackets suitable for the indicated installations.

B. Group-Operated Load Interrupter Switches
   1. Manually operated (switch handle operated) load interrupter switches shall comply with ANSI C37.32 and shall be of the outdoor, manually-operated, three-pole, single-throw type with either tilting or rotating insulators. Switches shall be equipped with interrupters capable of interrupting currents as indicated. Each switch shall be preassembled for the indicated configuration and mounting. Moving contacts shall be of the high-pressure, limited-area type, designed to ensure continuous surface contact. Switches shall be complete with necessary operating mechanisms, handles, and other items required for manual operation from the ground. Switch operating handles shall be located approximately 3 feet 6 inches above final grade. Insulation of switch operating mechanisms shall include both insulated interphase rod sections and insulated vertical shafts. Each handle shall be provided with a padlock arranged to lock the switch in both the open and the closed position. Gang operated load break switches shall be S&C Alduti-Rupter, or equal.

2.11 SURGE ARRESTORS

A. Surge arrestors shall comply with NEMA LA 1 and IEEE C62.1, IEEE C62.2, and IEEE C62.11, and shall be provided for protection of aerial-to-underground transitions, group-operated load-interrupter switches, transformers and other indicated equipment. Arrestors shall be station class, rated as shown. Arrestors shall be equipped with mounting brackets suitable for the indicated installations. Arrestors shall be of the metal-oxide varistor type suitable for outdoor installations.

2.12 GROUNDING AND BONDING

A. Driven Ground Rods
   1. Ground rods shall be of copper-clad steel not less than 3/4 inch in diameter by 10 feet in length of the sectional type driven full length into the earth.

B. Grounding Conductors
   1. Grounding conductors shall be bare, except where installed in conduit with associated phase conductors. Insulated conductors shall be of the same material as the phase conductors and green color-coded, except that conductors shall be rated no more than 600 volts. Bare conductors shall be soft-drawn unless otherwise indicated. Aluminum is not acceptable.

2.13 WARNING SIGNS

A. Warning signs shall be porcelain enameled steel or equal. Voltage warning signs shall comply with IEEE C2.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Equipment and devices shall be installed and energized in accordance with the manufacturer's published instructions. Circuits installed in conduits or underground and splices and terminations for medium-voltage cable shall conform to the requirements of Section 16312.

B. Conformance to Codes
   The installation shall comply with the requirements and recommendations of IEEE C2 for heavy loading districts, Grade B construction. No reduction in clearance shall be made. The installation shall also comply with the applicable parts of NFPA 70.

C. Verification of Dimensions
   The Contractor shall become familiar with details of the work, shall verify dimensions in the field, and shall notify the A/E of any discrepancy before performing any work.

3.2 POLE INSTALLATION

A. Steel Pole Setting: Poles shall be mounted on cast-in-place foundations.
   1. Cast-In-Place Foundations
      Concrete foundations, sized as indicated, shall have anchor bolts accurately set in foundations using templates supplied by the pole manufacturer. Concrete work and grouting is specified in Division 3. After the concrete has cured, pole anchor bases shall be set on foundations and leveled by shimming between anchor bases and foundations or by setting anchor bases on leveling nuts and grouting. Poles shall be set plumb. Anchor bolts shall be the manufacturer's standard, and not less than necessary to meet the pole wind loading specified herein and other design requirements.

3.3 EQUIPMENT MOUNTING

A. Equipment supports shall be set parallel or a right angles to lines as required to provide climbing space. Equipment supports shall be located below line construction to provide necessary wire and equipment clearances.

3.4 CONDUCTOR INSTALLATION

A. Line Conductors:
Unless otherwise indicated, conductors shall be installed in accordance with manufacturer's approved tables of sags and tensions. Proper care shall be taken in handling and stringing conductors to avoid abrasions, sharp bends, cuts, kinks, or any possibility of damage to insulation or conductors. Conductors shall be paid out with the free end of conductors fixed and cable reels portable, except where terrain or obstructions make this method unfeasible. Bend radius for any insulated conductor shall not be less than the applicable NEMA specification recommendation. Conductors shall not be drawn over rough or rocky ground, nor around sharp bends. When installed by machine power, conductors shall be drawn from a mounted reel through stringing sheaves in straight lines clear of obstructions. Initial sag and tension shall be checked by the Contractor, in accordance with the manufacturer's approved sag and tension charts, within an elapsed time after installation as recommended by the manufacturer.

B. Connectors and Splices:
Connectors and splices shall be mechanically and electrically secure under tension and shall be of the nonbolted compression type. The tensile strength of any splice shall be not less than the rated breaking strength of the conductor. Splice materials, sleeves, fittings, and connectors shall be non-corrosive and shall not adversely affect conductors. Aluminum-composition conductors shall be wire brushed and an oxide inhibitor applied before making a compression connection. Connectors which are factory-filled with an inhibitor are acceptable. Inhibitors and compression tools shall be of types recommended by the connector manufacturer. Primary line apparatus taps shall be by means of hot line clamps attached to compression type bail clamps (stirrups). Low-voltage connectors for copper conductors shall be of the solderless pressure type. Non-insulated connectors shall be smoothly taped to provide a waterproof insulation equivalent to the original insulation, when installed on insulated conductors. On overhead connections of aluminum and copper, the aluminum shall be installed above the copper.

C. Conductor-To-Insulator Attachments
Conductors shall be attached to insulators by means of clamps, shoes or tie wires, in accordance with type of insulator. For insulators requiring conductor tie-wire attachments, tie-wire sizes shall be as indicated in Table III.

Table III Tie-Wire Requirements	
Conductor Copper (AWG)	Tie Wire Soft-Drawn Copper (AWG)
6	8
4 and 2	6

1 through 3/0	4
4/0 and larger	2
ACSR (AWG)	AAAC or AAC (AWG)
Any Size	6 or 4

D. Armor Rods:
Armor rods shall be provided for ACSR conductors. Armor rods shall be installed at supports, except armor rods will not be required at primary dead-end assemblies if aluminum or aluminum-lined zinc-coated steel clamps are used. Lengths and methods of fastening armor rods shall be in accordance with the manufacturer's recommendations. For span lengths of less than 200 feet, flat aluminum armor rods may be used. Flat armor rods, not less than 762.0 micrometers by 0.03 by 0.25 inch shall be used on No. 5 AWG ACSR and smaller conductors. On larger sizes, flat armor rods shall be not less than 0.05 by 0.30 inches. For span lengths of200 feet or more, preformed round armor rods shall be used. In lieu of armor rods, neoprene coated tie wires designed to protect the conductor from abrasion at connections may be used at Contractor's discretion. Such ties shall also provide a conductor pad.

3.5 CONNECTIONS TO UTILITY LINES

A. The Contractor shall coordinate the work with the Utility Company and shall provide for final connections to the utility electric lines.

3.6 CONNECTIONS BETWEEN AERIAL AND UNDERGROUND SYSTEMS

A. Connections between aerial and underground systems shall be made as shown. Underground cables shall be extended up poles in [guards] [conduit] to cable terminations. Conduits shall be secured to poles by [conduit supports] [two-hole galvanized steel pipe straps] spaced not more than 3 m (10 feet) apart and with one support not more than 300 mm (13 inches) from any bend or termination. Cables shall be supported by devices separate from the conduit or guard, near their point of exit from the riser conduit or guard. Cables guards shall be secured in accordance with the manufacturers published procedure. Risers shall be equipped with bushings to protect cables.

3.7 GROUNDING

A. Noncurrent-carrying metal parts of equipment and conductor assemblies, such as cable terminations and messengers, metal poles, operating mechanisms of pole top switches, panel enclosures, and other non-current-carrying metal items shall be grounded. Additional grounding of equipment, neutral, and surge arrester grounding systems shall be installed at poles where indicated.

B. Grounding electrodes shall be installed as follows:
1. Driven rod electrodes - unless otherwise indicated, ground rods shall be located approximately 3 feet out from base of the pole and shall be driven into the earth until the tops of the rods are approximately 1 foot below finished grade. Multiple rods shall be evenly spaced at least 10 feet apart and connected together 600 mm (2 feet) below grade with a minimum No. 6 bare copper

conductor.

2. Pole butt electrodes - Pole butt electrodes shall be installed where indicated, except that this method shall not be the sole grounding electrode at transformer locations. The pole butt electrode shall consist of a coil of at least 12 feet of minimum No. 6 bare copper conductor stapled to the butt of the pole.
3. Plate electrodes - Plate electrodes shall be installed in accordance with the manufacturer's instructions and IEEE C2 and NFPA 70.
4. Ground Resistance - The maximum resistance of a [driven ground rod] [pole butt electrode] [plate electrode] shall not exceed 25 ohms under normally dry conditions. Whenever the required ground resistance is not met, provide additional electrodes [interconnected with grounding conductors] [as indicated], to achieve the specified ground resistance. The additional electrodes will be [up to three, [2.4 m (8 feet)] [3 m (10 feet)] rods spaced a minimum of 3 m (10 feet) apart], [a single extension-type rod, 19.1 mm (3/4 inch) diameter, up to 9.1 m (30 feet) long, [driven perpendicular to grade] [coupled and driven with the first rod]. In high ground resistance, UL listed chemically charged ground rods may be used. If the resultant resistance exceeds 25 ohms measured not less than 48 hours after rainfall, the Engineer shall be notified. Connections below grade shall be exothermically welded. Connections above grade shall be exothermically welded or shall use UL 467 approved connectors.

C. Grounding and Bonding Connections:
Connections above grade shall be made by the exothermically-welding process or with bolted solderless connectors in compliance with UL 467, and those below grade shall be made by the exothermically welding process. Where grounding conductors are connected to aluminum-composition conductors, specially treated or lined copper-to-aluminum connectors suitable for this purpose shall be used.

D. Grounding Electrode Conductors:
On multi-grounded circuits, as defined in IEEE C2, provide a single continuous vertical grounding electrode conductor. Neutrals, surge arresters, and equipment grounding conductors shall be bonded to this conductor. For single grounded or ungrounded systems, provide a grounding conductor for the surge arrester and equipment grounding conductors and a separate grounding conductor for the secondary neutrals. Grounding electrode conductors shall be sized as shown. Secondary system neutral conductors shall be connected directly to the transformer neutral bushings, then connected with a neutral bonding jumper between the transformer neutral bushing and the vertical grounding electrode conductor, as shown. On metal poles, a preformed galvanized steel strap, 5/8 inch wide by 22 gauge minimum by length, secured by a preformed locking method standard with the manufacturer, shall be used to support a grounding electrode conductor installation on the pole and spaced at intervals not exceeding 5 feet with one band not more than 3 inches from each end of the vertical grounding electrode conductor. Bends greater than 45 degrees in grounding electrode conductor are not permitted.

3.8 FIELD TESTING

A. General
Field testing shall be performed in the presence of the Engineer's representative. The Contractor shall notify the Engineer 30 days prior to conducting tests. The Contractor

shall furnish materials, labor, and equipment necessary to conduct field tests. The Contractor shall perform tests and inspections recommended by the manufacturer. The Contractor shall maintain a written record of tests which includes date, test performed, personnel involved, devices tested, serial number and name of test equipment, and test results. Field reports will be signed and dated by the Contractor.

B. Safety
The Contractor shall provide and use safety devices such as rubber gloves, protective barriers, and danger signs to protect and warn personnel in the test vicinity. The Contractor shall replace any devices or equipment which are damaged due to improper test procedures or handling.

C. Ground-Resistance Tests
The resistance of each grounding electrode system shall be measured using the fall-of-potential method defined in IEEE Std. 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes shall be provided.

D. High-Voltage Preassembled Cable Test
After installation, prior to connection to an existing system, and before the operating test, the high-voltage preassembled cable system shall be given a high potential test. Direct-current voltage shall be applied on each phase conductor of the system by connecting conductors at one terminal and connecting grounds or metallic shieldings or sheaths of the cable at the other terminal for each test. Prior to the test, the cables shall be isolated by opening applicable protective devices and disconnecting equipment. The method, voltage, length of time, and other characteristics of the test for initial installation shall be in accordance with NEMA WC 7 or NEMA WC 8 for the particular type of cable installed, and shall not exceed the recommendations of IEEE Std. 404 for cable joints unless the cable and accessory manufacturers indicate higher voltages are acceptable for testing. Should any cable fail due to a weakness of conductor insulation or due to defects or injuries incidental to the installation or because of improper installation of cable, cable joints, terminations, or other connections, the Contractor shall make necessary repairs or replace cables as directed. Repaired or replaced cables shall be retested.

E. Pre-Energization Services
The following services shall be performed on the equipment listed below. These services shall be performed subsequent to testing but prior to the initial energization. The equipment shall be inspected to ensure that installation is in compliance with the recommendations of the manufacturer and as shown on the detail drawings. Terminations of conductors at major equipment shall be inspected to ensure the adequacy of connections. Bare and insulated conductors between such terminations shall be inspected to detect possible damage during installation. If factory tests were not performed on completed assemblies, tests shall be performed after the installation of completed assemblies. Components shall be inspected for damage caused during installation or shipment and to ensure that packaging materials have

been removed. Components capable of being both manually and electrically operated shall be operated manually prior to the first electrical operation. Components capable of being calibrated, adjusted, and tested shall be calibrated, adjusted, and tested in accordance with the instructions of the equipment manufacturer. Items for which such services shall be provided, but are not limited to, are the following:

Switches.
Transformers.

F. Operating Tests
After the installation is completed, and at such time as the Engineer may direct, the Contractor shall conduct operating tests for acceptance. The equipment shall be demonstrated to operate in accordance with the specified requirements.

3.9 MANUFACTURER'S FIELD SERVICE

A. Installation Engineer
After delivery of the equipment, the Contractor shall furnish one or more field engineers, regularly employed by the equipment manufacturer to supervise the installation of the equipment, assist in the performance of the onsite tests, initial operation, and instruct personnel as to the operational and maintenance features of the equipment.

3.10 ACCEPTANCE

A. Final acceptance of the facility will not be given until the Contractor has successfully completed all tests and after all defects in installation, material or operation have been corrected.

END OF SECTION 33 71 49

APPENDIX A
GEOTECHNICAL REPORT

VECTOR ENGINEERS, INC

GEOTECHNICAL • MATERIALS • GEOSCIENCES

June 21, 2019

Mr. Chris Sivley
Cornerstone Engineering, Inc.
2303 Hurstbourne Village Drive, Suite 1000
Louisville, Kentucky 40299
chris@cei-engineering.com

Subject: Report of Geotechnical Subsurface Characterization
Taylor Mill WTP Generator Pad and Tower
Taylor Mill, Kentucky
Vector Engineers Project 19-3663

Dear Mr. Sivley,

VECTOR Engineers, Inc., has completed the geotechnical engineering subsurface characterization for the proposed water treatment plant (WTP) generator pad and tower in Taylor Mill, Kentucky. This exploration was in general accordance with our proposal No. 18-561, dated December 15, 2018, which was accepted by Mr. Chris Sivley with Cornerstone Engineering. The purpose of this exploration was to obtain specific subsurface data to develop site preparation and foundation recommendations for the proposed generator pad and tower foundation. This report describes our understanding of the project, summarizes our findings, discusses the geotechnical concerns, and contains our engineering recommendations.

PROJECT INFORMATION

Project information has been provided through correspondence with Mr. Kyle Ryan of Northern Kentucky Water District and Mr. Chris Sivley with Cornerstone Engineering. The following documents were provided to Vector during the site characterization and exploration:

- *Geotechnical Exploration, Advanced Treatment Facilities, Taylor Mill Treatment Plant. Grand Aveune, Taylor Mill, Kentucky*. Thelen Project No. 081069E, dated 22 May, 2009.
- *Structural Generator Pad and Tower/Transformer Pad Plans*, prepared by Malcolm Pirnie, dated March, 2011
- *Civil Site Grading Plan,* prepared by Malcom Pirnie, dated March 2011.

- *Aerial Site Plan – Option No.1,* prepared by Cornerstone Engineers, dated May 2019

We understand that a new substation standby tower (foundation dimensions of about 28 feet by 48½ feet and 4 feet thick) and a new generator (foundation dimensions of about 35 feet by 53½ feet and 1 foot thick) will be constructed at the existing Taylor Mill water treatment facility in Taylor Mill, Kentucky. The drawings from the unconstructed 2011 expansion included information for a substation tower and generator. We have assumed that the new structures will be similar to those proposed in 2011.

The substation tower will be an H-frame tower supported on a 28 foot by 48½ foot mat with a thickness of 4 feet. Although no loading information was provided, we have assumed that the bearing pressures will be less than 2,000 psf for the tower foundation. The generator will be founded on a 1-foot thick concrete slab with 1-foot wide turndowns at the perimeter to a depth of 3 feet below final grade. The 2011 drawing lists a 95 kip load for the generator, which equates to a bearing pressure of about 550 psf. We understand that both the tower and generator foundations will be underlain by a 6-inch crushed stone base. Additionally, a retaining wall will be constructed along the west side of the new generator area. The retaining wall will be incorporated into the generator pad as necessary to terrace the site due to the existing site grades. We anticipate the retaining will be less than 5 feet tall and 100 feet long.

There will also be a switchgear housing that will consist of a 10-foot by 20-foot pre-engineered metal building between the generator pad and the standby tower foundation. No information for the switchgear building was available in the provided 2011 drawings. However, we have assumed that the building will be supported on spread footings with column loads of less than 10 kips per column and load bearing walls, if any, supporting less than 2 kips per linear foot. We have assumed that the building will have a grade supported floor slab of about 4-inches in thickness. An access drive will be located between the existing chemical building and the generator pad to access the substation area, located on the north side of the chemical building.

Figure 1: Proposed layout of generator pad, switchgear housing, and substation will be on the west side to the water treatment plant..

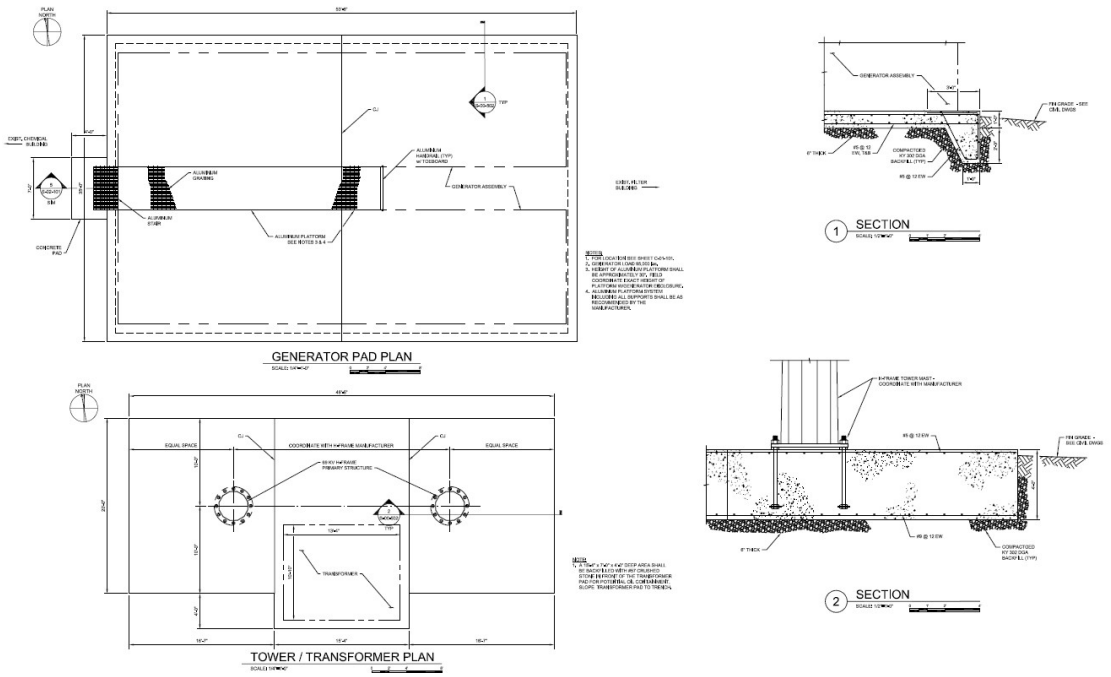

Figure 2: The generator and tower foundation for a proposed expansion in 2011 was never constructed. We have assumed that the new generator and tower foundations will be similar.

FINDINGS

As part of our geotechnical site characterization, we observed site conditions, reviewed regional geological maps and the previous geotechnical exploration, performed a subsurface exploration, and observed the groundwater conditions. The following sections report our findings.

Site Surface Conditions

Mr. Isaac Martin with Vector Engineers visited the site on May 14, 2019, to observe surface conditions to aid in interpreting the subsurface data and to detect conditions which could affect the project. The following is a general description of the site.

The existing Taylor Mill WTP is located at the northwest corner of the intersection of Howard Avenue and Grand Avenue in Taylor Mill, Kentucky. The WTP is bordered to the north by Banklick Creek, to the west by a drainage swale (grassy area), to the south by Grand Avenue, and to the east by Howard Avenue and the St. Anthony Church campus. The proposed project area is located in a well maintained lawn area in the northwest corner of the facility at the crest of the slope just north and west of the existing chemical building and west of the existing flocculation basins.

The terrain for the generator, switchgear housing, and standby tower site is relatively level with about 4 to 5 feet of elevational relief within each structure; however, about 40 feet off the north wall and 20 to 40 feet of the west wall of the existing chemical building, the ground slopes downward away from the building toward the drainage swale to the west, and drain toward the creek to the north. The slope is about 3H:1V or shallower (Photographs 1 and 2). Drainage was judged to be good, with water generally directed north and east toward the creek.

Photograph 1: The proposed project area on the west side of the existing chemical building. The area begins sloping toward the creek about 20 feet of the west wall at the north end and about 40 feet of the west wall at the south end.

Photograph 2: The area for the generator pad is near the southwest corner of the chemical building, where the slope is more gradual and begins about 40 feet of the west wall of the chemical building

Area Geology

The Geologic Map of the Covington Quadrangle, Kenton County, Kentucky, (GQ-955), published by the U.S. Geological Survey indicates the site is underlain by the Terrace Deposits of Tertiary to Quaternary age (Figure 3). The deposits are comprised of a mixture of sand, silt, gravel and clay. The clay is pale-yellowish-brown to grayish-orange and thinly bedded with a little silt. Terrace deposits commonly contain horizontal slabs, cobbles, and pebbles of local limestone and siltstone near the soil/bedrock interface. The Kentucky Geologic Survey lists the site geology as non-Karst, indicating minimal risk of sinkhole activity in the area. No closed depressions were indicated within 2 miles of the project site.

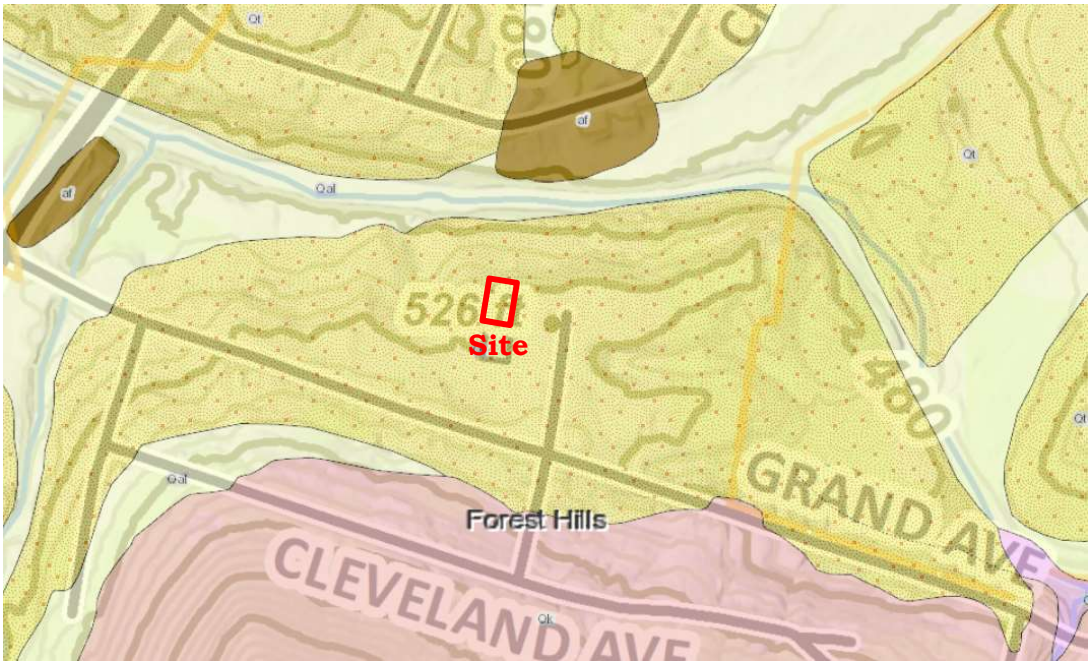

Figure 3: The geologic map of project site (outlined in red) indicates the soils were formed by Terrace Deposits (yellow shading).

Previous Geotechnical Exploration

Thelen Associates, Inc. issued a geotechnical report entitled *Geotechnical Exploration, Advanced Treatment Facilities, Taylor Mill Treatment Plant* (Thelen project number 081069E) on May 22, 2009 for an expansion to the water treatment plant that was never constructed. The expansion was proposed for the western end of the WTP

site. Thelen performed several borings during their exploration, three of which are within 100 feet of the proposed generator, switchgear, and tower locations.

Below the surface pavements and topsoil, the Thelen borings (SED2, SED3, and GAC8) encountered about 1 to 14½ feet of generally firm to stiff lean clay fill with crushed stone, bricks, and roots. The fill contained some layers of soft soil and perched water. Beneath the fill, lean clay mixed with various amounts of silt and sand was encountered extending to depths of about 48½ to 63 feet. The lean clay was generally firm to stiff and contained silt and sand seams. Beneath the clay, the borings generally encountered an interbedded weathered shale and limestone bedrock extending to refusal depths of 53 to 70½ feet in depth. Boring GAC8 encountered a 5½ foot layer of sand and gravel between the lean clay and bedrock. The bedrock was cored, with rock quality designation (RQD) values indicating fair to poor quality rock.

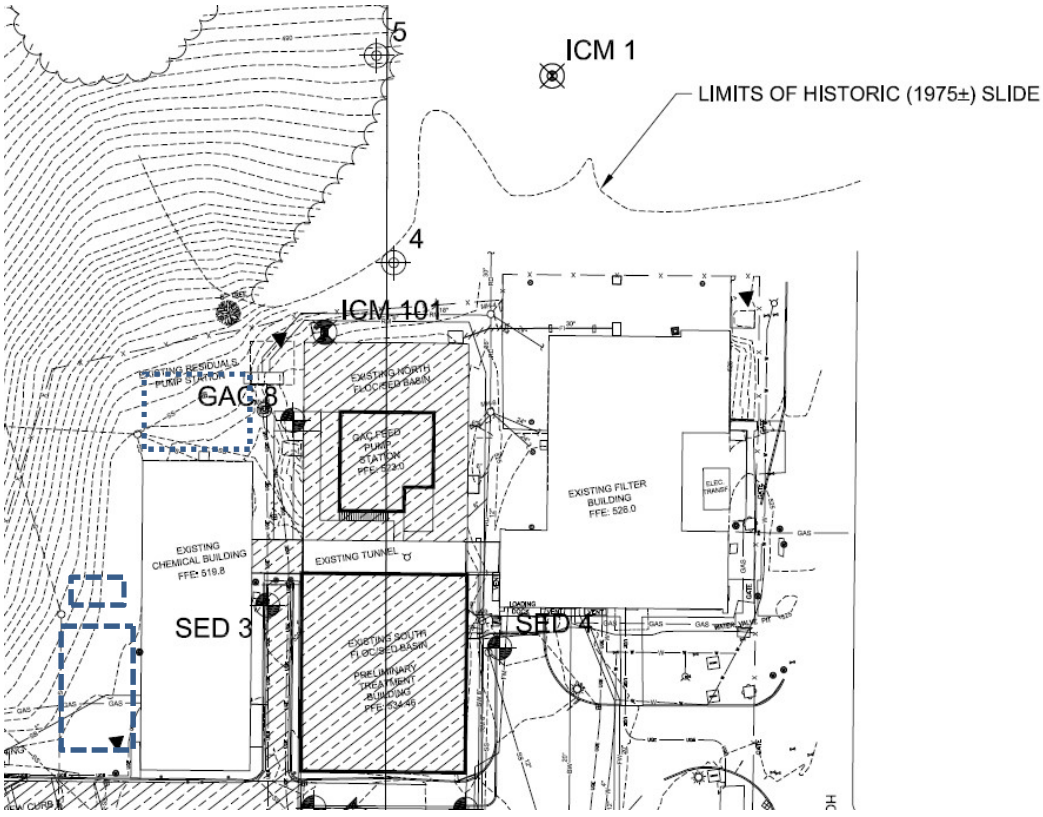

Figure 4: The Thelen report mentions a historic landslide in the north side of the WTP. The proposed locations for the new structures are outlined by blue dashed lines.

The Thelen report also mentions a historic landslide in 1975 along the slope just northeast of the project area (Figure 4). The remediation measures reported included

trench drains to removed groundwater from the slope. Thelen installed inclinometers at the mid-point and crest of the slope in 1985 and 2001 (ICM1 and ICM 101 in Figure 4). The slope has reportedly moved about a third of an inch at the mid-slope location and about 1-$^1/_3$ inch at the top of the slope from 2001 to 2008. Movement was in the upper 8 to 10 feet of the slope. Thelen stated that the movements are characteristic of a slope creep condition.

Subsurface Exploration

After researching the readily available published geological information, a preliminary subsurface profile is formulated. The soil boring program is a means to substantiate the assumptions made in our preliminary profile and assist us in developing a representative subsurface profile of the site. The subsurface conditions will vary between borings thereby making the development of a representative and reliable profile dependent upon the number of borings or data points obtained during the field operations. The following discusses our interpretation of the subsurface profile on the site based on the published information and the results of our borings. The individual Boring Logs attached to this report will have specific details at the location of the boring.

Field Exploration and Laboratory Testing Methods

We drilled three soil test borings to explore the subsurface conditions across the site. Mr. Isaac Martin directed drilling operations. The boring locations were located in the field by measuring distances from landmarks (i.e. –edge of pavements and buildings) using a tape measure. Boring surface elevations were relatively level. Because of the methods used, the soil boring locations shown on Boring Location Plan and elevations shown on the Boring Logs in the attachments are approximated from the contour maps seen in Figure 7 below. The stratification lines shown on the Boring Logs represent the approximate boundaries between soil types. The transitions may be more gradual than shown.

We obtained soil samples using a split-barrel sampler driven by an automatic hammer assembly in general accordance with ASTM D1586. The soil samples were

sealed in the field and returned to our laboratory where Mr. Martin visually classified the soils according to the Unified Soil Classification System (USCS, ASTM D2487).

The procedures used by Vector Engineers for field and laboratory sampling and testing are in general accordance with ASTM procedures and established engineering practice. A summary of the field procedures is included in the attachments.

Subsurface Conditions

Beneath about 3 to 4 inches of topsoil, our borings encountered a brown to grayish brown lean clay fill with trace to some brick fragments, roots, and crushed stone to a depth of about 21 feet in Boring B-2 and to the termination depth of 15½ feet in our other two borings. Standard penetration (SPT) N-values in the fill generally ranged from 5 to 22 blows per foot (bpf) with a median value of 10 bpf. The penetration values indicate generally firm to stiff soil consistency. A soil plasticity (Atterberg limits) test within the fill indicated a liquid limit of 46 and a plasticity index of 21. Using this laboratory test and USCS, we classified the clay fill as "CL" (a low plasticity clay). An organic content test was conducted on a sample from Boring B-3 which was visually judged to have a larger organic content than the other samples obtained during our exploration. The test indicated that the sample consisted of 2 percent organic matter by weight.

Photograph 3: Pieces of brick were observed in each of our borings. The brick fragment pictured above was recovered from Boring B-3 and was about 2-inches in diameter.

Underlying the fill in Boring B-3, a brown to gray silty clay and clayey silt with trace river gravel was encountered extending the the boring termination at 35½ feet. SPT N-values within the clay and silt ranged from 11 to 14 bpf, indicating a stiff soil consistency. Using standard visual-manual methods and the USCS, the soils were classified as "CL" (a low plasticity clay.) and "ML" (a low plasticity silt).

Groundwater

A stable groundwater table was not encountered in our three borings. However, some perched water was encountered at a depth of about 4 feet in Boring B-1. The Thelen borings in the area encountered groundwater during drilling at depths ranging from about 21 to 68 feet deep. After completion of drilling and removal of the tools, the groundwater dropped about 9 to 16 feet in the two southernmost borings, but rose to a dpeht of about 22 feet in boring GAC8. The holes were left open for 48 hours, at which time the groundwater was encountered at depths ranging from 10½ to 24½ (elevations of 498½ on the two northern borings and 511 on boring SED2.

Typically, water conditions affecting construction projects in the site area are related to trapped or perched water unless excavations deeper than 9 feet are required. The perched water occurs in irregular, discontinuous locations within the soil overburden. When these water-bearing strata are exposed in excavations, such as cut slopes, utility or footing trenches, they can produce widely varying seepage durations and rates depending on recent rainfall activity and other site specific characteristics of the area. These perched water sources are often not linked to the more continuous relatively stable groundwater table that typically occurs at greater depths. Groundwater levels fluctuate with seasonal and cyclical climatic variations in precipitation and may be either higher or lower at other times.

DISCUSSION

Based on the results of our borings and our understanding of the proposed project, we believe the project site is suitable for the proposed generator pad and tower foundation. However, the fill conditions and history of slope instability issues at the site represent a geotechnical challenge and financial impact to the project. The following subsections provide additional details and discuss other geotechnical concerns.

Uncontrolled Fill

Our three borings encountered fill extending beyond 15 feet in two borings and to depth of 21 feet in the only boring extended through the fill. Additionally, two of the

three borings drilled near the project area during the Thelen exploration encountered fill extending to depths ranging from 9½ to 14½ feet. Based on our observations and the description of the fill provided in the Thelen report, we suspect the fill may have been placed without quality control (uncontrolled) fill.

We reviewed historical aerial imagery and topographic information to evaluate the potential to encounter fill elsewhere in the project area. Based on the available data, it appears that much of the project area was likely filled during construction of the chemical building, with fill depths of up to about 20 feet. Therefore, we suspect additional uncontrolled fill will likely be encountered during construction.

Figure 5: Historical aerial photograph from April 4th, 1993 prior to construction of the chemical building. During construction of the chemical building (approximate outline in red), the west side of the water treatment plant was filled.

Figure 6: Historical aerial photograph from October 10th, 2000 after completion of the chemical building. The area on the south and north side of the building show signs of fill placement.

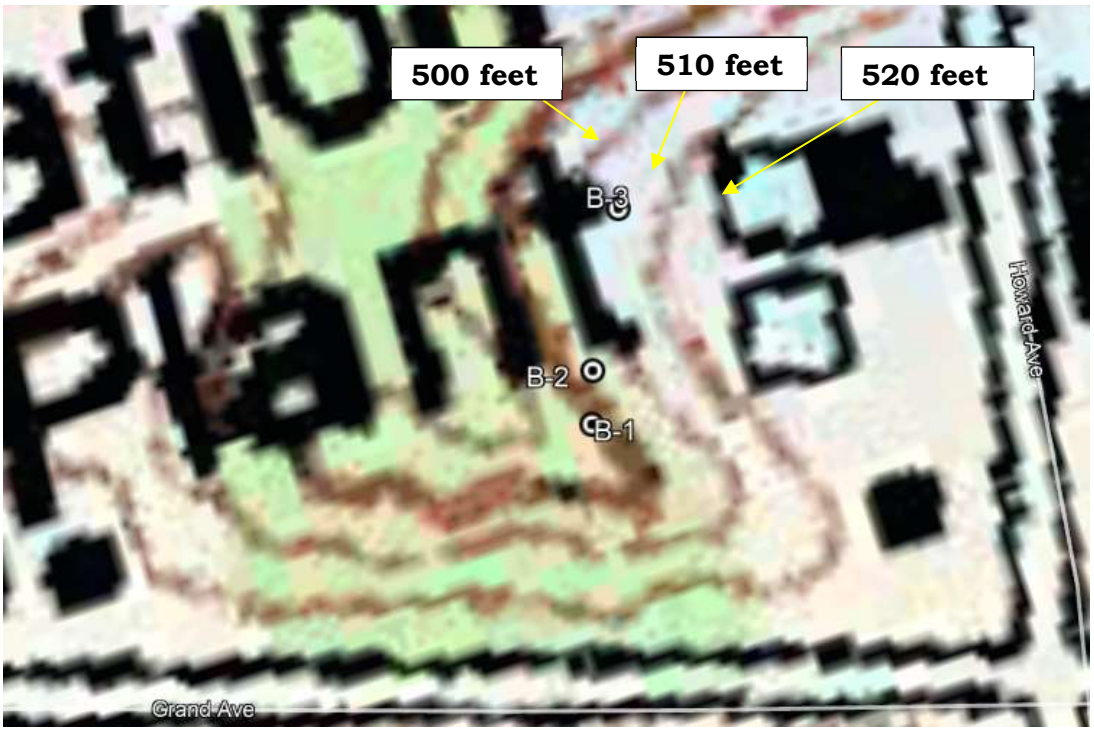

Figure 7: Topographic map of site published in 1971. Boring locations have been marked to compare these elevations, which existed before the chemical building, to the current elevations

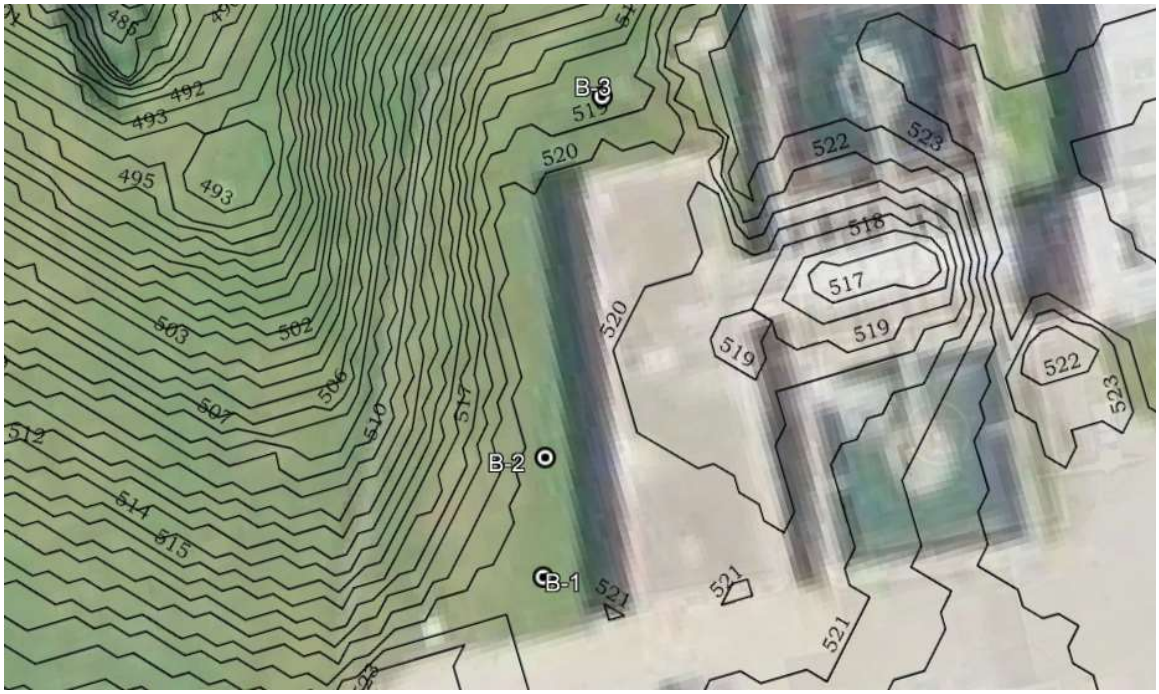

Figure 8: Aerial map with current site elevation contours obtained from the Kentucky Digital Elevation Model (DEM) LiDAR data. Boring locations have been marked to compare these elevations to the elevations provided in the 1971 topographic map.

Uncontrolled fills often contain deleterious or miscellaneous materials which may decay over time, causing subsidence at the surface. In addition, uncontrolled fills can contain zones of less compact materials which will settle under their own weight or under new loading. Although the consistency of the old fill encountered in our borings was consistent with compacted soil, the fill did contain traces of deleterious, organic materials such as roots, as well as miscellaneous construction debris materials, including brick, concrete, and crushed stone fragments.

Whenever uncontrolled fill is encountered, there is a risk of differential settlement, which could result in differential settlement of the foundations, cracked floor slabs, or depression/dip in pavements. The most prudent options would be undercutting these fill soils and replacing with structural fill or installing deep foundations. However, the large fill depths and relatively small footing sizes are likely to make these low risk options economically unfeasible.

Considering the generally small size of the construction debris and small organic content (2 percent or less), we believe that the risks of future differential settlement is low to moderate for the proposed structures. Additionally, since the structures are

utility buildings, we anticipate that some minor cracking of floor slabs and differential settlement may be acceptable. Therefore, we have provided options below for using shallow foundations without complete removal of the fill. Because these options allow the old fill to remain in place, the owner must understand and accept the risk of differential settlement due to the fill.

- *Standby Tower* – We understand that the standby tower foundation will consist of a 4 foot thick concrete mat founded on a 6-inch thick layer of crushed stone. We believe that the risk of cracking from differential settlement is low for this foundation. Therefore, we believe that the tower can be supported on the proposed foundation system provided the bearing soils are evaluated with a proofroll and/or dynamic cone penetrometer (DCP) testing.
- *Generator* – We understand that the generator foundation will consist of a 1 foot thick, grade supported slab with 1 foot wide turndowns at the perimeter. The slab will reportedly sit on a 6-inch crushed stone layer. The bearing pressure is understood to be about 500 psf maximum. We believe that the risk of cracking from differential settlement is low to moderate for this foundation. Therefore, we believe that the generator can be supported on the proposed foundation provided the bearing soils are evaluated with a proofroll and/or DCP testing and the crushed stone layer beneath the slab is increasde to 18 inches in thickness.
- *Switchgear Building* – We have assumed that the switchgear building will be supported on spread footings with a 4-inch thick floor slab. We recommend the use of continuous footings instead of individual column footings to reduce the risk of differential settlement. The continuous footings should have top and bottom reinforcement to help bridge over areas of differential support. For the floor slab, we recommend the installation of an 18-inch thick crushed stone mat with a layer of geogrid fabric beneath the slab.

We anticipate that the options allowing for shallow footings without complete removal of the fill will be accepted for this project. Therefore, we have provided recommendations for these options throughout the remainder of this report. If another option is chosen, then this report will need to be modified. After the owner and the design team have reviewed our report and the geotechnical risks addressed, then Vector should be retained to review fill placement records and revise our recommendations in light of the owners and design team comments. If the owner elects to leave any of the existing fill in-place, then Vector Engineers must be held harmless due to future poor

performance of the building or pavement area. The owner must weigh the risks with the development cost, and choose the option best suited for the project needs.

Slope Instability

The Thelen report indicates that the slope northeast of the project areas has experienced previous failure and showed signs a small "creep" movements from 2001 to 2008. Based on the available topographic data, the slope in the area of the failure is as steep as 2H:1V, while the slopes in the project area are generally flatter at about 3H:1V. Slopes of 3H:1V and flatter are generally considered stable unless there are large loads at the crest, soft/saturated soils in the slope, or other factors that could reduce the stability. The proposed structures will be located near the crest of the slope, which may negatively impact the stability of the slope.

We understand that a retaining wall will be constructed near the generator pad. Based on the existing grades, we anticipate the wall will have a maximum height of about 5 to 6 feet. Walls of this height are typically designed for internal stability, sliding, and bearing pressure by a wall design engineer and do not include a global stability analysis. Considering the history of marginal stability of slopes on site, we recommend that a global stability analysis be performed for the retaining wall to evaluate the slope stability in this area. The design team may also want to consider a slope stability analysis for other areas of the slope to evaluate the risk of slope failure under the load of the proposed construction. Vector can provide a proposal for these services upon request.

Site Degradation During Construction

The on-site soils are sensitive to changes in moisture content. These soils will pump and rut during wet conditions. If grading operations are performed during periods of wet weather, these materials will not perform satisfactorily during proofrolling. If soft or wet soils are encountered during the proofrolling observations, we recommend that the area be undercut to firm native soils or stabilized in-place. An alternative to wasting the wet clay soils is to temporarily stockpile this material for aeration and proper placement during drier conditions.

LIMITATIONS OF RECOMMENDATIONS

This report has been prepared for the exclusive use of Cornerstone Engineering for specific application to the project site. Our recommendations have been prepared using generally accepted standards of geotechnical engineering practice in the Commonwealth of Kentucky. No other warranty is expressed or implied. This company is not responsible for the conclusions, opinions, or recommendations of others based on these data. Additionally, our conclusions and recommendations are based on the information provided to us, the data obtained from our subsurface exploration, and our past experience. They do not reflect variations in the subsurface conditions which are likely to exist between borings and in unexplored areas of the site. These variations result from geologic variability of the subsurface conditions. If conditions are different than those encountered in our exploration, it will be necessary for us to re-evaluate our conclusions and recommendations based upon on-site observation of the conditions. For more information on the use and limitations of this report, please read the ASFE document included in the attachments.

If the overall design or location of the project is changed, the recommendations contained in this report must not be considered valid unless our firm reviews the changes and our recommendations are modified. When the design is finalized, we should be given the opportunity to provide the additional service of reviewing the grading plan, and applicable portions of the project specifications. This review will allow us to check whether these documents are consistent with the intent of our recommendations.

We may recommend that a supplementary exploration be performed when significant design changes such as movement of the project are incorporated in the final design after the geotechnical exploration has been completed. This supplementary exploration may include obtaining additional soil data along the new alignment to provide specific recommendations.

RECOMMENDATIONS

Earthwork

Preliminary grading information was not available at the time of this report. However, we anticipate that less than about 4 feet of cut or fill will be required to achieve a final grade based on the existing site grades in the project areas.

Stripping

Topsoil and debris should be stripped to prepare the site for construction. The stripping should extend 5 feet outside of the pad and foundation areas. Abandoned buried utilities and utility trench backfill should also be removed. Vector should observe site stripping as previously unexplored or unknown conditions could become evident during these operations. Vector should be contacted if unusual or unexpected subsurface conditions (i.e. – such as buried underground structures) are encountered during stripping operations.

For the geogrid mat beneath the switchgear structure, we recommend undercutting the structure to a depth of **at least 18 inches** below the bottom of the floor slab. There is a possibility of a high concentration of deleterious material or soft soils that may be encountered, thus some undercutting could extend deeper.

Subgrade Evaluation (Proofrolling)

After stripping, the subgrade should be evaluated by a geotechnical engineer by observing proofrolling. Proofrolling consists of applying two passes (additional passes may cause the subgrade to deteriorate) on the subgrade with a fully loaded dump truck or similar rubber tired vehicle. Any materials judged to deflect excessively under the wheel loads should be stabilized before placing fill.

Structural Fill Placement

After subgrade evaluation, fill areas may be brought to the planned subgrade elevations with structural fill. Ideally, the structural fill is defined as inorganic natural soil with maximum particle sizes of 3 inches and a maximum dry density of at least 95

pounds per cubic foot (pcf) when tested by the standard Proctor method (ASTM D698). Limit the fill materials to a Plasticity Index less than 35. On-site soil should meet these criteria.

Structural fill should be placed in relatively thin (6 to 8-inch) layers and compacted to at least 95 percent of the soil's maximum dry density as determined by the standard Proctor compaction test. Additionally, the moisture content of the fill material should be maintained within 2 percent of its standard Proctor optimum moisture content. We anticipate any new fill will come from an off-site borrow source. The fill source should be tested and approved by a geotechnical engineer before it is allowed to be used as fill.

Field Density Testing

In-place density testing must be performed as a check that the previously recommended compaction criteria (density and moisture) have been achieved. This allows our project engineer to monitor the quality of the fill construction and verifies that his design criterion is being achieved in the field. The performance of slabs-on-grade will depend directly on the quality of the fill construction. The testing frequency for density tests performed on a full-time basis can be determined by our personnel based on the area to be tested, the grading equipment used, and construction schedule. Tests should be performed at vertical intervals of at least one-foot as the fill is being placed. We recommend that an engineering technician working under the direction of our project geotechnical engineer perform the density tests.

Geogrid Mat Construction

We recommend that the foundations and slab for the switchgear building be supported on a geogrid reinforced granular mat. To construct the geogrid mat, the undercut excavation discussed in the "stripping" section of this report should be lined with a geotextile fabric prior to placing the gravel to prevent the clay from pushing into the granular fill. Place the layer of geogrid on top of the fabric. Geogrid confines the stone and enhances it strength. The geogrid should be equivalent to Tensar BX-1200 or better. For an improved strength mat, high performance Tensar Triaxial TX 160 should be used.

We recommend the undercut building pad be backfilled with an open graded stone such as KYTC No. 57 or No. 23 above the geogrid fabric. Cap the gravel backfill with about 4 inches compacted dense graded aggregate (DGA) to provide a smooth surface for construction of the floor slab.

Monitoring of fill placement of an open graded stone (like KTC No. 57) must be conducted. The experience of the equipment operators and testing personnel are crucial to achieving the desired performance from the fill. Each lift should be compacted by the contractor, visually monitored by an experienced geotechnical technician working closely with our senior geotechnical engineer, and approved before additional lifts are placed. Ultimately, approval of each lift will be based on the judgment of the geotechnical engineer based on all of the following criteria:

- Compliance with lift thickness guidelines
- Gradation of material throughout the lift
- Adequate and uniform compactive effort by the contractor

DGA should be placed in relatively thin (6- to 8-inch) layers and compacted to at least 95 percent of the DGA's maximum dry density as determined by the standard Proctor test. Additionally, the moisture content of the DGA should be maintained within 2 percent of its standard Proctor optimum moisture content.

Foundations

As discussed previously, we believe that the structures can be founded on shallow spread footings without complete removal of the fill, provided the discussed improvements are installed and the recommended testing is performed. We anticipate that bearing pressures for the proposed foundations will be less than 2,000 psf. If bearing pressures are larger than 2,000 psf, Vector should be contacted to review our recommendations.

The exterior foundations should be designed with a minimum 30-inch embedment to protect against frost heave. We also recommend foundations have a minimum footing width of 24 inches to lessen the risk of differential settlement and to reduce the risk of punching failure. This footing width also allows for entry into the

excavation to remove loose debris and for placement of the reinforcing steel. Reinforcing steel should be clean and dry prior to concrete placement.

Floor Slab

We anticipate the geogrid mat will be supporting the slab-on-grade floor slab. We recommend a k-value (modulus of subgrade reaction) of 150 pounds per cubic inch (pci) be used in determining the slab thickness provided the geogrid mat is used. We do not recommend supporting

We recommend control joints be placed in the slab around columns and along footing supported walls so these elements may move independently. We recommend a 6-inch thick (minimum) layer of compacted, well-graded crushed stone directly beneath the slab to enhance support and provide a working base for construction of the floor slab. The crushed stone should be moist, but not wet, as the concrete is placed to reduce curling of the slab as the concrete cures.

Between completion of grading and slab construction, floor slab subgrades are often disturbed by weather, footing, and utility line installation and other construction activities. For this reason, the subgrade should be evaluated by a geotechnical engineer immediately prior to constructing the slab. During this evaluation, the subgrade should be proofrolled with relatively heavy rubber-tired equipment. Areas judged by the geotechnical engineer to perform unacceptably under the moving load should be undercut and replaced with dense graded crushed stone compacted to at least 95 percent of its standard Proctor maximum dry density.

Lateral Earth Pressures

We understand that the proposed retaining wall will be connected to the generator pad for at least a portion of it's length. Therefore, we anticipate the wall will be restrained by the generator pad and should be designed for the at-rest condition. If the wall will not be restrained, then the active and passive earth pressure coefficients should be used instead. The table lists our recommended earth pressure coefficients. These values assume that the existing fill soils or Kentucky Transportation Cabinet

(KYTC) 57 stone will be used as backfill, the backfill surface will be level, and adequate drainage is present behind the wall to prevent the build-up of hydrostatic pressure.

We anticipate that the foundations for the proposed structures will create a surcharge load on the wall. These surcharges are not included in our coefficients and should be added to the earth pressures when designing the wall. Drainage can be provided by including a minimum 2-foot wide zone behind the wall consisting of No. 57 stone. The stone should be separated from the soil by KTC Type II geotextile fabric. A perforated pipe can be included at the base of the stone backfill to channel the water collected to a suitable discharge point. Alternatively, weep holes can be constructed just above the toe of the wall to provide a means of drainage. The stone backfill should be capped with at least 12 inches of clay over the geotextile to retard surface water infiltration into the backfill zone. If the water behind the wall cannot be drained, then the design should include the appropriate hydrostatic pressure.

Table 1: Lateral Earth Pressures

Backfill Soil Type	Backfill Slope[3]	Drained Unit Weight (psf)	Friction Angle[1]	Lateral Earth Pressure Coefficients		
				Active	At-rest	Passive
Firm Clay	Level	120	22°	0.45	0.65	2.20
Granular Backfill	Level	115	36°	0.26	0.41	N/A
Coefficient of sliding, cast-in-place concrete on clay fill 0.4						
Notes 1. Long term drained conditions 2. Based on our soil borings. Conditions may vary between borings. 3. Slope behind the wall for a distance equal to the ¾ height of the wall.						

Seismic Site Classification

The seismic design procedures outlined in the NEHRP (National Earthquake Hazard Reduction Program) guidelines mandate structural design loads be based on the seismic accelerations of the site. Based on the results of our exploration and the geology of the area, we believe that the assigned site seismic classification will be a "D". Using

the OSHPD[1] application as recommended by U.S. Geologic Survey (USGS) and the site coordinates, the seismic design values from the 2010 ASCE-7 Standard were determined for the classification. These values are listed in the attachments.

Valediction

Vector Engineers, Inc. appreciates the opportunity to provide you with these geotechnical services. Should you have questions or require any additional information, please contact us.

Respectfully submitted,
VECTOR ENGINEERS, INC.

Matthew J. Slusser, PE
Project Engineer
Licensed Kentucky 32069

W. Robert Folsom, PE
Chief Engineer

Attachments:

ASFE - Important Information about This Geotechnical-Engineering Report
Site Location Map
Aerial Boring Location Plan
Vector Boring Logs
Thelen Boring Logs (2009)
Field Testing Procedures
Lab Testing Summary
Atterberg Testing Summary
Lab Testing Procedures
OSHPD Seismic Design Map

[1] California Office of Statewide Health Planning and Development

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be,* and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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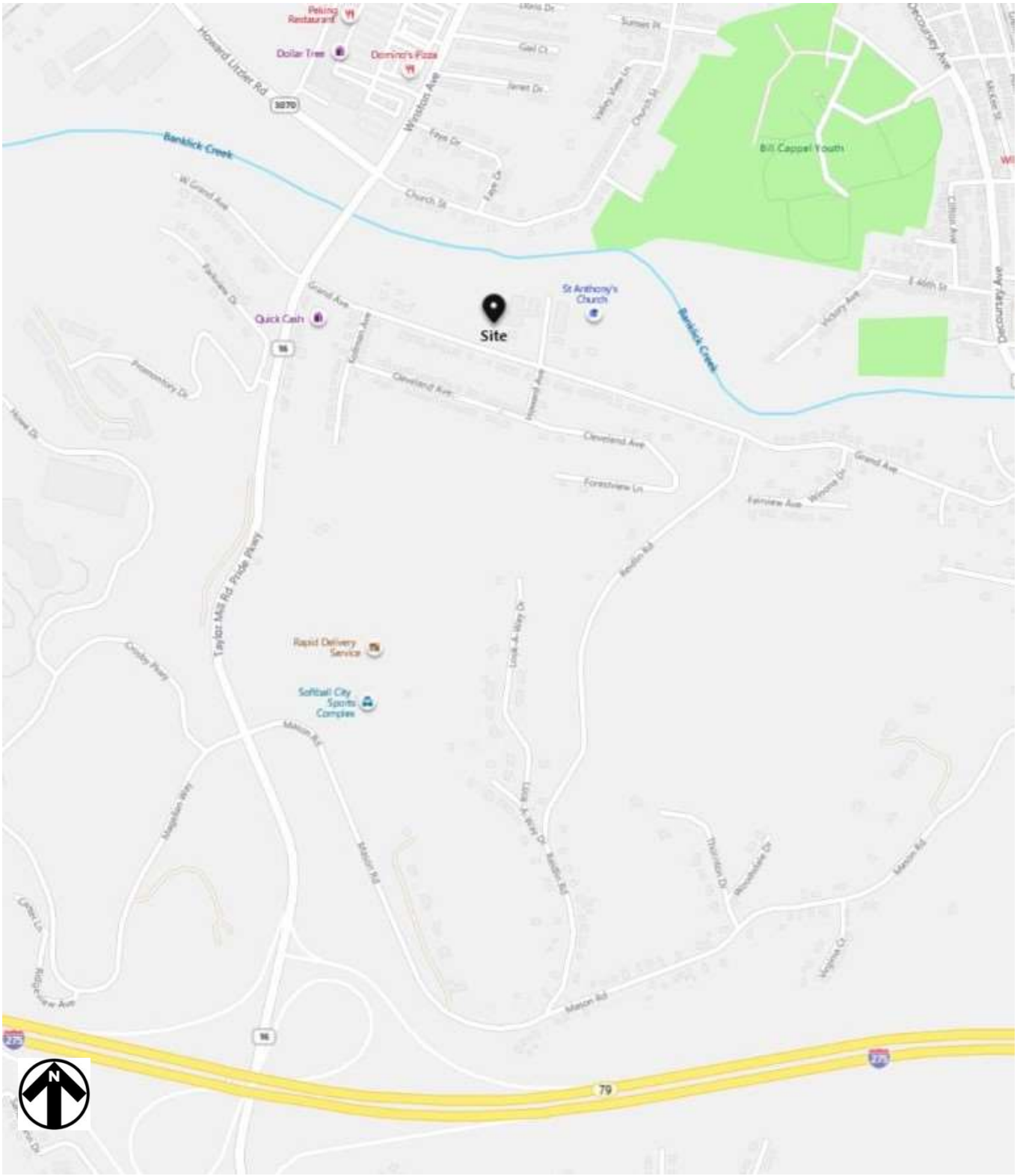
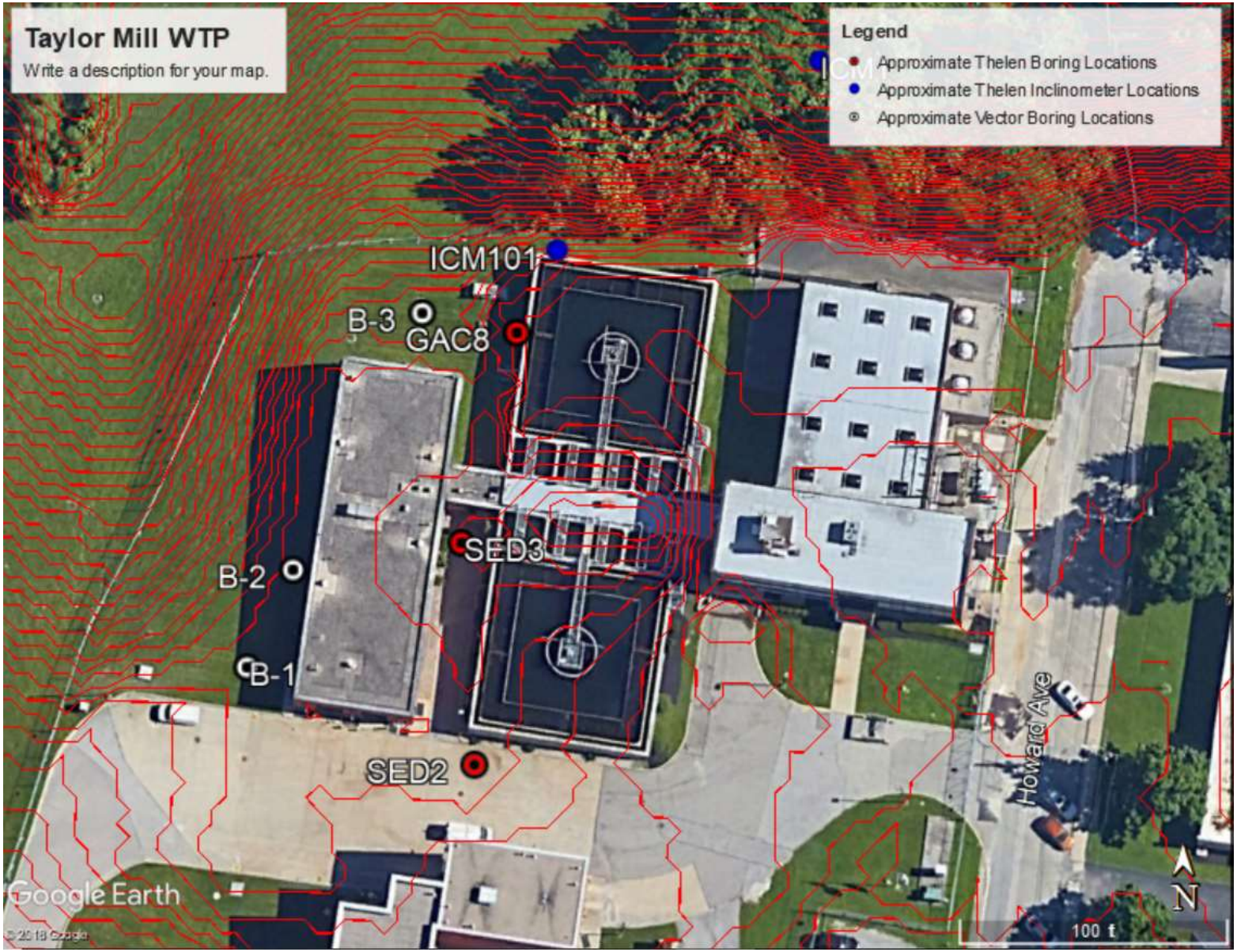


Cornerstone Engineering	VECTOR ENGINEERS, INC GEOTECHNICAL • MATERIALS • GEOSCIENCES	**Site Location Map** **Taylor Mill WTP** Taylor Mill, Kentucky Vector Project 19-3663



Cornerstone Engineering	VECTOR ENGINEERS, INC GEOTECHNICAL · MATERIALS · GEOSCIENCES	**Aerial Boring Location Plan** **Taylor Mill WTP** Taylor Mill, Kentucky Vector Project 19-3663

VECTOR ENGINEERS, INC
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Boring Log

Elevation: 520 feet

Boring: B-1

Project: **19-3663 Taylor Mill WTP** — **Taylor Mill, Kentucky**

Method: H.S.A.	**Date:** 5/14/2019	**Location:** 22' off southwest corner of existing building and 17' north from concrete pavement
Diameter: 3¼ inches (inside diameter)	**Rig Type:** CME-45 (track)	**Hammer Type:** Automatic
Groundwater: Dry upon completion		**Weather:** Sunny, mid 60's °F
Engineer: Isaac Martin **Driller:** Jim Powers	**Notes:**	

From (ft)	To (ft)	Material Description	Symbol	Sample Depth (ft)	Sample Type	Blows per 6-inch increment	Recovery (in)	SPT-N value	Rock Quality (RQD,%)	Atterberg Limits (LL, PI)	Moisture Content (%)	% Fines (clay & silt)	Unconfined Compressive Strength (ksf)
0.0	0.4	TOPSOIL (4 inches)		1	SS	1, 2, 4	10	6					
0.4	1.0	FILL -- FIRM, dark brown to brown LEAN CLAY (CL) with few roots and rock fragments, moist		2 1/2	SS	5, 6, 7	7	13					
1.0	4.0	FILL -- STIFF, brown LEAN CLAY (CL) with few concrete fragments, moist											
4.0		Perched water encountered at 4 feet		5	SS	4, 10, 7	16	17					
		Few roots encountered at 7 feet											
				7 1/2	SS	3, 3, 4	9	7					
		FILL -- FIRM to STIFF, brown to dark grayish brown (CL) with few brick and rock fragments, moist		10	SS	2, 2, 3	13	5					
		Trace to few decaying roots (black) and trace gray fat clay encountered at 14 feet		15	SS	2, 4, 6	16	10					
	15.5												
15.5		**Boring terminated without refusal at 15.5 feet**											

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Boring Log

Elevation: 520 feet

Boring: B-2

Project: 19-3663 Taylor Mill WTP — **Taylor Mill, Kentucky**

Method: H.S.A.	**Date: 5/14/2019**	**Location: West side of building center of wall**
Diameter: 3¼ inches (inside diameter)	**Rig Type: CME-45 (track)**	**Hammer Type: Automatic**
Groundwater: Dry upon completion		**Weather: Sunny, mid 60's °F**
Engineer: Isaac Martin **Driller: Jim Powers**	**Notes:**	

From (ft)	To (ft)	Material Description	Symbol	Sample Depth (ft)	Sample Type	Blows per 6-inch increment	Recovery (in)	SPT-N value	Rock Quality (RQD,%)	Atterberg Limits (LL, PI)	Moisture Content (%)	% Fines (clay & silt)	Unconfined Compressive Strength (ksf)
0.0	0.4	TOPSOIL (4 inches)		1	SS	1, 2, 3	8	5					
0.4		FILL -- FIRM to STIFF, dark brown LEAN CLAY (CL) with few rock and brick fragments, moist		2 1/2	SS	2, 4, 4	2	8		46, 21	20%		
	5.0			5	SS	4, 6, 9	16	15			21%		
5.0	6.0	FILL -- STIFF, brown LEAN CLAY (CL), moist											
6.0				7 1/2	SS	4, 6, 9	14	15			23%		
		Few rock fragments at 10 feet		10	SS	5, 5, 6	9	11					
		FILL -- FIRM to STIFF, grayish brown to brown LEAN CLAY (CL) with trace rock fragments, moist		15	SS	2, 2, 5	5	7					
	16.0												
16.0		FILL -- FIRM, gray to gray brown LEAN CLAY (CL) with few rock and fiber fragments, moist		20	SS	5, 4, 3	10	7					
	21.0												
21.0		FIRM to STIFF, brown to gray brown LEAN CLAY (CL) with few rock and gravel fragments, moist Trace silt at 25 feet		25	SS	3, 6, 8	16	14					
	28.0												
28.0		STIFF, dark gray and brown, clayey SILT (ML) with trace gravel, moist		30	SS	3, 5, 6	16	11					
				35	SS	5, 6, 7	16	13					
	35.5												
35.5		**Boring terminated without refusal at 35.5 feet**											

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Boring Log

Elevation: 519 feet

Boring: B-3

Project: **19-3663 Taylor Mill WTP** — **Taylor Mill, Kentucky**

Method: H.S.A.	**Date:** 5/14/2019	**Location:** North side of existing building center of wall (18' off wall north toward fence)
Diameter: 3¼ inches (inside diameter)	**Rig Type:** CME-45 (track)	**Hammer Type:** Automatic
Groundwater: Dry upon completion		**Weather:** Sunny, mid 60's °F
Engineer: Isaac Martin **Driller:** Jim Powers	**Notes:**	

From (ft)	To (ft)	Material Description	Symbol	Sample Depth (ft)	Sample Type	Blows per 6-inch increment	Recovery (in)	SPT-N value	Rock Quality (RQD,%)	Atterberg Limits (LL, PI)	Moisture Content (%)	% Fines (clay & silt)	Unconfined Compressive Strength (ksf)
0.0	0.3	TOPSOIL (3 inches)		1	SS	1, 3, 5	10	8					
0.3	2.0	FILL -- STIFF to VERY STIFF, brown LEAN CLAY (CL) with few roots, moist		2 1/2	SS	3, 5, 11	5	16					
2.0	4.0	FILL -- VERY STIFF, dark brown to brown LEAN CLAY (CL) with few brick, rock and mulch (black) fragments, moist		5	SS	12, 11, 11	6	22					
4.0				7 1/2	SS	3, 5, 6	15	11					
		FILL -- STIFF to VERY STIFF, grayish brown LEAN CLAY (CL), trace roots and rock fragments, moist		10	SS	2, 5, 5	15	10					
				15	SS	4, 4, 5	16	9					
	15.5												
15.5		**Boring terminated without refusal at 15.5 feet**											

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LOG OF TEST BORING

CLIENT: Malcolm Pirnie, Inc. BORING #: SED 2 (1 of 2)

PROJECT: Geotechnical Exploration, Advanced Treatment Facilities, TMTP, Taylor Mill, Kentucky JOB #: 081069E

LOCATION OF BORING: As shown on Boring Plan, Drawing 081069E-1

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRATA DEPTH (feet)	DEPTH SCALE (feet)	SAMPLE Cond	Blows/6"	No.	Type	Rec. (Inches)
521.4	SURFACE	0.0						
520.8	CONCRETE	0.6		I	10/42/14	1	DS	5
519.1	Mixed gray and brown moist very dense FILL, sand and gravel with some clay, trace asphaltic concrete pieces.	2.3		I	3/4/7	2	DS	18
	Mixed brown and gray moist medium stiff to stiff FILL, silty clay.		5	I	3/3/7	3	DS	18
511.9		9.5		I	1/1/2	4	DS	18
509.9	Mixed brown, gray and black moist medium stiff FILL, silty clay with asphaltic concrete and brick pieces.	11.5	10	I	1/2/2	5	DS	18
506.9	Mixed brown and gray moist stiff FILL, silty clay with silt and fine sand, trace limestone gravel, shale fragments and roots.	14.5		I	2/3/4	6	DS	18
504.4	Brown, gray and reddish brown moist medium stiff to stiff SILTY CLAY.	17.0	15	I	2/4/5	7	DS	18
499.4	Brown moist stiff SILTY CLAY.	22.0		I	4/4/7	8	DS	18
496.9	Brown, gray and reddish brown moist stiff SILTY CLAY.	24.5	20	I	3/4/4	9	DS	18
493.4	Brown, olive brown and gray moist stiff SILTY CLAY, with silt seams, varved.	28.0		I	2/4/5	10	DS	18
			25	I	3/4/6	11	DS	18

Datum MSL Hammer Wt. 140 lbs. Hole Diameter 8 in. Foreman JS / TD-2

Surf. Elev. 521.4 ft. Hammer Drop 30 in. Rock Core Dia. -- in. Engineer LJC/TWV

Date Started 12/12/08 Pipe Size O.D. 2 in. Boring Method 3-1/4" HSA Date Completed 12/12/08

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

SAMPLE TYPE
DS - DRIVEN SPLIT SPOON
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

GROUNDWATER DEPTH
FIRST NOTED Trace 11.2/28 ft.
AT COMPLETION 43.6 ft.
AFTER 48 hrs. 10.9 ft.
BACKFILLED 7 days

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST - DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

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LOG OF TEST BORING

CLIENT: Malcolm Pirnie, Inc. BORING #: SED 2 (2 of 2)

PROJECT: Geotechnical Exploration, Advanced Treatment Facilities, TMTP, Taylor Mill, Kentucky JOB #: 081069E

LOCATION OF BORING: As shown on Boring Plan, Drawing 081069E-1

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRATA DEPTH (feet)	DEPTH SCALE (feet)	SAMPLE Cond	Blows/6"	No.	Type	Rec. (Inches)
491.4			30					
	Gray, trace brown moist medium stiff SILTY CLAY, with silt seams, varved.			I	2/4/5	12	DS	18
488.4		33.0						
	Mottled brown and gray moist very stiff CLAY, trace iron oxide stains.		35	I	4/5/8	13	DS	18
483.4		38.0						
	Gray and olive brown moist very stiff SILTY CLAY, with limestone and shale fragments and limestone floaters (CL).		40	I	9/12/17	14	DS	18
			45	I	12/14/18	15	DS	18
472.9		48.5						
	Interbedded gray, trace olive brown moist soft weathered SHALE and gray hard LIMESTONE (bedrock).		50	I	50/5"	16	DS	3
468.4		53.0						
	Auger refusal at 53.0 feet.		55					

Datum MSL Hammer Wt. 140 lbs. Hole Diameter 8 in. Foreman JS / TD-2

Surf. Elev. 521.4 ft. Hammer Drop 30 in. Rock Core Dia. -- in. Engineer LJC/TWV

Date Started 12/12/08 Pipe Size O.D. 2 in. Boring Method 3-1/4" HSA Date Completed 12/12/08

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

SAMPLE TYPE
DS - DRIVEN SPLIT SPOON
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

GROUNDWATER DEPTH
FIRST NOTED Trace 11.2/28 ft.
AT COMPLETION 43.6 ft.
AFTER 48 hrs. 10.9 ft.
BACKFILLED 7 days

BORING METHOD
HSA - HOLLOW STEM AUGERS
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LOG OF TEST BORING

CLIENT: Malcolm Pirnie, Inc. BORING #: SED 3 (1 of 2)

PROJECT: Geotechnical Exploration, Advanced Treatment Facilities, TMTP, Taylor Mill, Kentucky JOB #: 081069E

LOCATION OF BORING: As shown on Boring Plan, Drawing 081069E-1

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRATA DEPTH (feet)	DEPTH SCALE (feet)	SAMPLE Cond	Blows/6"	No.	Type	Rec. (Inches)
519.5	SURFACE	0.0						
518.5	ASPHALT	1.0						
517.0	Brown and gray moist medium stiff to stiff SILTY CLAY.	2.5		I	2/2/3	1	DS	9
515.0	Brown and tan moist stiff SILTY CLAY, with silt seams.	4.5		I	4/4/5	2	DS	18
512.5	Brown, trace gray moist stiff SILTY CLAY, with silt seams.	7.0	5	I	2/4/4	3	DS	18
505.0	Brown, trace gray moist medium stiff SILTY CLAY.	14.5	10	I	2/3/3	4	DS	18
				I	3/3/5	5	DS	18
				I	4/3/5	6	DS	18
500.5	Brown moist stiff SILTY CLAY.	19.0	15	I	3/3/5	7	DS	18
				I	2/3/4	8	DS	18
497.5	Brown, trace tan moist stiff SILTY CLAY, with silt seams and iron oxide stains.	22.0	20	I	4/6/8	9	DS	18
495.0	Brown and gray moist medium stiff to stiff SILTY CLAY, partially varved.	24.5		I	2/3/4	10	DS	18
491.5	Gray and olive brown moist stiff SILTY CLAY, with silt seams, varved.	28.0	25	I	3/3/5	11	DS	18

Datum MSL Hammer Wt. 140 lbs. Hole Diameter 8 in. Foreman JS / TD-2

Surf. Elev. 519.5 ft. Hammer Drop 30 in. Rock Core Dia. -- in. Engineer LJC/TWV

Date Started 12/17/08 Pipe Size O.D. 2 in. Boring Method 3-1/4" HSA Date Completed 12/17/08

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

SAMPLE TYPE
DS - DRIVEN SPLIT SPOON
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

GROUNDWATER DEPTH
FIRST NOTED 20.9 ft.
AT COMPLETION 31.4 ft.
AFTER 48 hrs. 17.2 ft.
BACKFILLED 2 days

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST - DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

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LOG OF TEST BORING

CLIENT: Malcolm Pirnie, Inc. BORING #: SED 3 (2 of 2)

PROJECT: Geotechnical Exploration, Advanced Treatment Facilities, TMTP, Taylor Mill, Kentucky JOB #: 081069E

LOCATION OF BORING: As shown on Boring Plan, Drawing 081069E-1

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRATA DEPTH (feet)	DEPTH SCALE (feet)	SAMPLE Cond	Blows/6"	No.	Type	Rec. (Inches)
489.5			30					
	Gray moist stiff SILTY CLAY, with silt seams, varved.			I	2/4/5	12	DS	18
			35	I	2/4/5	13	DS	18
481.5		38.0						
	Bluish gray and olive brown moist stiff SILTY CLAY, with randomly oriented limestone fragments.		40	I	3/5/8	14	DS	8
477.5		42.0						
	Gray moist medium stiff sandy CLAY, with limestone fragments.		45	I	3/4/7	15	DS	18
471.5		48.0						
	Gray, trace brown moist medium stiff CLAY.				Note: Scale Change			
			50	I	4/4/6	16	DS	18
466.5		53.0						
	Gray moist stiff SILTY CLAY, with randomly oriented shale and limestone fragments and limestone floaters.		55	I	50/6"	17	DS	6
461.5		58.0						
	Interbedded gray, trace brown moist soft weathered SHALE and gray hard LIMESTONE (bedrock).		60	I	19/26/50/8"	18	DS	14
454.1		65.4	65	I	50/5"	19	DS	5
	Bottom of test boring at 65.4 feet.							

Datum MSL Hammer Wt. 140 lbs. Hole Diameter 8 in. Foreman JS / TD-2

Surf. Elev. 519.5 ft. Hammer Drop 30 in. Rock Core Dia. -- in. Engineer LJC/TWV

Date Started 12/17/08 Pipe Size O.D. 2 in. Boring Method 3-1/4" HSA Date Completed 12/17/08

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

SAMPLE TYPE
DS - DRIVEN SPLIT SPOON
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

GROUNDWATER DEPTH
FIRST NOTED 20.9 ft.
AT COMPLETION 31.4 ft.
AFTER 48 hrs. 17.2 ft.
BACKFILLED 2 days

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST - DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

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LOG OF TEST BORING

CLIENT: Malcolm Pirnie, Inc. BORING #: GAC 8 (1 of 3)

PROJECT: Geotechnical Exploration, Advanced Treatment Facilities, TMTP, Taylor Mill, Kentucky JOB #: 081069E

LOCATION OF BORING: As shown on Boring Plan, Drawing 081069E-1

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRATA DEPTH (feet)	DEPTH SCALE (feet)	SAMPLE Cond	Blows/6"	No.	Type	Rec. (Inches)
523.6	SURFACE	0.0						
521.6	Mixed brown moist medium stiff FILL, silty clay, trace topsoil and hairlike roots.	2.0		I	2/2/3	1	DS	18
				I	4/7/5	2	DS	10
	Mixed brown moist medium stiff to stiff FILL, silty clay with shale and limestone fragments and trace hairlike roots.		5	U		3	PT	23
				I	2/2/2	4	DS	18
514.1		9.5						
	Brown, trace tan and gray moist stiff SILTY CLAY, with silt and fine sand seams, varved.		10	I	2/4/4	5	DS	18
509.6		14.0		I	2/4/3	6	DS	18
	Brown, trace gray moist medium stiff SILTY CLAY, trace iron oxide stains and organic matter.		15	I	2/2/3	7	DS	18
506.6		17.0						
504.1	Mottled brown and reddish brown moist stiff SILTY CLAY, trace iron oxide stains.	19.5		I	3/4/6	8	DS	18
			20	I	2/4/8	9	DS	18
	Mottled light brown and brown moist medium stiff to stiff SILTY CLAY, with shale fragments and limestone floaters.			I	3/4/3	10	DS	18
			25	I	6/8/9	11	DS	3
495.6		28.0						

Datum MSL Hammer Wt. 140 lbs. Hole Diameter 8 in. Foreman JS / TD-2

Surf. Elev. 523.6 ft. Hammer Drop 30 in. Rock Core Dia. 1-7/8 in. Engineer LJC/TWV

Date Started 12/17/08 Pipe Size O.D. 2 in. Boring Method 3-1/4" HSA Date Completed 12/18/08

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

SAMPLE TYPE
DS - DRIVEN SPLIT SPOON
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

GROUNDWATER DEPTH
FIRST NOTED Trace 45/63 ft.
AT COMPLETION 22.2 ft.
AFTER 48 hrs. 25.3 ft.
BACKFILLED 12 days

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST - DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

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LOG OF TEST BORING

CLIENT: Malcolm Pirnie, Inc. BORING #: GAC 8 (2 of 3)

PROJECT: Geotechnical Exploration, Advanced Treatment Facilities, TMTP, Taylor Mill, Kentucky JOB #: 081069E

LOCATION OF BORING: As shown on Boring Plan, Drawing 081069E-1

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRATA DEPTH (feet)	DEPTH SCALE (feet)	SAMPLE Cond	Blows/6"	No.	Type	Rec. (Inches)
493.6			30					
	Brown, trace gray moist medium stiff to stiff SILTY CLAY, with silt and fine sand seams, varved.			I	2/4/6	12	DS	18
490.6		33.0						
			35	I	3/4/6	13	DS	18
	Gray moist medium stiff to stiff SILTY CLAY, with silt seams, varved (CL).		40	I	2/4/5	14	DS	18
			45	I	2/3/3	15	DS	18
475.6		48.0						
	Bluish gray and olive brown moist stiff CLAY.		50	I	3/5/7	16	DS	18
470.6		53.0						
	Mottled brown and gray moist very stiff SILTY CLAY, with randomly oriented shale fragments and limestone floaters.		55	I	4/6/20	17	DS	18

Datum MSL Hammer Wt. 140 lbs. Hole Diameter 8 in. Foreman JS / TD-2

Surf. Elev. 523.6 ft. Hammer Drop 30 in. Rock Core Dia. 1-7/8 in. Engineer LJC/TWV

Date Started 12/17/08 Pipe Size O.D. 2 in. Boring Method 3-1/4" HSA Date Completed 12/18/08

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

SAMPLE TYPE
DS - DRIVEN SPLIT SPOON
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

GROUNDWATER DEPTH
FIRST NOTED Trace 45/63 ft.
AT COMPLETION 22.2 ft.
AFTER 48 hrs. 25.3 ft.
BACKFILLED 12 days

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
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STANDARD PENETRATION TEST - DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

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LOG OF TEST BORING

CLIENT: Malcolm Pirnie, Inc. BORING #: GAC 8 (3 of 3)

PROJECT: Geotechnical Exploration, Advanced Treatment Facilities, TMTP, Taylor Mill, Kentucky JOB #: 081069E

LOCATION OF BORING: As shown on Boring Plan, Drawing 081069E-1

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRATA DEPTH (feet)	DEPTH SCALE (feet)	SAMPLE Cond	Blows/6"	No.	Type	Rec. (Inches)
463.6	SURFACE		60					
	Mottled brown and gray moist very stiff SILTY CLAY, with randomly oriented shale fragments and limestone floaters.			I	6/10/14	18	DS	18
460.6		63.0						
	Brown wet very dense silty fine to coarse SAND and GRAVEL.		65	I	22/42/37	19	DS	18
455.1		68.5						
453.1	Interbedded gray moist soft SHALE and gray hard LIMESTONE (bedrock).	70.5	70	I	50/6"	20	DS	5
	Interbedded gray moist, extremely weak to weak slightly weathered to unweathered thin to medium bedded calcareous SHALE and gray strong to very strong unweathered thin to medium bedded medium to coarse crystalline grained locally fossiliferous LIMESTONE. The limestone occurs in 1 to 3-inch beds and comprises 34.4 % of this interval. (Point Pleasant Formation Bedrock)	72.5			RQD = 25%	21	RC	24/24
451.1			75					
	Interbedded gray moist, extremely weak to weak slightly weathered to unweathered thin to medium bedded calcareous SHALE and gray strong to very strong unweathered thin to medium bedded medium to coarse crystalline grained locally fossiliferous LIMESTONE. The limestone occurs in 1 to 8-inch beds and comprises 37.5 % of this interval. (Point Pleasant Formation Bedrock)				RQD = 49%	22	RC	120/120
441.1		82.5	80					
	Bottom of test boring at 82.5 feet.		85					

Datum MSL Hammer Wt. 140 lbs. Hole Diameter 8 in. Foreman JS / TD-2

Surf. Elev. 523.6 ft. Hammer Drop 30 in. Rock Core Dia. 1-7/8 in. Engineer LJC/TWV

Date Started 12/17/08 Pipe Size O.D. 2 in. Boring Method 3-1/4" HSA Date Completed 12/18/08

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

SAMPLE TYPE
DS - DRIVEN SPLIT SPOON
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

GROUNDWATER DEPTH
FIRST NOTED Trace 45/63 ft.
AT COMPLETION 22.2 ft.
AFTER 48 hrs. 25.3 ft.
BACKFILLED 12 days

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST - DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS

FIELD TESTING PROCEDURES

Vector Engineers performs field tests in general accordance with the American Society for Testing and Materials (ASTM). These procedures are generally recognized as the basis for uniformity and consistency of test results in the geotechnical engineering profession. All work is initiated and supervised by qualified geotechnical professionals.

Subsequent portions of this attachment briefly describe of our field testing procedures. Where applicable, we have referenced these procedures to ASTM standards which contain specific descriptions of apparatus, procedures, reporting, etc.

SOIL TEST BORING, ASTM D-1586

The borings were made with a hollow-stem auger powered by a drill rig. At regular intervals, soil samples were obtained through the hollow augers with a standard 1.4-inch I.D., 2.0-inch O.D. split-tube sampler.

The sampler was initially seated 6 inches to penetrate any loose cuttings; then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot was recorded and is designated as the *standard penetration resistance (SPT N-value)*. Penetration resistance, when properly evaluated, is an index to soil consistency and strength.

In the field, our geotechnical professional logged and described the samples as they were obtained. Representative portions of each soil sample were labeled and sealed, then transported to our laboratory. The samples were examined by a graduate geotechnical engineer or geologist to visually check the field descriptions. Boring data, including sample intervals, penetration resistances, soil descriptions, and groundwater levels are shown on the attached Test Boring Records.

CORRELATION
OF
STANDARD
PENETRATION RESISTANCE
WITH
RELATIVE COMPACTNESS AND CONSISTENCY

Sand and Gravel

Standard Penetration Resistance Blows/Foot	Relative Compactness
0-4	Very Loose
5-10	Loose
11-20	Firm
21-30	Very Firm
31-50	Dense
Over 50	Very Dense

Silt and Clay

Standard Penetration Resistance Blows/Foot	Consistency
0-2	Very Soft
3-4	Soft
5-8	Firm
9-15	Stiff
16-30	Very Stiff
31-50	Hard
Over 50	Very Hard

Laboratory Data Summary

PROJECT NAME: *Taylor Mill WTP*

PROJECT NUMBER: *19-3672*

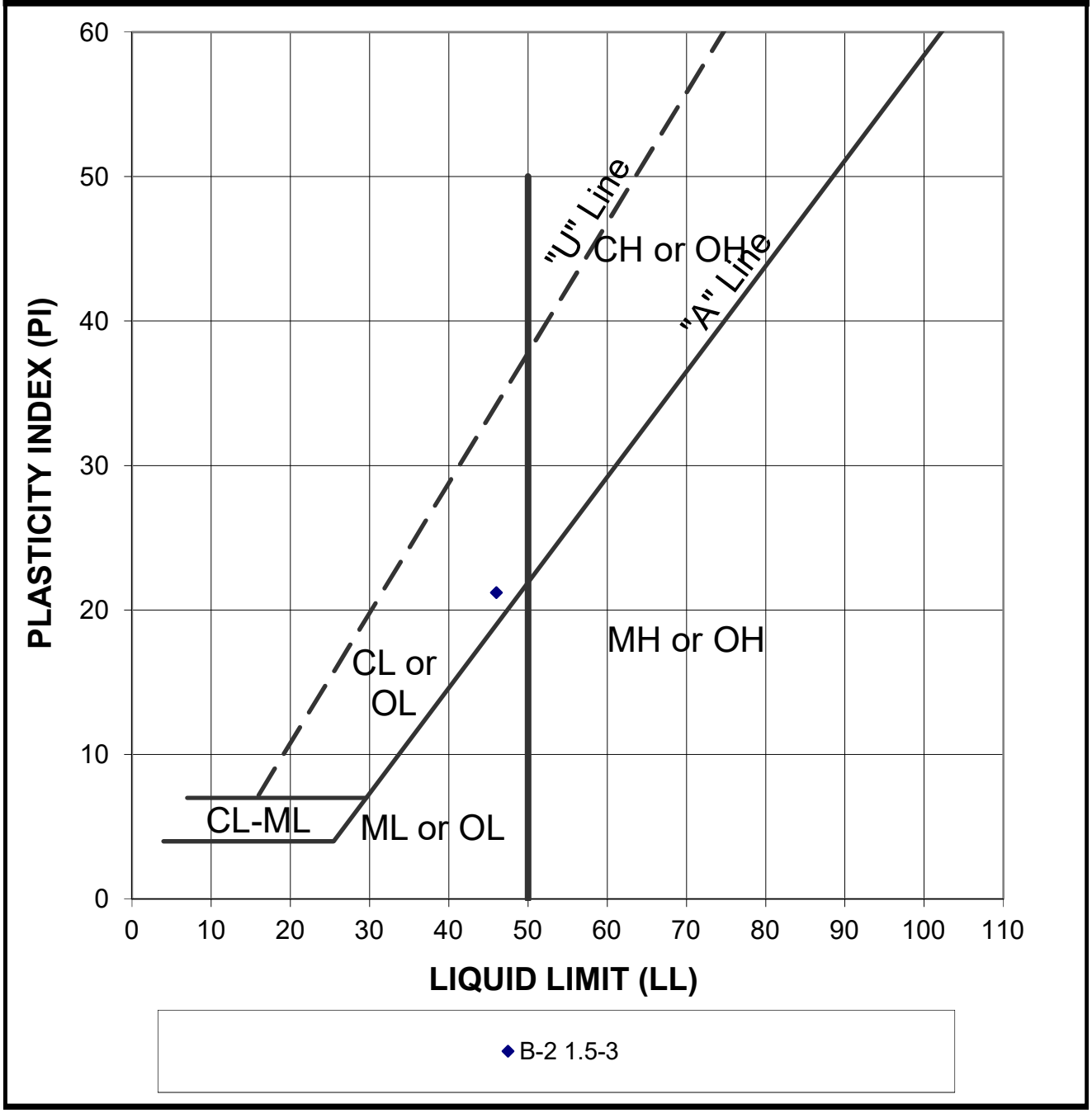
REPORT DATE: *06/04/19*

BORING NO.	SAMPLE DEPTH, FT.	SAMPLE TYPE*	USCS	NATURAL MOISTURE CONTENT, %	ATTERBERG LIMITS			MAX. DRY DENSITY PCF /OPTIMUM MOISTURE %	UNIT WEIGHT, PCF		UNCONFINED COMPRESSIVE STRENGTH, KSF	MATERIAL FINER THAN NO. 200, %	ORGANIC CONTENT, %	CBR, %
					L.L.	P.L.	P.I.		WET	DRY				
B-2	1.5-3	SS	CL	20.2	46	25	21							
B-2	4-5.5	SS		20.6										
B-2	6.5-8	SS		22.8										
B-3	1.5-3	SS		10.9									2.0	

Atterberg Limits
(ASTM D4318)

PROJECT NAME:	*Taylor Mill WTP*	**PROJECT NO.:**	*19-3663*
SAMPLE RECEIVED:	*05/15/19*	**TECHNICIAN:**	*EH*
TEST DATE:	*05/30/19*	**REVIEWED BY:**	*MS*
METHOD:	*Multipoint*	**REPORT DATE:**	*06/04/19*

Sample ID / Location	Depth	LL	PL	PI	Moist, %	Est. % retained on No. 40 sieve	Classification - Description
B-2	1.5-3	46	25	21	20.2	<5	Dark brown CL



LABORATORY TESTING PROCEDURES

The laboratory tests are performed in general accordance with the American Society for Testing and Materials (ASTM). These procedures are generally recognized as the basis for uniformity and consistency of test results in the geotechnical engineering profession. The tests are performed by skilled technicians trained in ASTM procedures. The laboratory equipment is well maintained and calibrated at least yearly.

Subsequent portions of this attachment present briefly describe of our testing procedures. Where applicable, we have referenced these procedures to ASTM standards which contain specific descriptions of apparatus, procedures, reporting, etc.

MOISTURE CONTENT DETERMINATION, ASTM D-2216

The moisture content of soils is an indicator of various physical properties, including strength and compressibility. Selected samples obtained during exploratory drilling were taken from their sealed containers. Each sample was weighed and then placed in an oven heated to 110°C $\pm$ 5°. The sample remained in the oven until the free moisture had evaporated. The dried sample was removed from the oven, allowed to cool, and re-weighed. The moisture content was computed by dividing the weight of evaporated water by the weight of the dry sample. The results are expressed as a percent.

ATTERBERG LIMITS DETERMINATION, ASTM D-4318

Representative samples were subjected to Atterberg limits testing to determine the soil's plasticity characteristics. The plasticity index (PI) is the range of moisture content through which the soil deforms as a plastic material. It is bracketed by the liquid limit (LL) and the plastic limit (PL). The liquid limit is the moisture content at which the soil becomes wet enough to flow as a viscous fluid. To determine the liquid limit, a soil specimen is first washed through a No. 40 sieve. The materials finer than the No. 40 sieve are retained and dried until the soil is in a viscous fluid state. A portion of this soil is then placed in a brass cup of standardized dimensions. A groove is cut through the middle of the soil specimen with a grooving tool of standard dimensions. The cup is attached to a cam that lifts the cup 10 mm and then allows the cup to fall onto a hard rubber base. The cam is rotated at about 2 cps until the two halves of the soil specimen come in contact at the bottom of the groove for a distance of 1/2 inch. The number of blows required to achieve this 1/2 inch contact is recorded, and part of the specimen is subjected to a moisture content determination. The remainder of the specimen is allowed to air dry for a short time, and the grooving process and cam action repeated. This testing sequence is repeated until more than 25 blows are required to achieve the required groove contact. After the number of blows vs. moisture content for the various test points are plotted on arithmetic graph paper, the moisture content corresponding to 25 blows is designated the liquid limit.

The plastic limit (PL) is the lowest moisture content at which the soil is sufficiently plastic to be manually rolled into threads 1/8" in diameter. The plastic limit is determined by taking a part of soil remaining from the liquid limit test, and repeatedly

rolling, kneading, and air drying it until the soil breaks into threads about 1/8 inches in diameter and 3/8 inches long. The moisture content of these soil threads is then determined and is designated the plastic limit.

Taylor Mill WTP

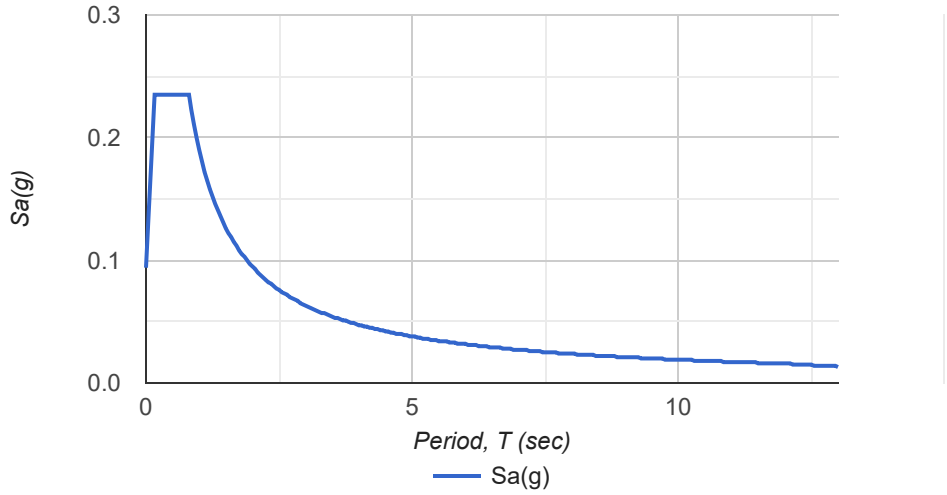
Latitude, Longitude: 39.034958, -84.506244

Date	6/17/2019, 10:30:49 AM
Design Code Reference Document	ASCE7-10
Risk Category	II
Site Class	D - Stiff Soil

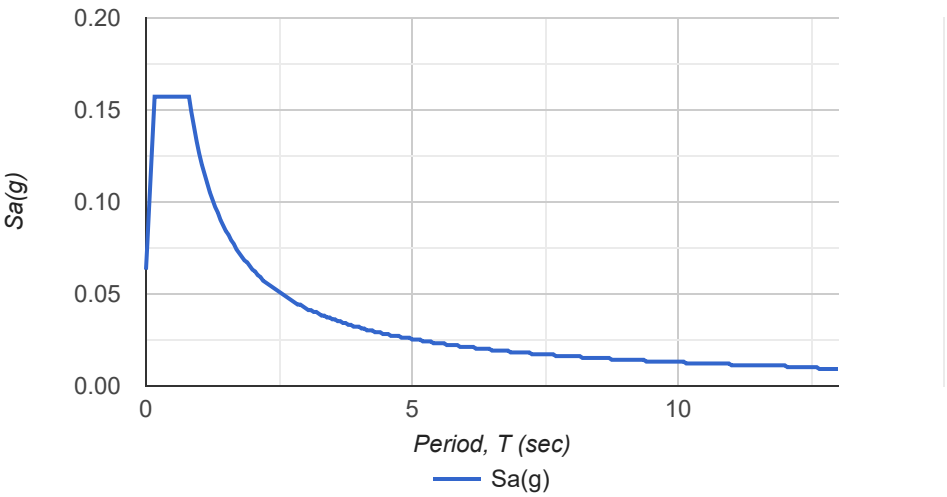
Type	Value	Description
S_S	0.147	MCE_R ground motion. (for 0.2 second period)
S_1	0.079	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.235	Site-modified spectral acceleration value
S_{M1}	0.19	Site-modified spectral acceleration value
S_{DS}	0.157	Numeric seismic design value at 0.2 second SA
S_{D1}	0.126	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	B	Seismic design category
F_a	1.6	Site amplification factor at 0.2 second
F_v	2.4	Site amplification factor at 1.0 second
PGA	0.068	MCE_G peak ground acceleration
F_{PGA}	1.6	Site amplification factor at PGA
PGA_M	0.109	Site modified peak ground acceleration
T_L	12	Long-period transition period in seconds
SsRT	0.147	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.159	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.079	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.09	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.922	Mapped value of the risk coefficient at short periods
C_{R1}	0.881	Mapped value of the risk coefficient at a period of 1 s

MCER Response Spectrum



Design Response Spectrum



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APPENDIX B
SLOPE STABILITY REPORT

VECTOR ENGINEERS, INC
GEOTECHNICAL · MATERIALS · GEOSCIENCES
A SUBSIDIARY OF CTL ENGINEERING, INC

June 19, 2020

Mr. Chris Sivley, PE
Cornerstone Engineering
2302 Hurstbourne Village Dr.
Louisville, KY 40299

Subject: Summary Letter of Slope Stability Analysis
Taylor Mill WTP
Taylor Mill, Kentucky
Vector Project Number 20050090SHE

Dear Mr. Sivley,

Vector has completed the slope stability analysis of the slope and retaining walls adjacent to the proposed generator, switchgear, and transformer pads. The purpose of the analysis was to evaluate the stability of the slope under the proposed wall location and review potential remediation methods if the slope is found to be unstable. The following summary letter discussed the background information for the slope, our research and assumptions for modeling the slope, the results of our analysis, and our recommendations for reconstruction of the slope.

Project Information

Project information has been provided through correspondence with Mr. Sivley and a set of four structural drawings (S-01 to S-04) and one civil drawing (C-03) entitled *Taylor Mill Treatment Plant Emergency Generator Phase 1 of WX21117210*, prepared by Cornerstone Engineers, dated December 20, 2019. Vector also previously prepared a geotechnical report entitled *Report of Geotechnical Subsurface Characterization, Taylor Mill Generator Pad and Tower* in June of 2019 (Vector project 19-3663). We understand that, as part of the additions to the Taylor Mill WTP, a retaining wall will be constructed along the slope on the west and north sides of the proposed additions. The wall varies in height, with a maximum height of about 12 feet (with 10 feet of soil behind the wall) at the northwest corner. The wall is anticipated to have about 1 foot minimum of soil above the footing in front of the wall to provide passive resistance. The wall is founded independent of the substation and switchgear structures but will be tied into the generator foundation.

As discussed in our geotechnical report, the slope in this area is about 3 horizontal to 1 vertical (3H:1V). Typically, slopes of 3H:1V and flatter are considered stable. However, the slopes north and east of the site have previously failed and, based on inclinometer readings collected by Thelen Associates, appear to experience continued creep. Also, our borings at the crest of the slope encountered up to 21 feet of fill that contained some debris and traces of organics. Therefore, considering the nearby history of slope failure, the large height of the wall, and the heavy equipment loads proposed behind the wall, we recommended a slope stability analysis for the retaining wall.

Slope Stability Analysis

Matt Slusser, PE, performed an analysis of the slope stability using SLIDE2 (Version 9.006) developed by Rocscience. In slope stability analyses, the forces that resist failure of the slope (resisting forces) and forces that cause failure of the slope (driving forces) are calculated. The resisting forces are then divided by the driving forces to calculate a factor of safety (FS). Theoretically, a slope with an FS of 1 or greater is stable, while a slope with FS less than 1 is unstable and would fail. However, prudent practice is to design slopes with an FS greater than 1 to reduce the risk of failure due to unforeseen conditions. For this analysis, we target a factor of safety of at least 1.35, meaning the resisting forces are theoretically 35 percent larger than the driving forces.

The accuracy of the stability analyses depends on the accuracy of the slope shape for the stability model and the selection of soil properties and water levels. The following sections discuss the development of the stability model for this analysis.

<u>Slope Dimensions</u>

Dimensions for the original slope are based on the topographic data in the civil drawing and contours extracted from the Kentucky Digital Elevation Model (DEM) data developed through a statewide LiDAR scan. Three cross sections were considered; One that went through each of the proposed structures. Mr. Slusser generally elected to combine the higher elevations from the civil drawings at the crest of the slope with the lower DEM elevations at the toe to create a more conservative model. Generally,

the equipment slabs were modeled as crushed stone instead of concrete to be conservative.

Soil Properties

Vector reviewed the geotechnical data collected by Thelen as well as our own geotechnical data to develop a subsurface profile along the slope. The borings indicated a layer of fill (clay with traces of organics and debris) extending as deep as 21 feet before a native clay was encountered extending to bedrock. Both the fill and clay layers were generally firm to stiff.

After the subsurface profile was developed, initial soil properties were selected based on empirical correlations to the encountered soil types. Once the initial soil properties were selected, a preliminary analysis was performed for the existing conditions at each cross section. Since the slope north of the transformer is likely to be marginally stable, soil properties were chosen to achieve a factor of safety (FS) of between 1 and 1.1 for a failure plane downslope from the proposed wall location (near the previous failure location.

In addition to the soil encountered in the borings, we also assigned properties for the crushed stone that will be used for the geogrid-reinforced granular mats underlying the generator and switchgear pads, as well as the new fill (which was generally considered to be similar to the existing clay on site.

Table 1: Soil Properties

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	24	Piezometric Line 1	
Crushed Stone		110	Mohr-Coulomb	0	38	Piezometric Line 1	

Groundwater Conditions

Vector reviewed the groundwater data in the Thelen and Vector boring logs to develop a typical groundwater profile. Based on this information, it appears that the groundwater surface is near an elevation of 510 feet at the crest of the slope. Since groundwater data was not available at the toe of the slope, we assumed the groundwater slopes downward with the slope, with the water meeting the creek surface in Section C-C and staying below the ground surface in the other two borings.

Analysis Summary and Results

Mr. Slusser then conducted an analysis of the stability of the slope. First, the slope was analyzed with the proposed construction as designed. The proposed design had factors of safety ranging from about 1.10 to 1.28 at the substation, generator, and switchgear pad structures, which is less than the target FS of 1.35. Therefore, we recommend lengthening the heel of the foundation so that it extends back into the slope at least 67 percent of the wall height. Although this didn't have a significant effect on the FS encountered at the structures, this modification improved the wall to be generally stable (FS greater than 1.35) outside of the proposed structure foundations near the generator and substation. However, the wall between the substation and switchgear pad had an FS of 1.15, indicating that it would still require remediation along with the sections of wall adjacent to the structures.

Because of the low factors of safety indicated in our analysis, we considered several options for remediation of the slope. However, we believe that three options stand out as the most feasible; geogrid reinforcement, soil improvement (with rammed aggregate piers), and deep foundations (piles). Each of these options is discussed in further detail below.

Geogrid Reinforcement

Both the switchgear and generator pads will be underlain by 18 inches of crushed stone reinforced with geogrids spaced at 18 inches. However, this geogrid reinforcement was not enough to improve the FS to the target value of 1.35. The generator pad required geogrids extending from the rear of the wall to the rear of the pad (30 feet) down to an elevation of 515 feet (6 feet deep) in order to achieve the

desired FS. At the switchgear pad and surrounding area, the grids would need to extend beyond the rear of the pad (30 feet from the wall) and down to an elevation of 513 feet (8 feet) deep to achieve the desired FS. At the transformer (substation) pad, the geogrids would begin below the pad, extending from the wall to the back of the pad (30 feet) to an elevation of 511 feet (10 feet).

For our analysis, we considered the Tensar UX1100 (or equivalent) geogrids to be anchored by the wall and free to pull out at the other end, with pullout governed by a friction angle of 30 degrees (less than the friction angle of the crushed stone). If the geogrid option is selected, the structural engineer may want to consider a segmental retaining wall (SRW) instead of the proposed concrete wall to facilitate easier anchoring of the geogrid to the wall.

Soil Improvement (Rammed Aggregate Piers)

Rammed aggregate piers (stone columns) can be compacted into the existing soil on site to create a stone and soil matrix with a much higher friction angle than the soil along can achieve. Design of the rammed aggregate pier improvement is typically performed by an engineer with the installation contractor. Therefore, we modeled this improved zone in our analysis as a block of soil with no cohesion and improved friction angles.

The generator pad required the reinforced zone to have a friction angle of 40 degrees extending from the rear of the wall to the rear of the pad (30 feet) down to an elevation of 512 feet (9 feet deep) in order to achieve the desired FS. At the switchgear pad and surrounding area, the reinforced zone would need have a friction angle of 40 degrees extending below the switchgear pad/ground surface and wall foundation down to an elevation of 500 feet (21 feet deep) to achieve the desired FS. At the transformer pad, the reinforced zone would need to have a friction angle of 45 degrees extending to an elevation of 511 feet (10 feet deep) for the entire width of the pad to achieve the desired FS.

An advantage of the rammed aggregate piers is that the system does not require a large, open excavation like geogrids. Additionally, if rammed aggregate piers are used below the switchgear and generator pads, the geogrid reinforced granular mat

below these structures is not longer needed and can be removed. Design of these soil improvements should be conducted by an engineer for a reputable contractor that specializes in the installation and design of rammed aggregate piers. Additionally, there is no need to install the rammed aggregate piers above the wall footing from a slope stability standpoint. However, the structural engineer should make sure that any structures founded over both improved and unimproved soil can bridge over the unimproved soil without significant damage from the differential settlement of the two materials.

Deep Foundations (Piles)

For the deep foundations at this site, we considered vertical piles beneath the middle of the wall. We considered the piles on a spacing of 3 feet center to center. However, larger spacings are possible with larger loads per pile. The piles were modeled to resist the driving forces by shear along the failure surface.

At the generator pad, the piles need to extend to an elevation of 492 feet (about 20 feet below the footing) and resist a shear load of 7 kips to achieve the desired FS. At the switchgear pad and surrounding area and the transformer pad, the piles need to extend to an elevation of 480 feet (about 30 feet below the footing) and resist a shear load of 18 kips to achieve the desired FS.

Conclusion & Limitations

Based on the results of the slope stability analysis, Vector recommends utilizing one of the 3 recommended remediation methods discussed in this report. The designs discussed are preliminary. Once a remediation method is selected, Vector should be contacted to provide additional recommendations and/or provide a more detailed analysis of the proposed remediation system.

This analysis is based on the engineering judgement and the data discussed in this letter. If soil conditions are encountered that differ from those discussed in this report, Vector should be contacted to revise this analysis. This analysis was performed for Cornerstone Engineering for specific use for this project.

Valediction

Vector Engineers, Inc. appreciates the opportunity to provide you with these geotechnical services. Should you have questions or require any additional information, please contact us.

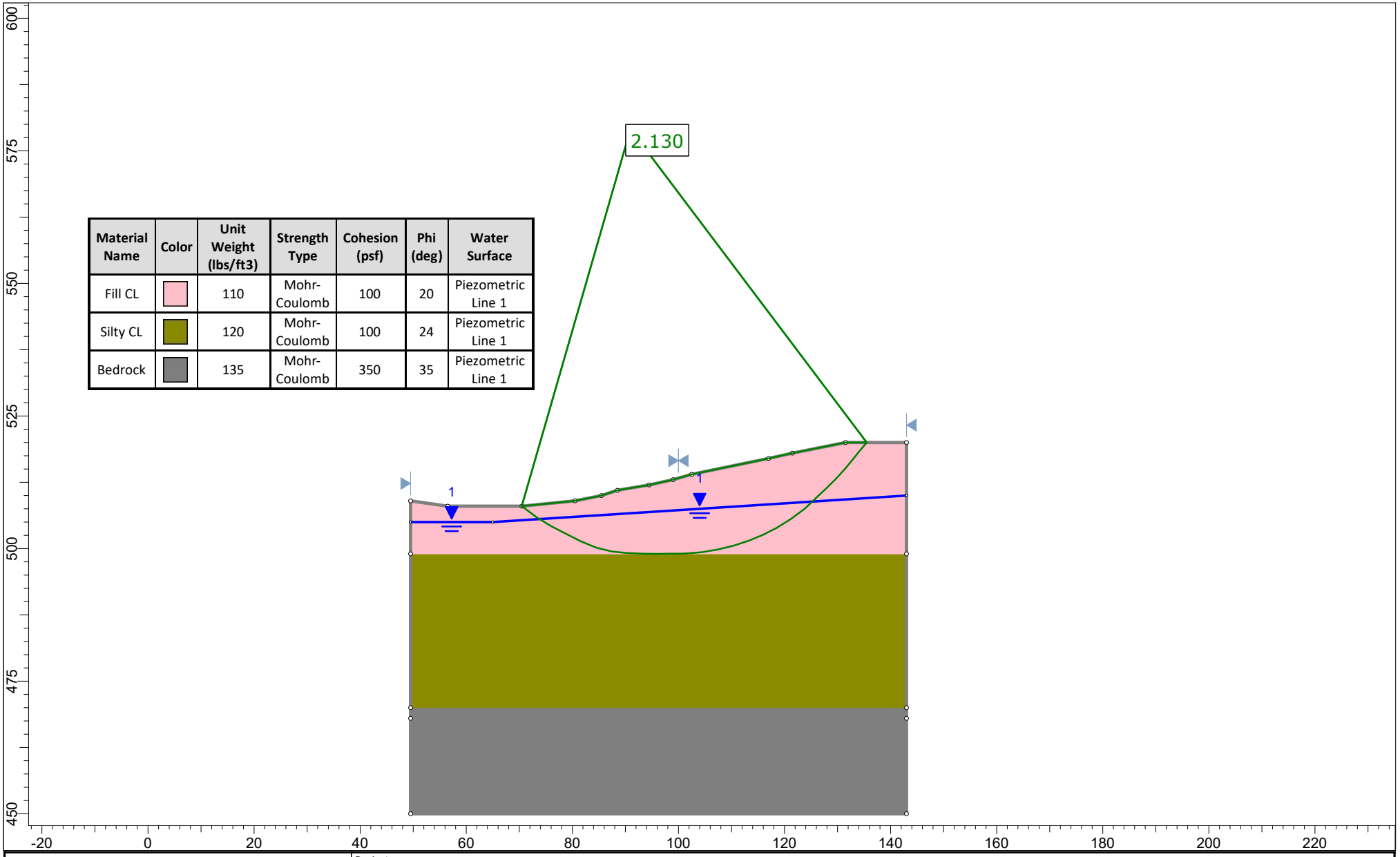
Respectfully submitted,
VECTOR ENGINEERS, INC.

Matthew J. Slusser, PE
Project Engineer
Licensed Kentucky 32059

Wayne A. Karem, PhD, PE
Principal

Attachments: Stability Analysis Results

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1

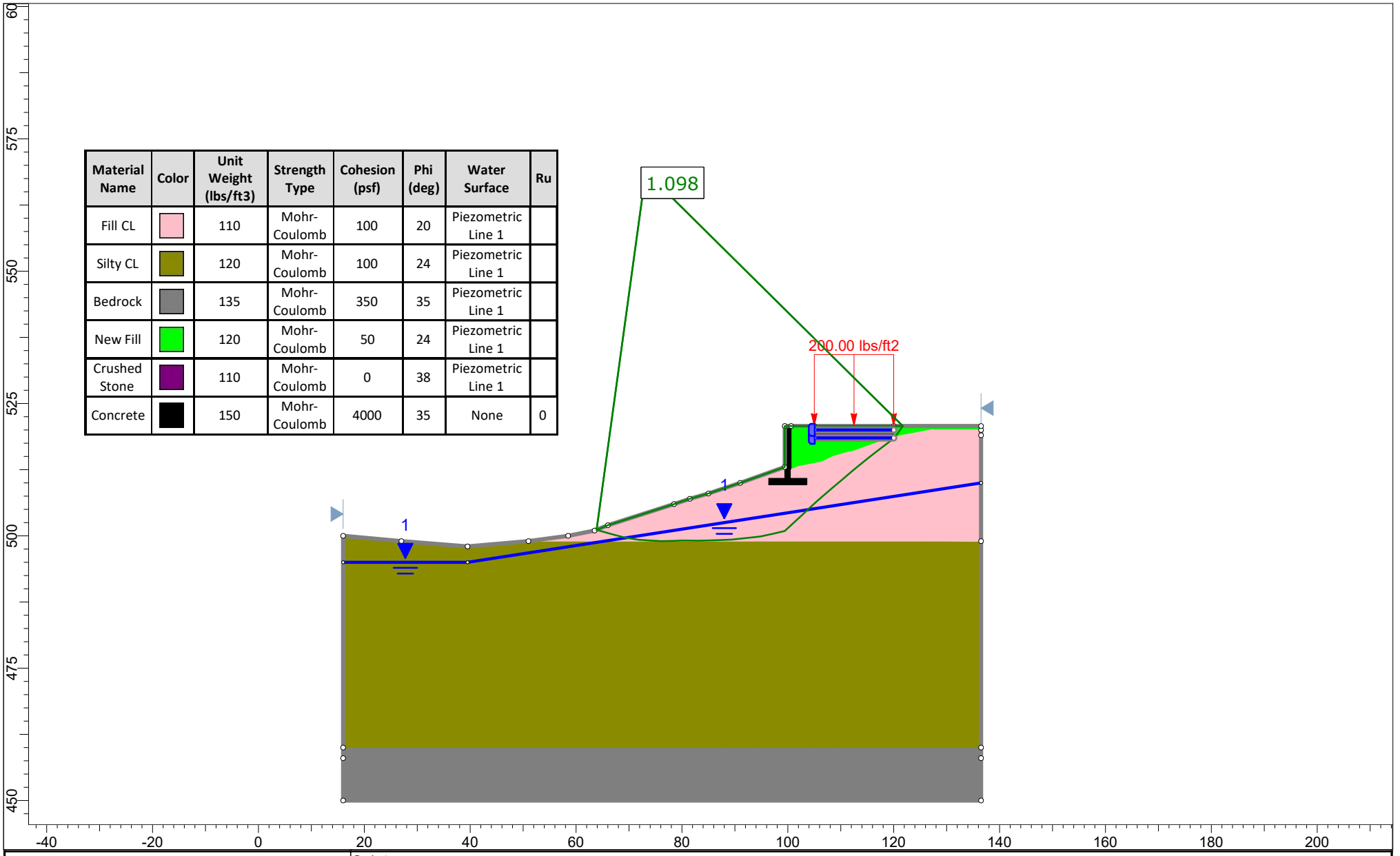


rocscience

SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	Scenario	Master Scenario
Drawn By		Company	
Date	6/10/2020, 8:50:23 AM	File Name	Section A-A - Existing.slmd

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	24	Piezometric Line 1	
Crushed Stone		110	Mohr-Coulomb	0	38	Piezometric Line 1	
Concrete		150	Mohr-Coulomb	4000	35	None	0



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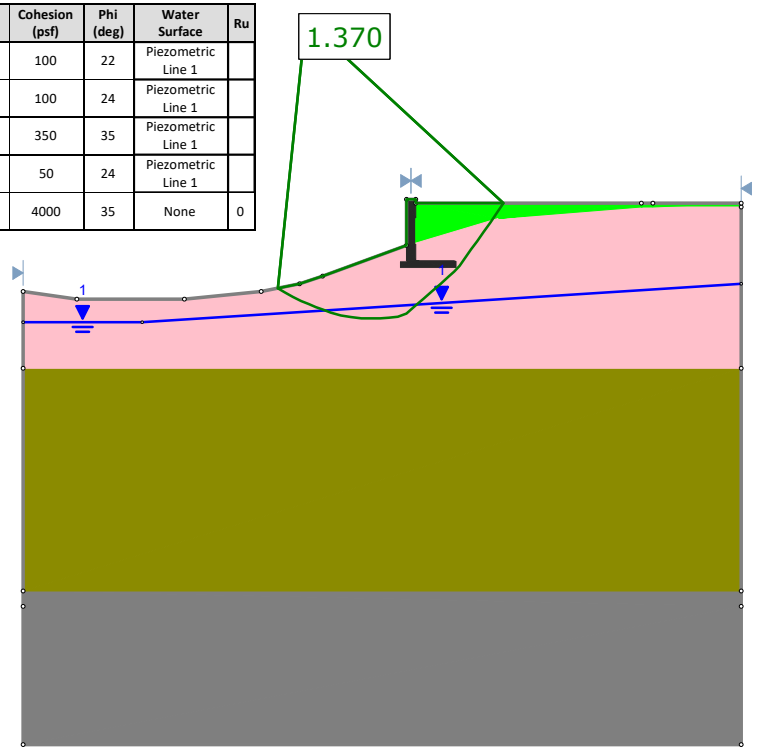
SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	Scenario	Master Scenario
Drawn By		Company	
Date	6/10/2020, 8:50:23 AM	File Name	Section B-B - Proposed.slmd

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	22	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	24	Piezometric Line 1	
Concrete		150	Mohr-Coulomb	4000	35	None	0



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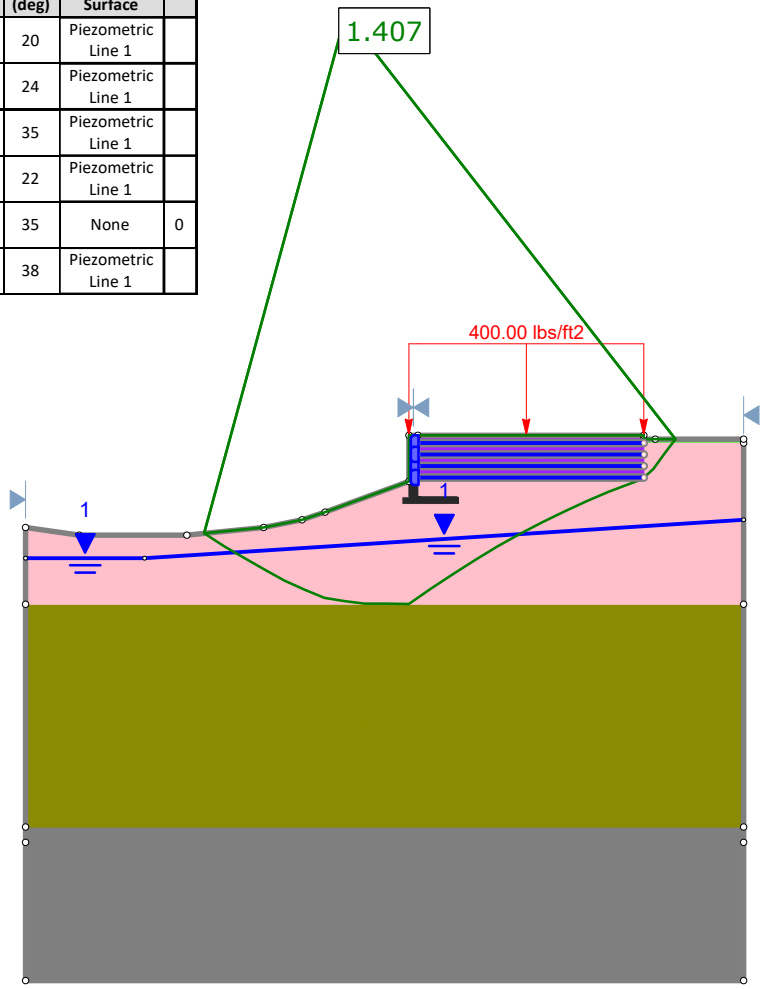
SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	Scenario	Master Scenario
Drawn By		Company	
Date	6/10/2020, 8:50:23 AM	File Name	Section A-A - No Loads as proposed.slmd

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	22	Piezometric Line 1	
Concrete		150	Mohr-Coulomb	4000	35	None	0
Crushed Stone		110	Mohr-Coulomb	0	38	Piezometric Line 1	



575
550
525
500
475
450

-20 0 20 40 60 80 100 120 140 160 180 200 220

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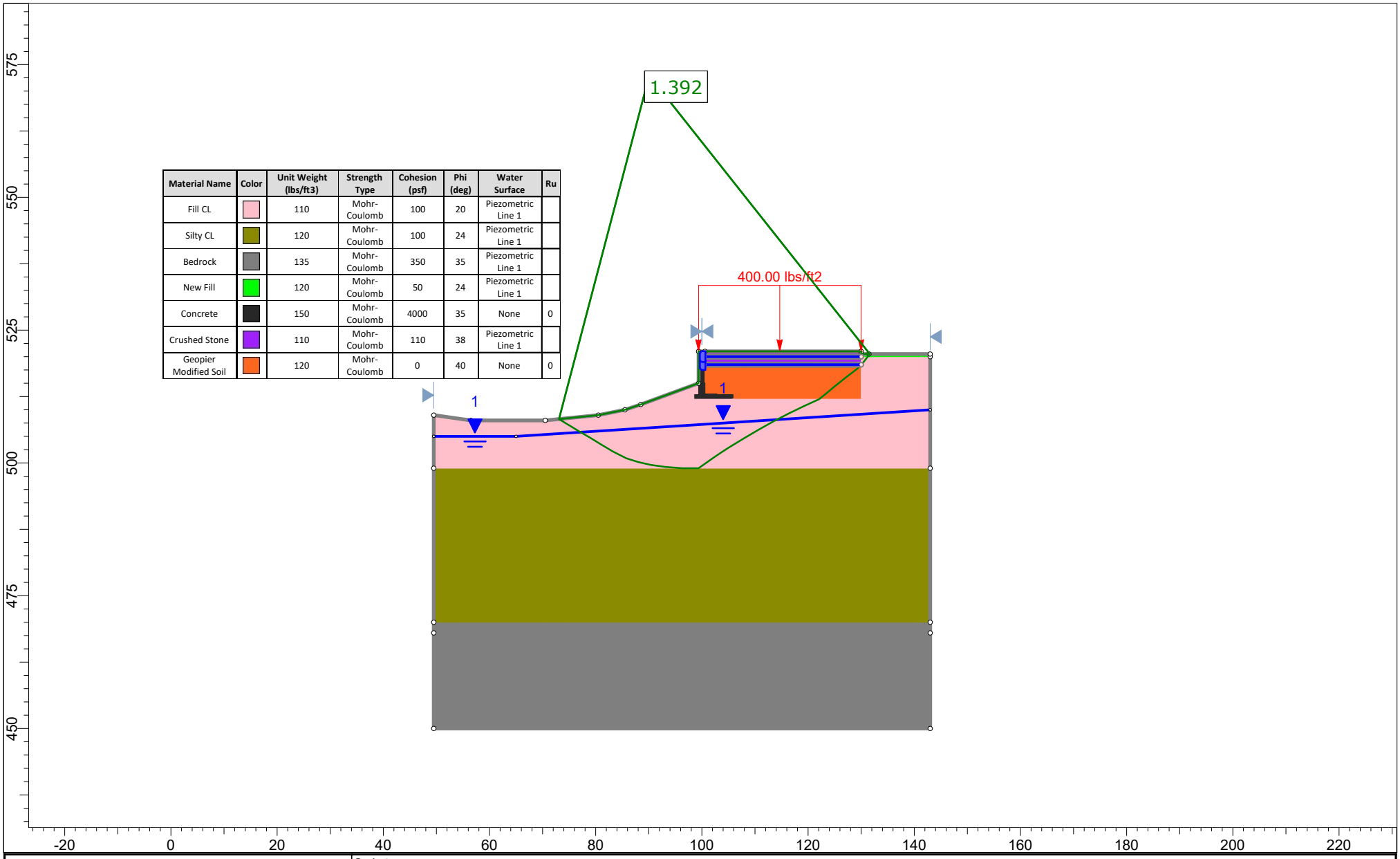
SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	Scenario	Master Scenario
Drawn By		Company	
Date	6/10/2020, 8:50:23 AM	File Name	Section A-A - Generator Loads, 1.4 FS.slmd

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	24	Piezometric Line 1	
Concrete		150	Mohr-Coulomb	4000	35	None	0
Crushed Stone		110	Mohr-Coulomb	110	38	Piezometric Line 1	
Geopier Modified Soil		120	Mohr-Coulomb	0	40	None	0



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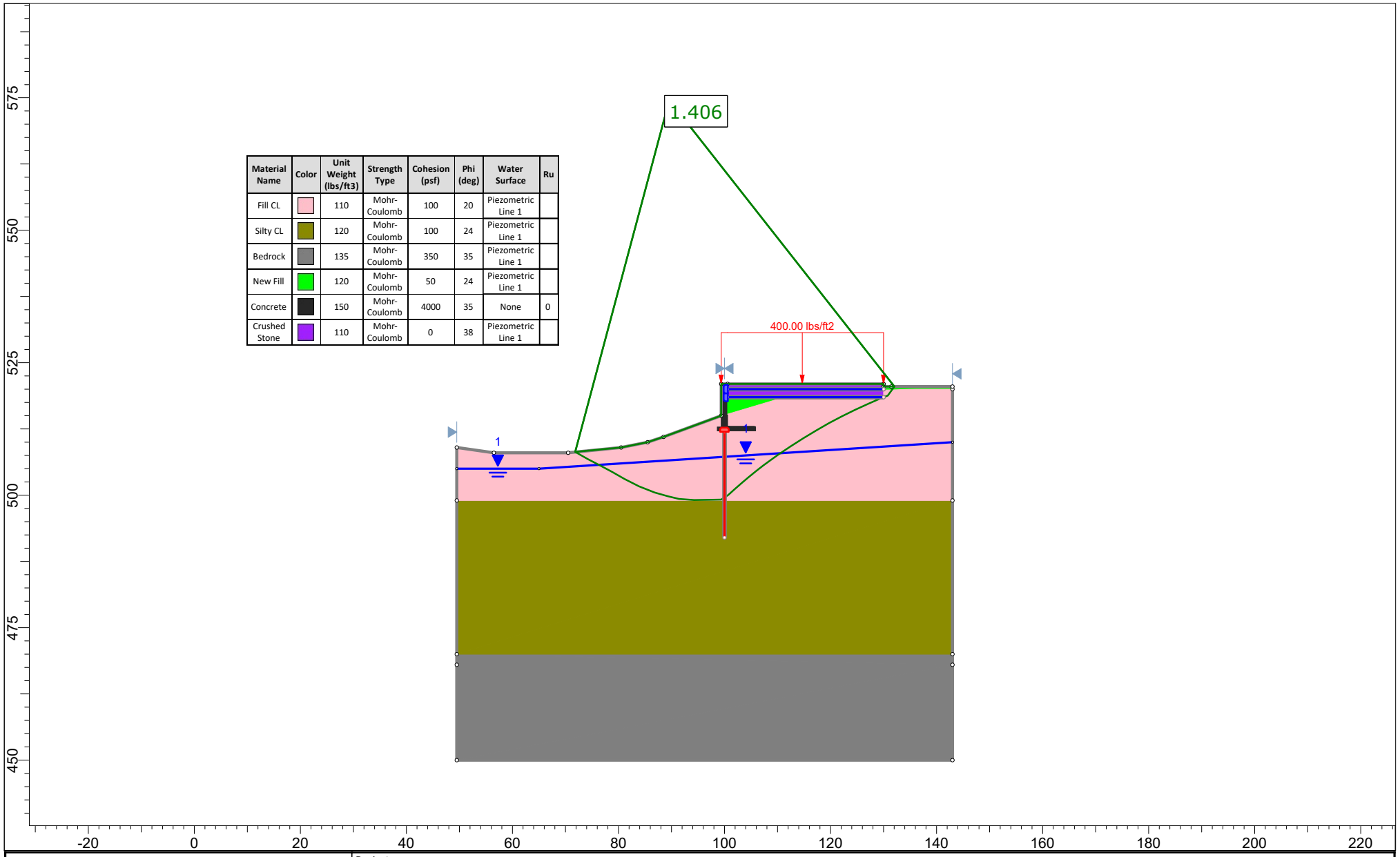
SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	*Scenario*	Master Scenario
Drawn By		*Company*	
Date	6/10/2020, 8:50:23 AM	*File Name*	Section A-A - Generator Loads - Geopiers.slmd

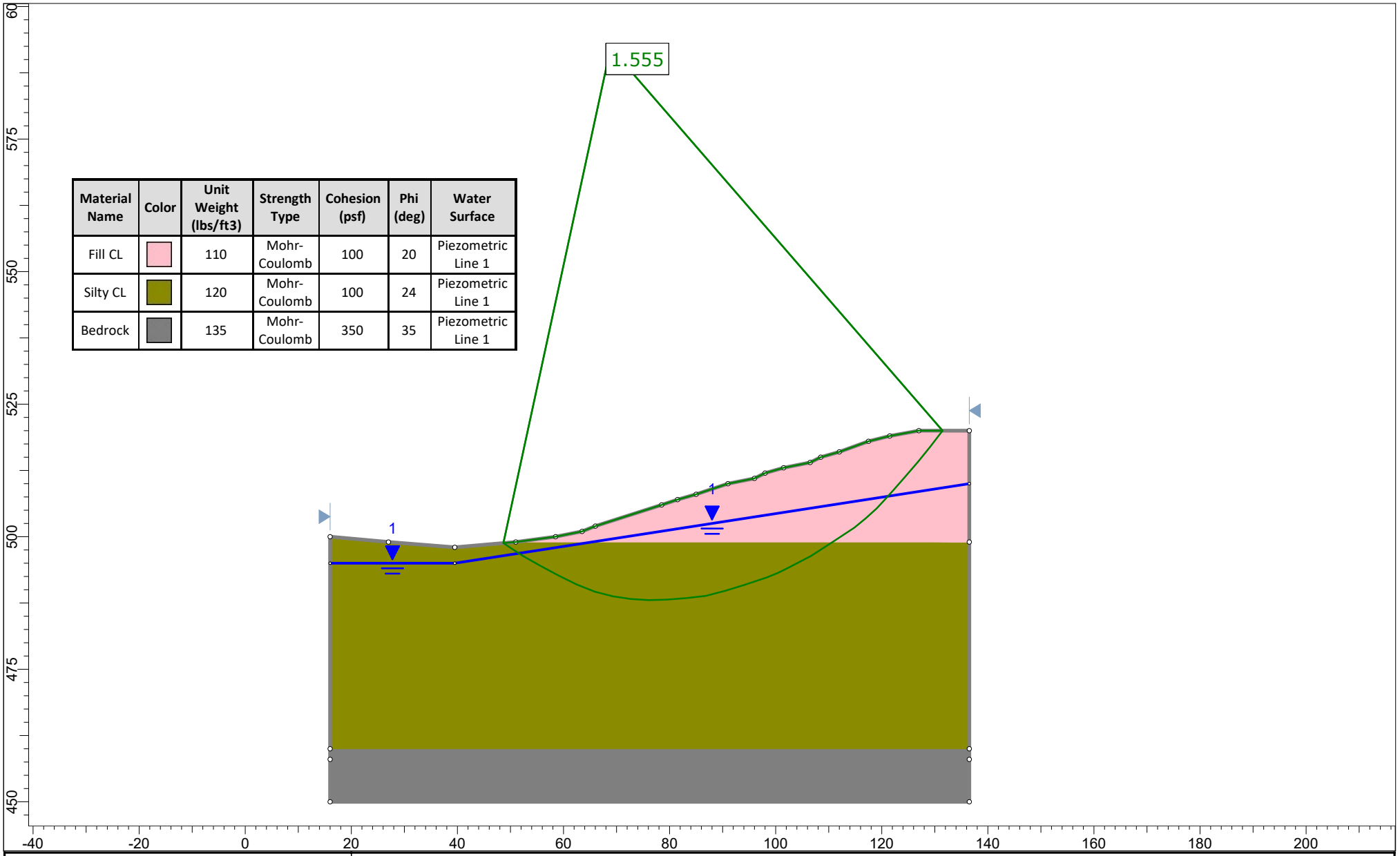
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	24	Piezometric Line 1	
Concrete		150	Mohr-Coulomb	4000	35	None	0
Crushed Stone		110	Mohr-Coulomb	0	38	Piezometric Line 1	



rocscience

SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	*Scenario*	Master Scenario
Drawn By		*Company*	
Date	6/10/2020, 8:50:23 AM	*File Name*	Section A-A - Generator Loads, 1.4 FS Piles.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1

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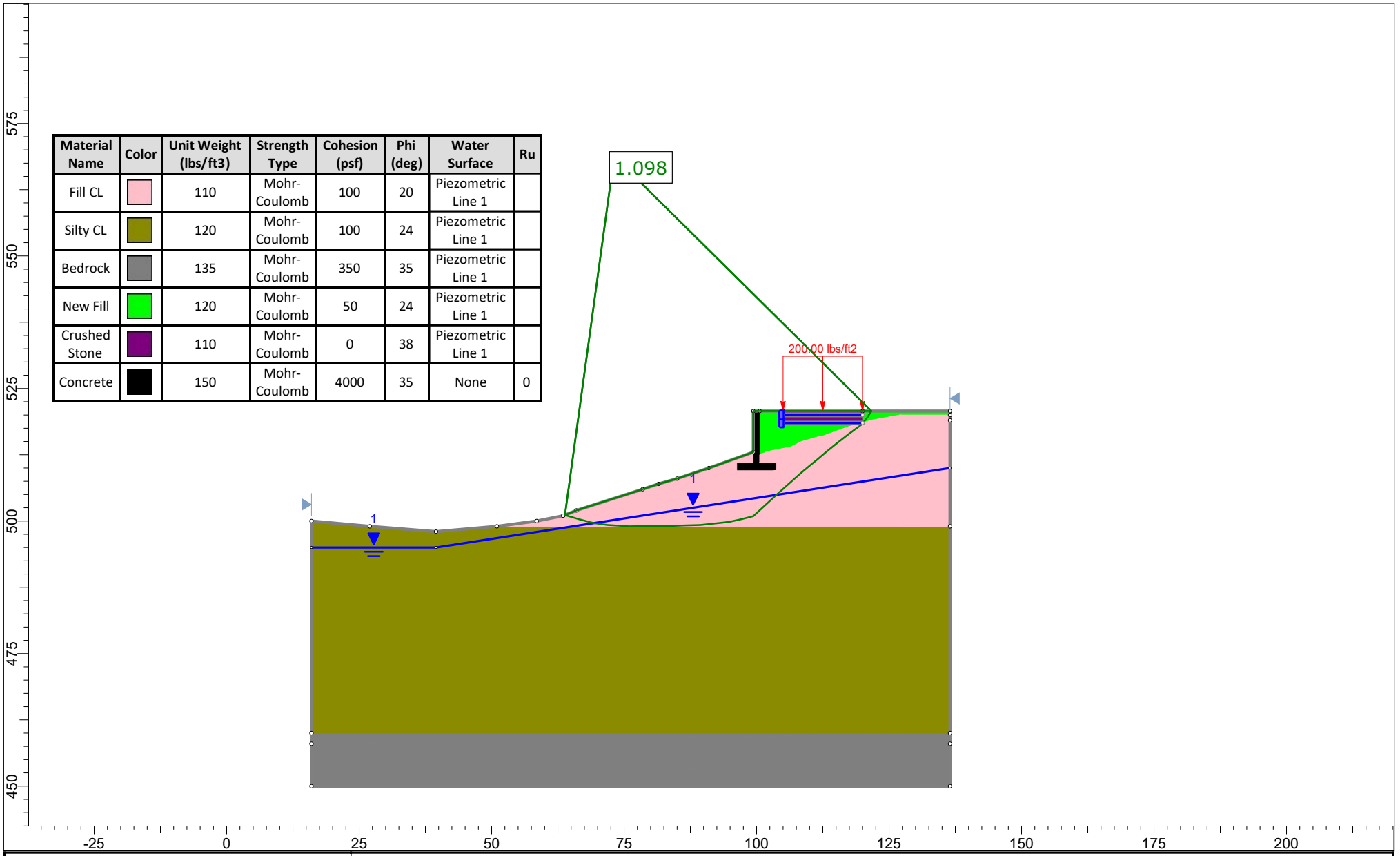
SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	*Scenario*	Master Scenario
Drawn By		*Company*	
Date	6/10/2020, 8:50:23 AM	*File Name*	Section B-B - Existing.slmd

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	24	Piezometric Line 1	
Crushed Stone		110	Mohr-Coulomb	0	38	Piezometric Line 1	
Concrete		150	Mohr-Coulomb	4000	35	None	0



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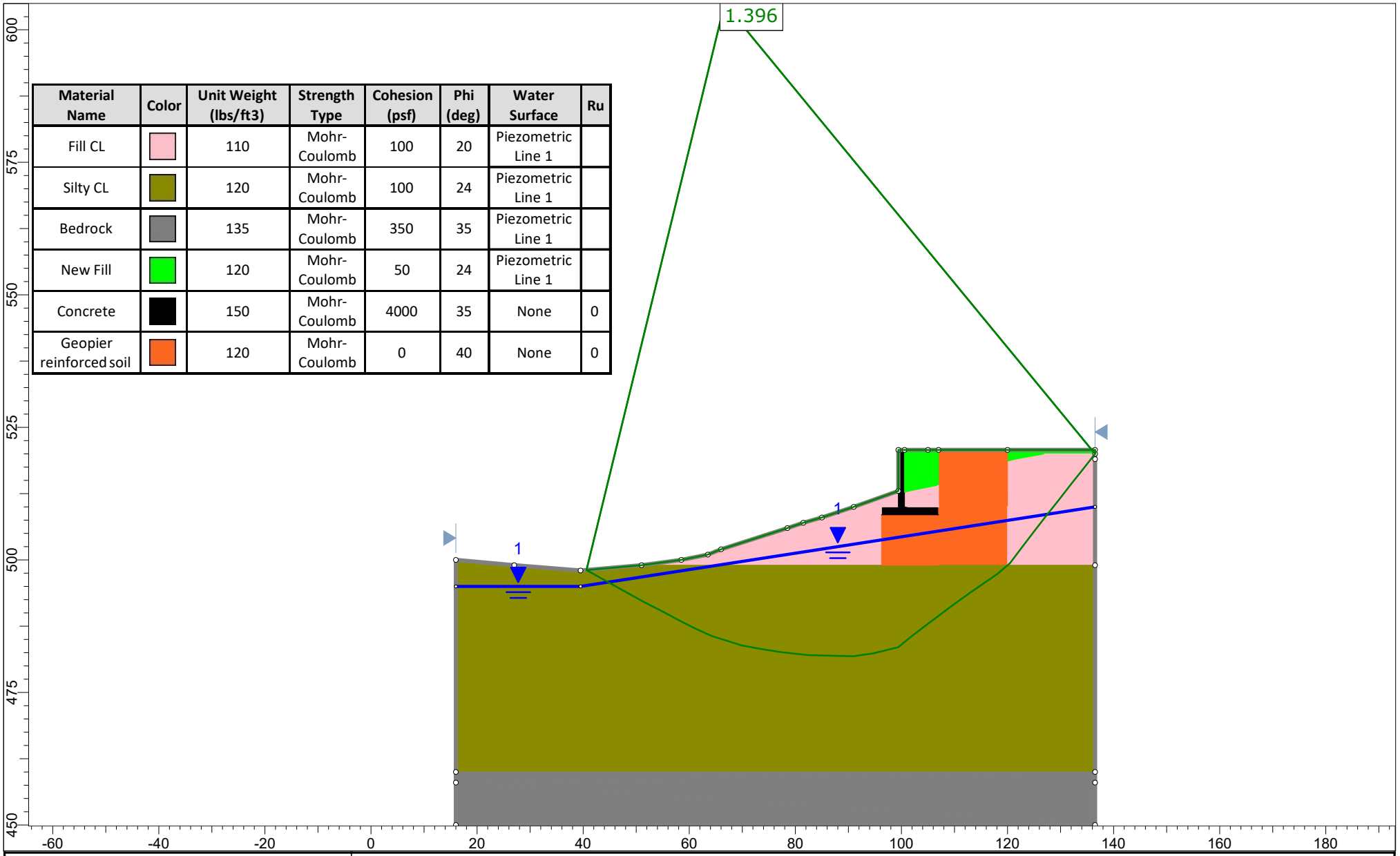
SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	Scenario	Master Scenario
Drawn By		Company	
Date	6/10/2020, 8:50:23 AM	File Name	Section B-B - Proposed.slmd

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	24	Piezometric Line 1	
Concrete		150	Mohr-Coulomb	4000	35	None	0
Geopier reinforced soil		120	Mohr-Coulomb	0	40	None	0



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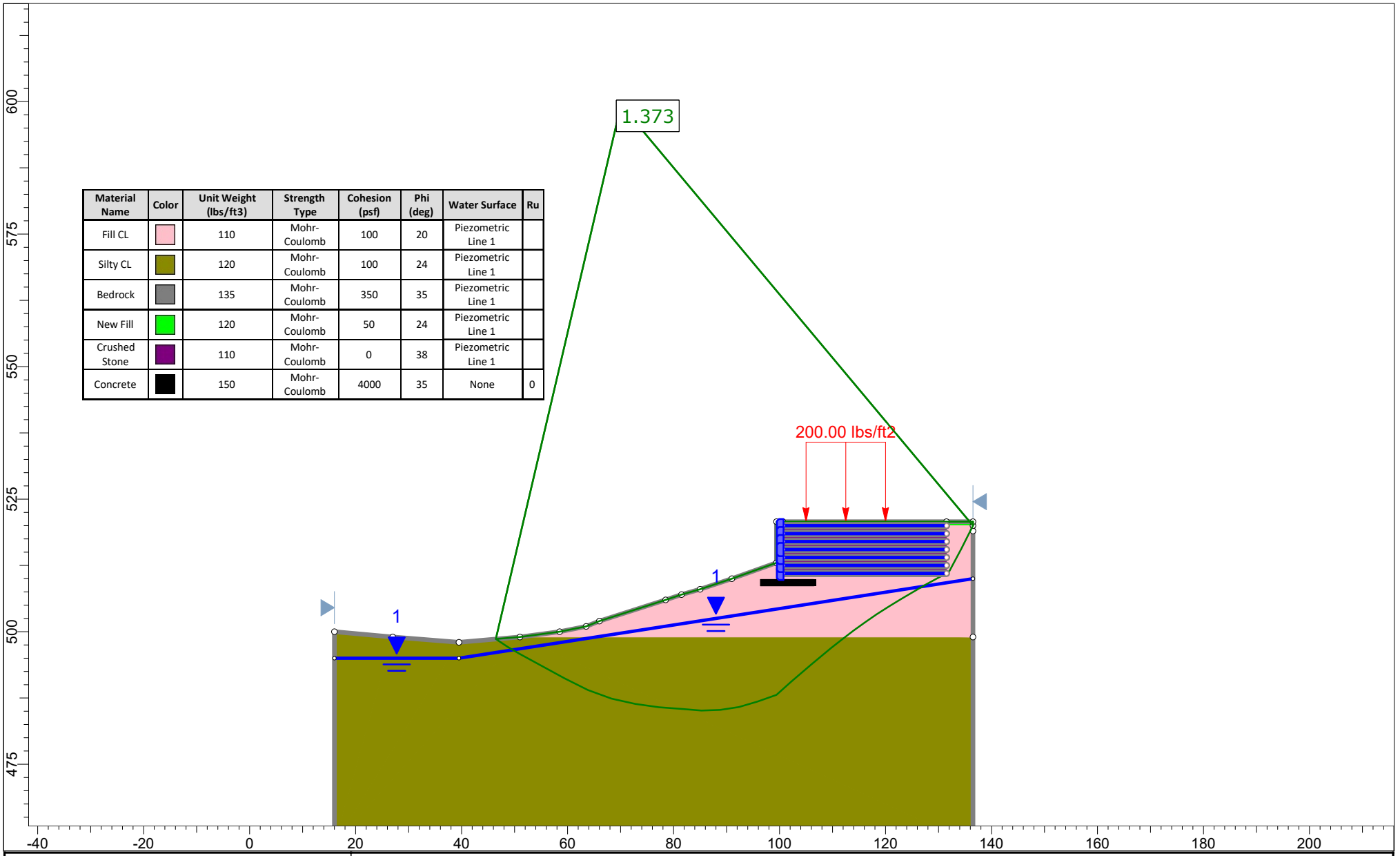
SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	Scenario	Master Scenario
Drawn By		Company	
Date	6/10/2020, 8:50:23 AM	File Name	Section B-B - No Loads.slmd

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	24	Piezometric Line 1	
Crushed Stone		110	Mohr-Coulomb	0	38	Piezometric Line 1	
Concrete		150	Mohr-Coulomb	4000	35	None	0



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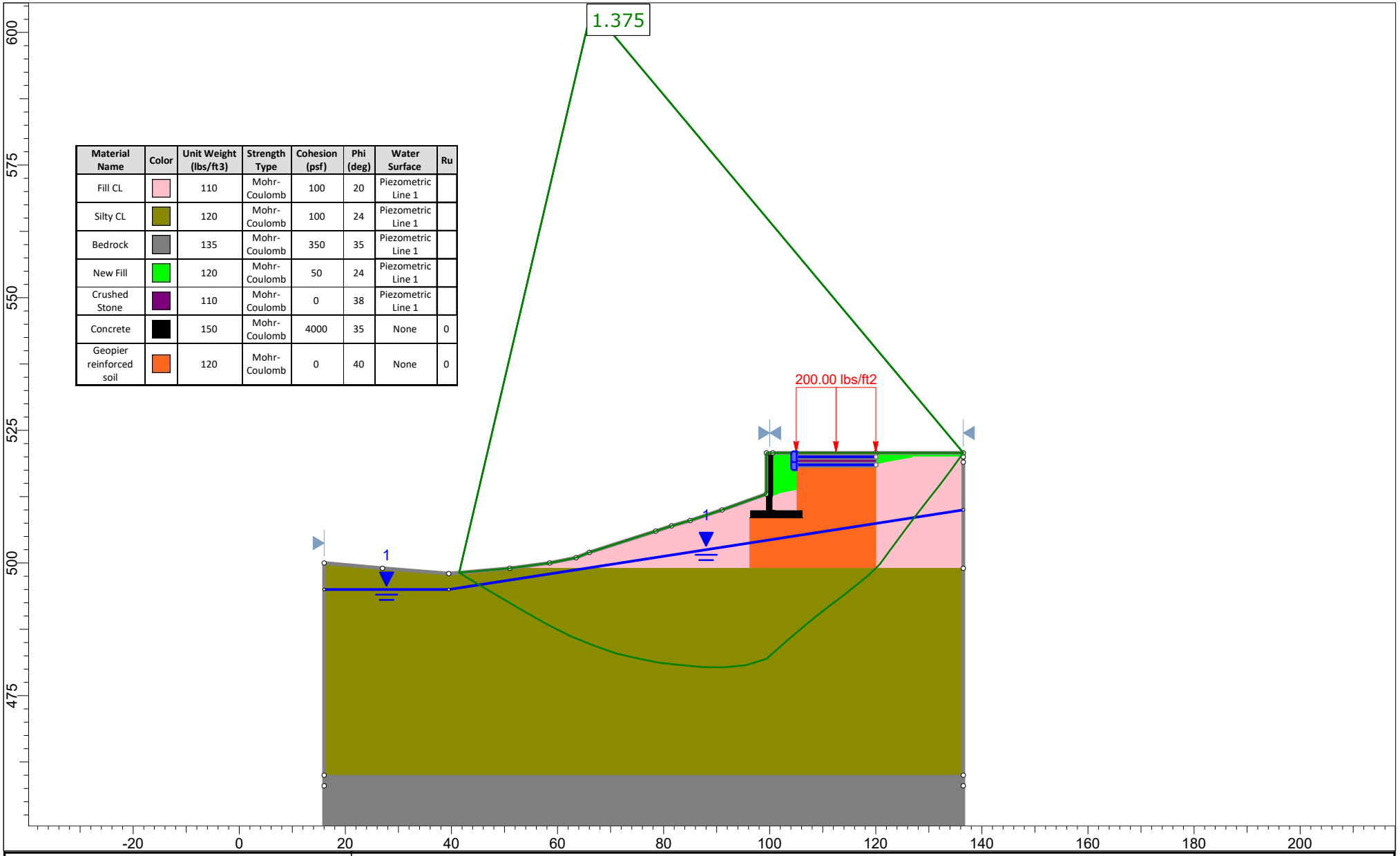
SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	Scenario	Master Scenario
Drawn By		Company	
Date	6/10/2020, 8:50:23 AM	File Name	Section B-B - Loads FS 1.4 Grids.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	24	Piezometric Line 1	
Crushed Stone		110	Mohr-Coulomb	0	38	Piezometric Line 1	
Concrete		150	Mohr-Coulomb	4000	35	None	0
Geopier reinforced soil		120	Mohr-Coulomb	0	40	None	0

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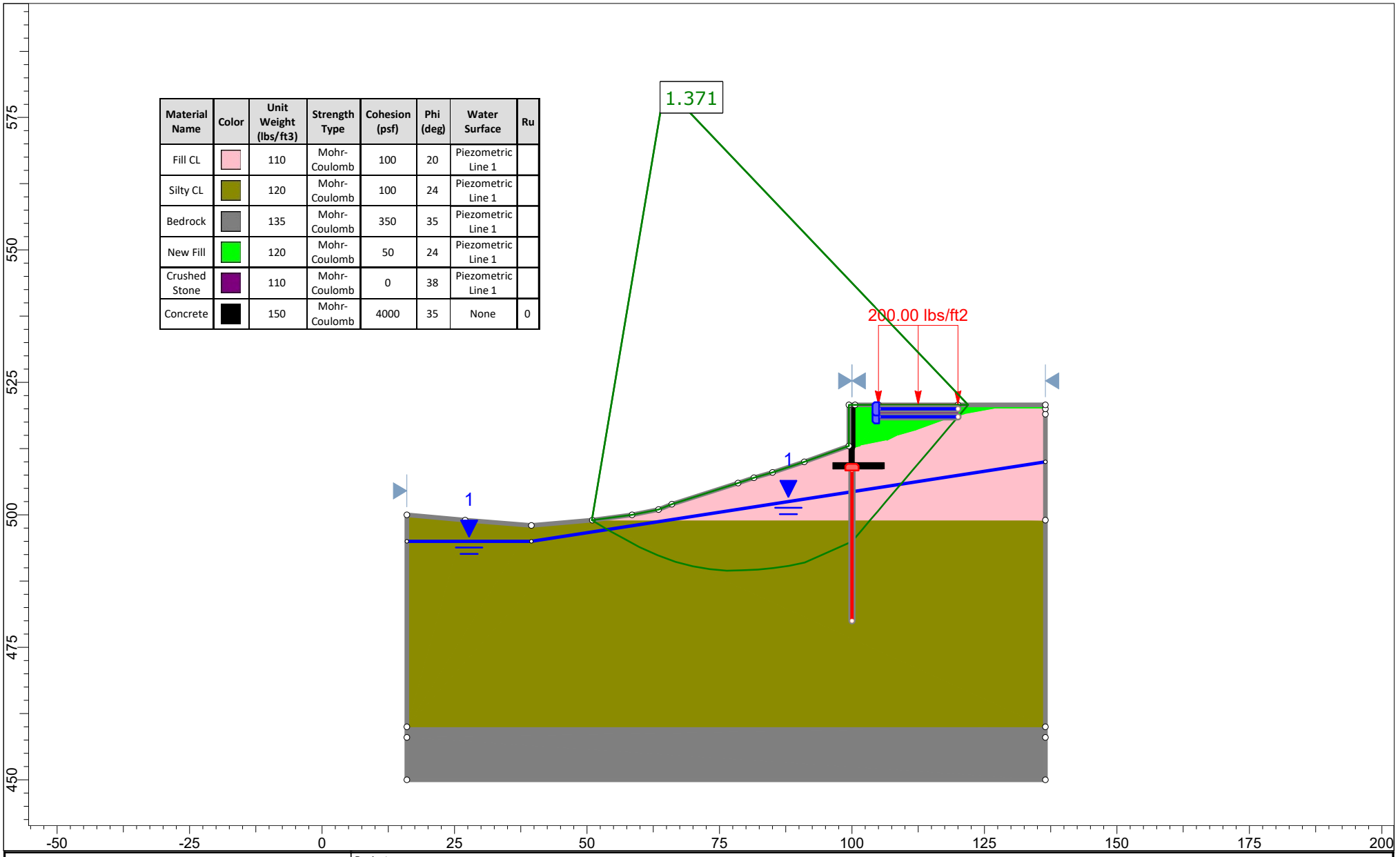
SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	*Scenario*	Master Scenario
Drawn By		*Company*	
Date	6/10/2020, 8:50:23 AM	*File Name*	Section B-B - Loads FS 1.4 piles.slmd

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	24	Piezometric Line 1	
Crushed Stone		110	Mohr-Coulomb	0	38	Piezometric Line 1	
Concrete		150	Mohr-Coulomb	4000	35	None	0



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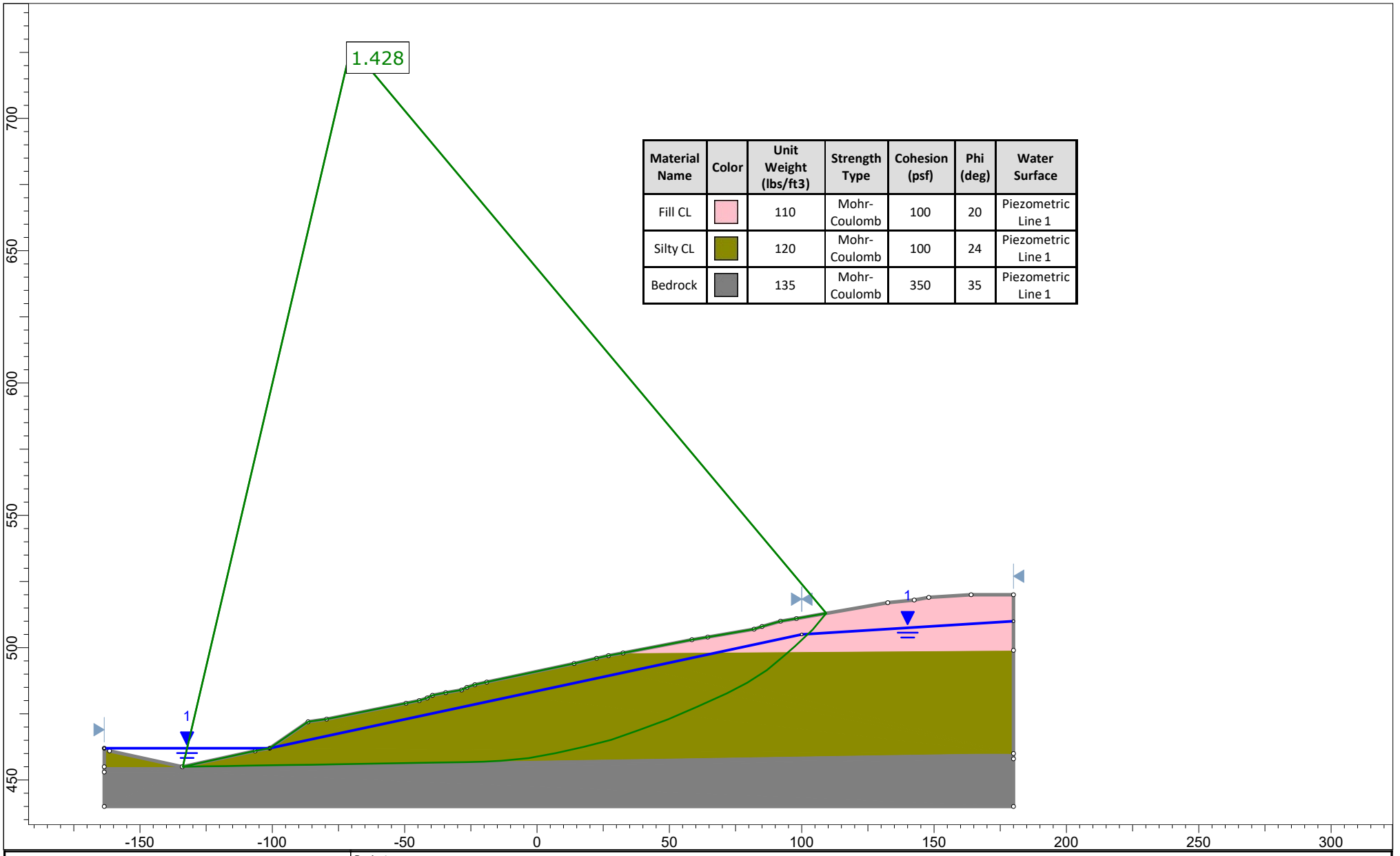
SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	Scenario	Master Scenario
Drawn By		Company	
Date	6/10/2020, 8:50:23 AM	File Name	Section B-B - Loads FS 1.4 piles.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1

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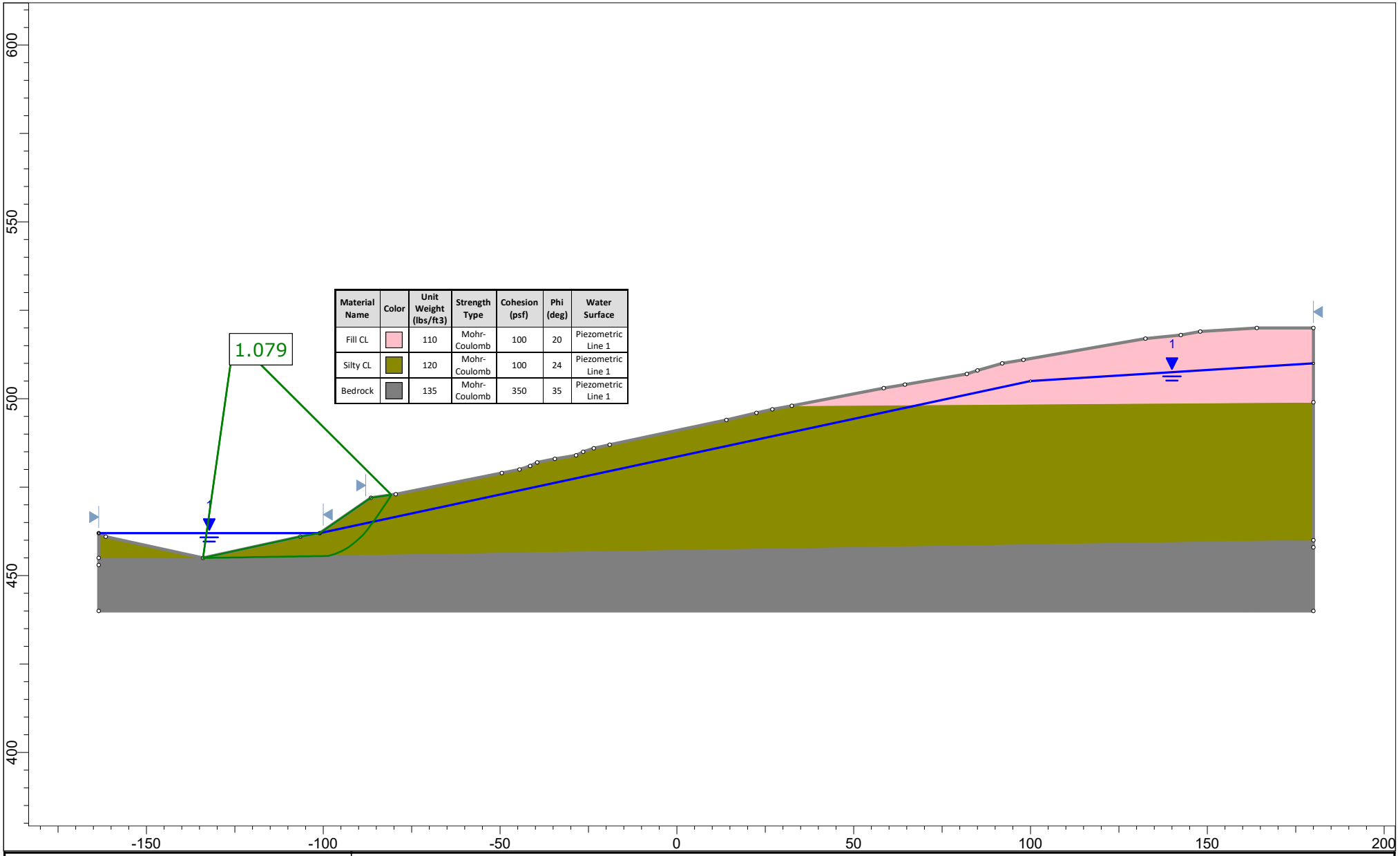
SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	*Scenario*	Master Scenario
Drawn By		*Company*	
Date	6/10/2020, 8:50:23 AM	*File Name*	Section C-C - Existing.slmd



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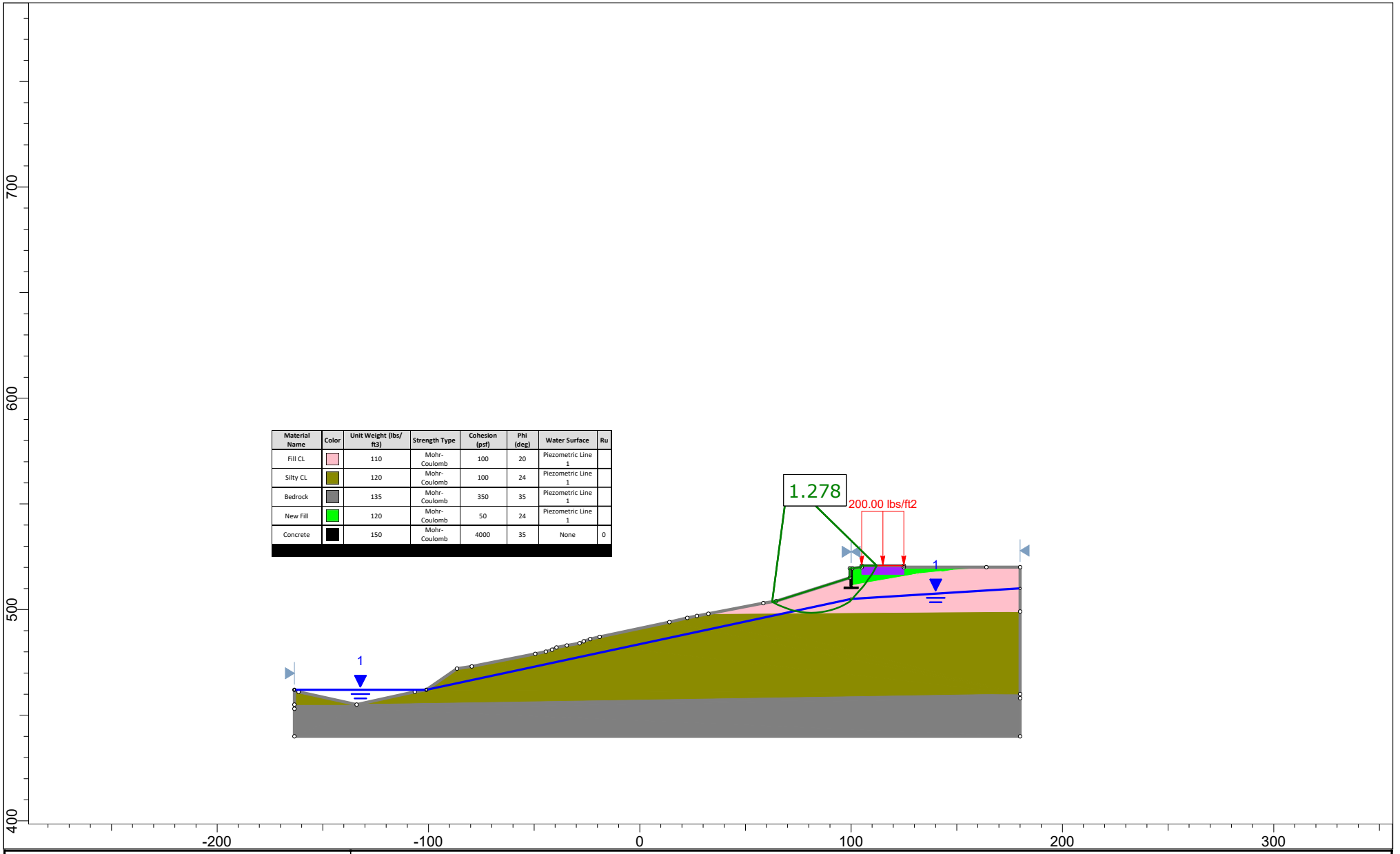
SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	Scenario	Master Scenario
Drawn By		Company	
Date	6/10/2020, 8:50:23 AM	File Name	Section C-C - Existing Overall.slmd

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	24	Piezometric Line 1	
Concrete		150	Mohr-Coulomb	4000	35	None	0



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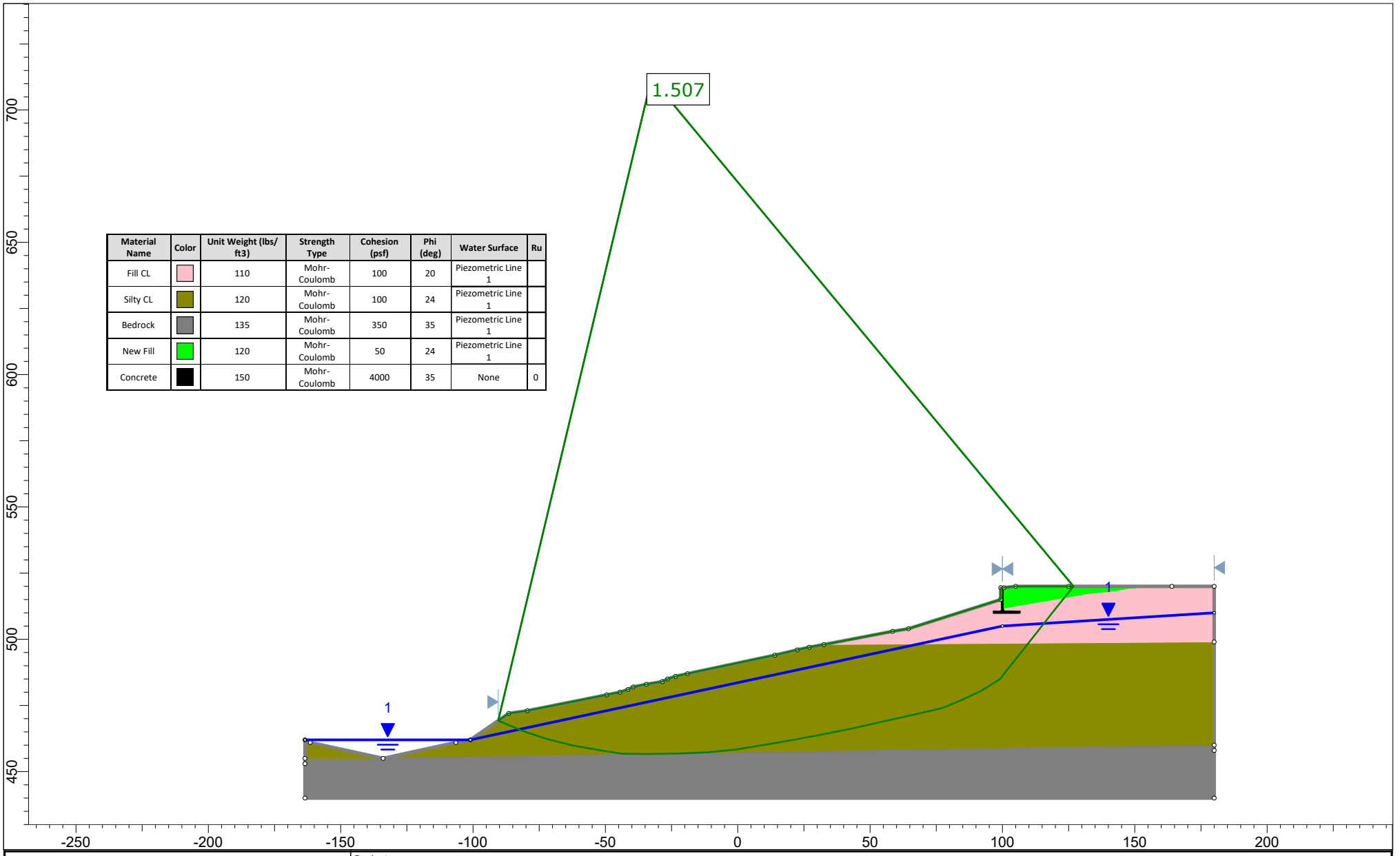
SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	Scenario	Master Scenario
Drawn By		Company	
Date	6/10/2020, 8:50:23 AM	File Name	Section C-C - Proposed.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	24	Piezometric Line 1	
Concrete		150	Mohr-Coulomb	4000	35	None	0

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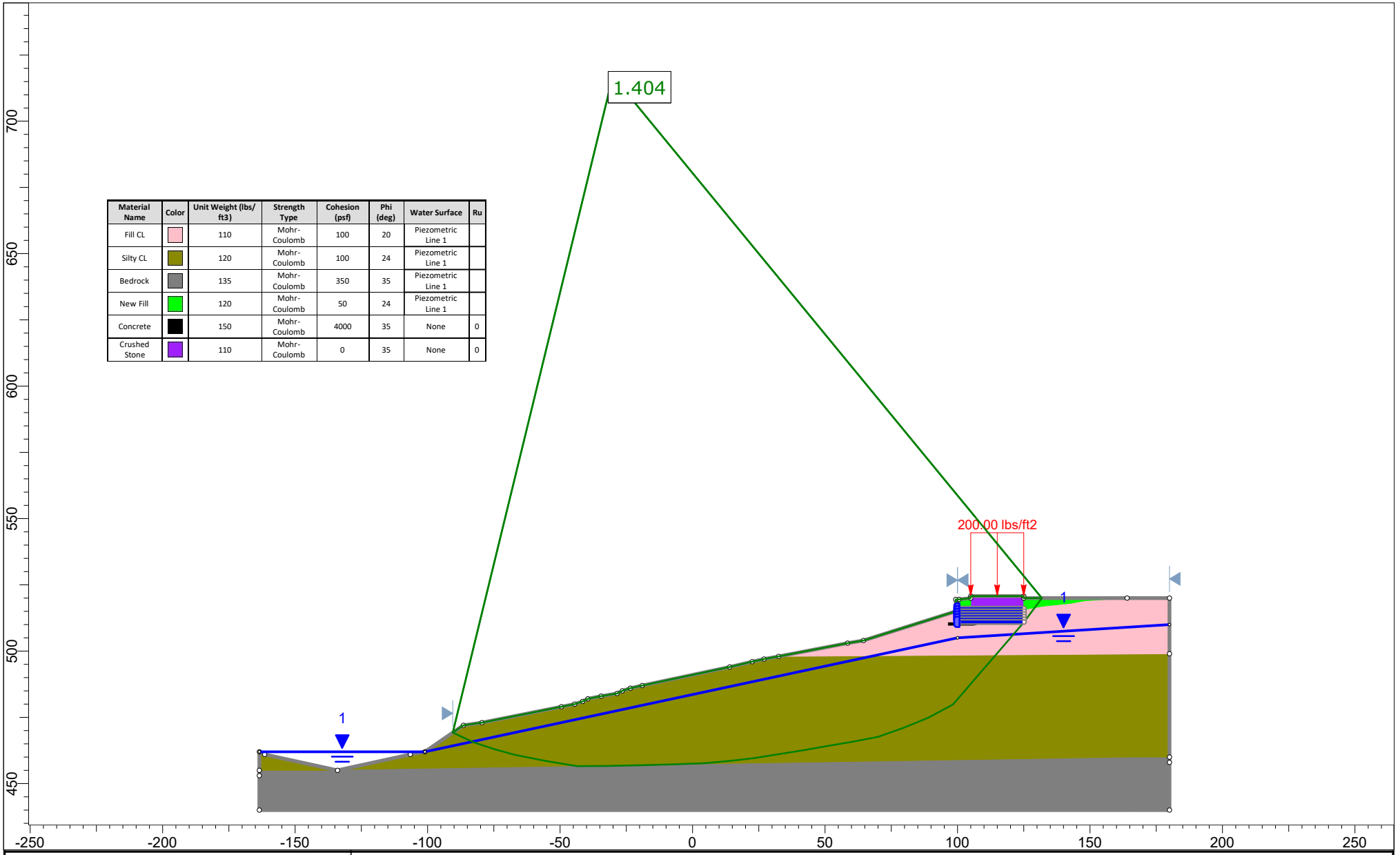
SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	*Scenario*	Master Scenario
Drawn By		*Company*	
Date	6/10/2020, 8:50:23 AM	*File Name*	Section C-C - no loads.slmd

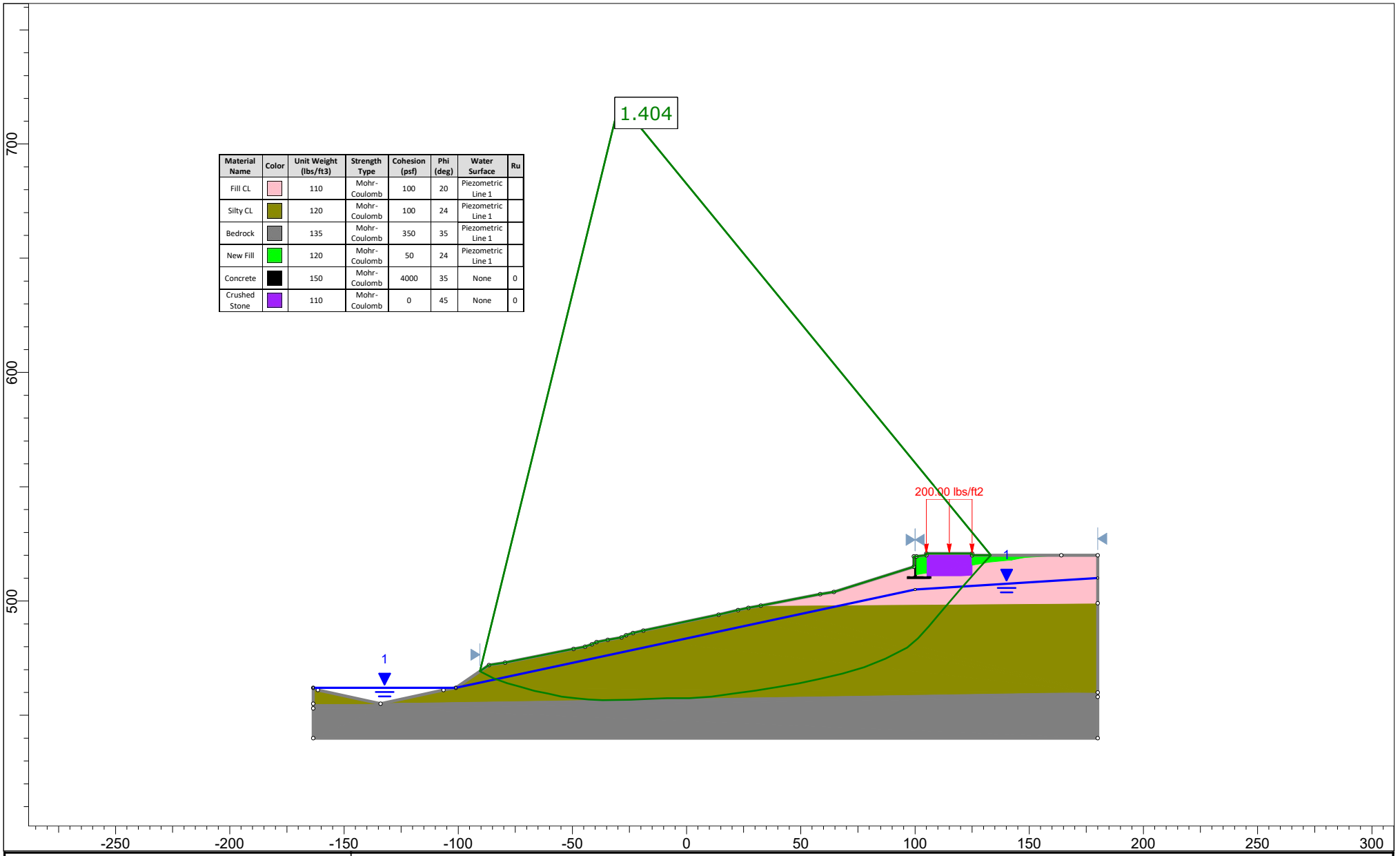
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	24	Piezometric Line 1	
Concrete		150	Mohr-Coulomb	4000	35	None	0
Crushed Stone		110	Mohr-Coulomb	0	35	None	0



rocscience

SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	Scenario	Master Scenario
Drawn By		Company	
Date	6/10/2020, 8:50:23 AM	File Name	grids, 1.4 FS.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	24	Piezometric Line 1	
Concrete		150	Mohr-Coulomb	4000	35	None	0
Crushed Stone		110	Mohr-Coulomb	0	45	None	0

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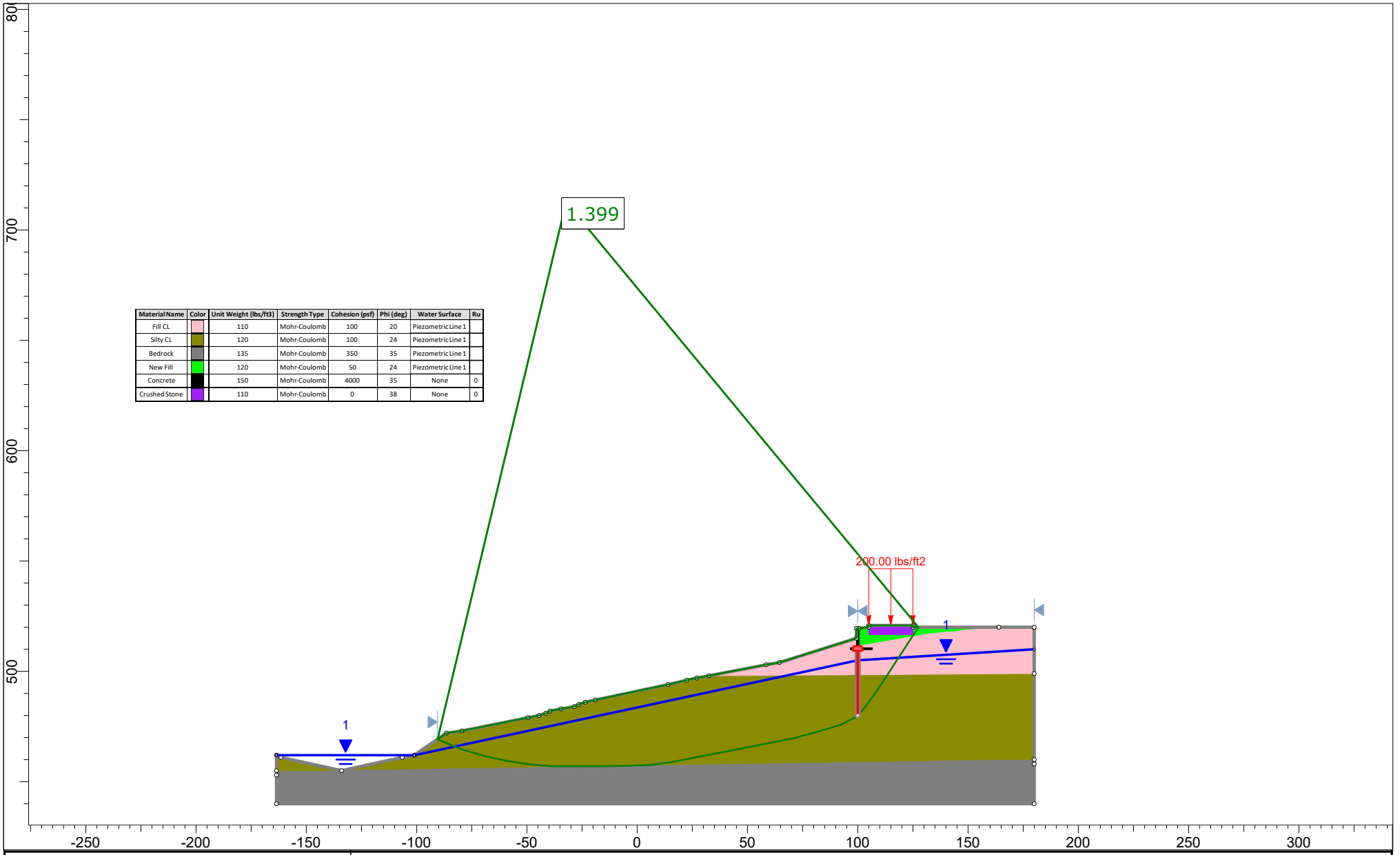
SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	*Scenario*	Master Scenario
Drawn By		*Company*	
Date	6/10/2020, 8:50:23 AM	*File Name*	Section C-C - Heel back with loads.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Fill CL		110	Mohr-Coulomb	100	20	Piezometric Line 1	
Silty CL		120	Mohr-Coulomb	100	24	Piezometric Line 1	
Bedrock		135	Mohr-Coulomb	350	35	Piezometric Line 1	
New Fill		120	Mohr-Coulomb	50	24	Piezometric Line 1	
Concrete		150	Mohr-Coulomb	4000	35	None	0
Crushed Stone		110	Mohr-Coulomb	0	38	None	0

rocscience

SLIDEINTERPRET 9.006

Project	SLIDE - An Interactive Slope Stability Program		
Group	Group 1	*Scenario*	Master Scenario
Drawn By		*Company*	
Date	6/10/2020, 8:50:23 AM	*File Name*	Section C-C - Proposed.slmd

Appendix C

Q&A from First Time Project was Bid

1. The plans show 3/8" Grade A36 steel for the columns. Is this a requirement or will it be left to the delegated designer to determine plate grade and thickness?

The structure design as detailed was performed by Valmont based on information provided by Duke Energy. The actual supplier/fabricator will need to confirm the design based on the criteria in the Specifications.

2. They are calling out the base plate size, thickness, and grade as well as the anchor bolt pattern as (12) 2-1/4" ø A615 bars with 6'-6" length on a 47" B.C. Is this a requirement we need to match or are these components going to be left to the delegated design to determine.

Same response as question 1.

3. The only line tensions provided at 10k/wire at NESC Heavy. Those are pretty heavy tensions for a 69kV structure. Can we confirm whether these are factored or unfactored?

Section 33 71 49, Overhead High Voltage Power Distribution, Part 1.3.E, Paragraph 1, has been changed to "3,000 lb, NESC heaving loading, per phase and static, factored."

4. The specifications list the allowable deflection as 6" max at 60°F. We will need the design tensions for the 60°F case in order to perform the desired deflection analysis.

Section 33 71 49, Overhead High Voltage Power Distribution, Part 1.3.E, Paragraph 4, has been revised to include the following "at 600 lbs."

5. Will the walk in switchgear building require perimeter ground grid?

Yes. The following note has been added to Drawing Sheet E-11: "Note: Install #3/0 bare CU counterpoise around building, with a ground rod at each corner of the building, and connected to the main switchgear ground bus."

6. Ref Sheet E-04. The duct bank running between the switchgear bldg. and filter bldg. is detailed per D3/E-14 and D4/E-14. Please explain detail D4/E-14 in the middle of the other detail; is this a mistake?

The conduits in D4 should match those in D3. On Sheet E-14, the detail for D4 has been changed to the following: six (6) conduits with Tag 2, one (1) conduit with Tag 7, and one (1) conduit with Tag 8.

7. Regarding the liquid filled transformers, the specified manufacturer ABB will not guarantee pricing nor lead time. Is it possible to make the two liquid filled transformers an allowance item as well as remove the liquidated damages?

The contract times for this project are now 730 days for substantial completion and 760 days for final completion per Specification Sections 00 11 13, 00 41 13, & 00 52 13.

Specification Section 00 73 01 Supplementary Conditions, Sub-Section 12.03. Delays (page 15 of 22) has been updated to specify "reasonably documented / unavoidable supply chain issues" and "delays caused by a Supplier" as a reason for authorizing a time extension.

8. Note, the generator lead time and switchgear buildings are likely to exceed the number of days allowed for completion per the contract.

The contract times for this project are now 730 days for substantial completion and 760 days for final completion per Specification Sections 00 11 13, 00 41 13, & 00 52 13.

Specification Section 00 73 01 Supplementary Conditions, Sub-Section 12.03. Delays (page 15 of 22) has been updated to specify "reasonably documented / unavoidable supply chain issues" and "delays caused by a Supplier" as a reason for authorizing a time extension.

9. Ref Sheet E-14 Detail 2.

A. Is rebar required for all duct banks even when not under roadways?

B. Are all vertical elbows required to be rigid galvanized steel and are these to be PVC coated?

Vertical elbows are required to be PVC coated aluminum per Specification 26 05 33, Raceways. Drawing Sheet E-14, Electrical Details, Typical Ductbank Construction Detail, Ductbank Notes, the note referring to duct banks running under roadways has been deleted. Specification Section 26 05 33, Raceways, Part 3, Subpart 3.02.A, paragraph j, the following was added "and at all underground to above-grade transitions."

10. Regarding the existing SS transformer, should we assume the PCB levels are above or below 49 mg?

This information is not known. Bids shall include either condition.

11. Reference plan C-01. Please advise what material to be installed between the Existing Chemical Building and the light and heavy-duty concrete paving.

The area adjacent to concrete drive shall be crushed stone surface. See Detail C-07 – L (There are no lawn areas / maintenance within the substation fence.

12. Reference allowance for the gas line indicated on plan page C-02 & C-03. Has this gas line been scheduled to be relocated? If so when is the gas line schedule to be relocated?

The gas line has not been scheduled to be relocated. This will be the responsibility of the Contractor for this project.

13. Reference allowance for the gas line 01 21 00. "Duke Energy Gas Line Relocation Charges" $2,000.00. Please confirm this allowance cover all cost for Duke Energy to remove the existing gas line and to reinstall the new gas line as indicated on the plans.

The amount listed in the allowance is the amount provided by Duke to relocate the gas line.

14. Reference plan S-03 Note 1 aggregate piers. The design contractor has raised concerns that they are unable to get to the required safety factor with the currently provided geotechnical information and that this may be more suited for drilled concrete shafts. Please advise if additional information is available or if there are requirements for drilled concrete shafts.

There are currently no recommendations specific to drilled shafts within this project. The Aggregate Pier Ground Improvements have been added as an allowance item in Specification Sections 01 21 00, Allowances, Part 1.01 and in Specification Section 00 41 13 Bid Disclosure Form, Bid Form.

15. Reference plan page C-02, Note # 2. "Existing gas line to be disconnected at both ends and removed in project area and abandoned in place outside of work area – coordinate with approved gas line contractor and occupants to insure service outage does not disrupt operations". Spec section 01 21 00 section C states " The work to be performed by Duke energy for the gas line relocation is detailed on Drawing C-03". Please confirm that Duke Energy is the approved gas line contractor to complete all gas line work. Please also indicate what operations may not be disrupted by the gas line work at the plant.

Duke Energy is the approved gas line contractor to complete all gas line work. Shutdown of the equipment served by the gas line will be permitted but must be coordinated two weeks in advance per Specification 01 15 00, Work Sequence.

16. In Reference to question [#12] that we submitted, If the gas line relocation has not been scheduled, please consider doing so now. Once the relocation is scheduled, what is the current lead time? We have run into long lead times on this with other projects.

Scheduling of the gas line relocation is the responsibility of the Contractor for this project. The contract times for this project are now 730 days for substantial completion and 760 days for final completion per Specification Sections 00 11 13, 00 41 13, & 00 52 13.

17. Section 1/S-04 indicates the transformer pad as 4'-0" Thick. 2/E-13 indicates anchor bolts for the mast to be 6'-6" Long with 9.5" projections. This means that the bolts will be embedded into the concrete 5'-8 ½". The pad is only 4'-0" Thick. Please revise pad thickness to accept the anchor bolts.

The final length of the anchor bolts will be determined during shop drawing review. The depth of the pad will be adjusted as required at that time. Please bid as shown.

18. Spec. Section 033000-Page 16 states a "Smoothed Rubbed Finish" for exposed to view. This will increase the cost of the retaining wall drastically. The project consists of a retaining wall for an Emergency Generator Assembly at a Water Treatment Facility that faces the rear of the project which is wooded. The wall will not be exposed to the immediate public. Is a smooth rubbed truly required/desired? Typically, a project similar to this with the same functionality would consist of a Surface Finish-2.0 (SF-2.0) with a Class B Surface Tolerance, not rubbed/architectural looking wall (Reference ACI Specs/Tolerances). Please advise if a smooth formed/rubbed finish is required or if a smooth formed Surface Finish-2.0 (SF-2.0) with a Class B Surface Tolerance is acceptable?

Section 03 30 00 Cast-in-Place Concrete subpart 3.3F, paragraph 1, now indicates that the finish type for exposed concrete sufaces shall be "Smooth form finish."

19. Spec. Section 033000-Page 4-Section 5-e. states "Provide rubber plug type water stops at interior ties holes; exterior tie holes shall be patched per concrete repair procedure herein". Please confirm this spec, does not apply for this project, as this is an exterior retaining wall, not a foundation wall interior finish space or water holding structure.

Section 03 30 00 Cast-in-Place Concrete subpart 2.1.A.5, has been updated to remove the section referring to rubber plug type water stops.

20. Spec. Section 033000-Page 19-Section 3.4-D & E Crack Repairs & Misc. Repairs. Please confirm crack injection/repair is not required on this project. This is not a water holding structure and is a retaining wall that is exposed to the exterior conditions, expansion, and contraction. This is a reinforced concrete retaining wall with control joints. This wall will crack, in which control joints are placed to localize the cracking.

Section 03 30 00 Cast-in-Place Concrete no longer contains a section on Crack Repairs & Misc. Repairs.

Northern Kentucky Water District

REMAINING PORTIONS SUBMITTED
FOR CONFIDENTIAL TREATMENT
PURSUANT TO 807 KAR 5:001, SECTION 13

EXHIBIT A-6

ADDENDA

ADDENDUM NO. 1
TAYLOR MILL TREATMENT PLANT EMERGENCY GENERATOR – PHASE 1 OF WX21117210
NORTHERN KENTUCKY WATER DISTRICT **March 29, 2023**

This Addendum forms a part of the Contract documents and modifies the original Bidding Documents.

REVISIONS TO SPECIFICATIONS – NEW SALES TAX EXEMPTION UNDER KENTUCKY HOUSE BILL 360

Item No. AD1-1

Effective as of January 1, 2023, building materials, fixtures, or supplies purchased by contractors of the Northern Kentucky Water District which will be permanently incorporated into a structure or improvement to real property, or will be completely consumed, in fulfilling a construction contract for the purpose of furnishing water or sewer services to the general public are exempt from sales tax by KRS 139.480.

Contractor agrees that the Contract price for this project shall not include sales tax on exempt building materials, fixtures, or supplies.

END ADDENDUM NO. 1

ADDENDUM NO. 2
Taylor Mill Treatment Plant Emergency Generator
Phase 1 of WX21117210
608 Grand Avenue
Taylor Mill, Kentucky 41015

TO: All Planholders

PROJECT: Taylor Mill Treatment Plant Emergency Generator
Phase 1 of WX21117210

Northern Kentucky Water District
2835 Crescent Spring Road
Erlanger, Kentucky 41018-0640
Bid Date: April 6, 2023 at 2:00 pm (local)

DATE: March 30, 2023

SUBJECT: Revisions to Contract Documents

SPECIFICATION REVISIONS:

1. Section 00 41 13, Bid Form, Table 1 – Base and Alternate Manufacturers, Item 2, Standby Power Generation Systems, Fixed, add Cummins as a base bid manufacturer.

2. Section 00 52 13, Agreement, Part 3.1, change 730 days to 900 days. Change 760 days to 930 days.

3. Table of Contents, delete Section 32 12 16, Asphalt Paving.

4. Section 26 32 13 Standby Power Generation Systems, Fixed, Part 2.03.A, first sentence, change 78.2 dB(A) to 81 dB9A).

DRAWING REVISIONS:

1. Sheet E-09, Filter Building Elevations, Keynote 10, change to the following:
   Install support channel for conduits. Support the channel from the brick wall to the right of the spandrel panel and extend to the area behind the conduit. Move downspout out from wall to extend in front of the support channel.

END OF ADDENDUM NO. 2

ADDENDUM NO. 3
Taylor Mill Treatment Plant Emergency Generator
Phase 1 of WX21117210
608 Grand Avenue
Taylor Mill, Kentucky 41015

TO: All Planholders

PROJECT: Taylor Mill Treatment Plant Emergency Generator
Phase 1 of WX21117210

Northern Kentucky Water District
2835 Crescent Spring Road
Erlanger, Kentucky 41018-0640
Bid Date: April 6, 2023 at 2:00 pm (local)

DATE: March 31, 2023

SUBJECT: Revisions to Contract Documents

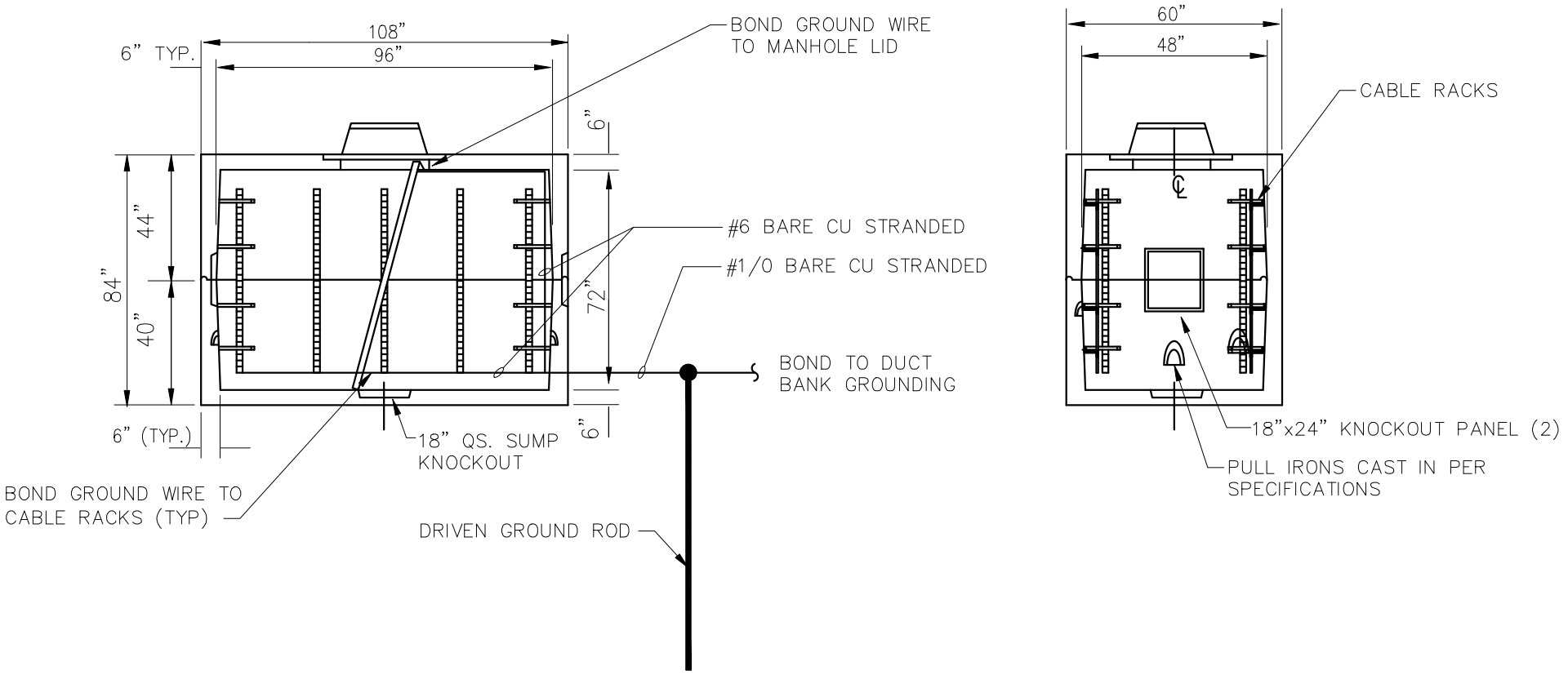
SPECIFICATION REVISIONS:

DRAWING REVISIONS:

1. Sheet E-04, Electrical Site Plan, Keynote 5, change to UNDERGROUND MANHOLE, SEE DETAIL ON SHEET E-14.

2. Sheet E-14, add the attached detail, Utility Manhole.

END OF ADDENDUM NO. 3



UTILITY MANHOLE

NOT TO SCALE

STRUCTURE SHALL BE DESIGNED FOR A WHEEL LOAD OF 33 KIPS (33,000 LBS.) SHOP DRAWINGS AND DESIGN CALCULATIONS SHALL BE PROVIDED BY CONTRACTOR AND STAMPED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF KENTUCKY. CASTING SHALL BE IN ACCORDANCE WITH AASHTO M-306-07 REQUIREMENTS.

EXHIBIT B

APPROVALS AND PERMITS
(Franchises, Plan Review and Permit Status, Easements, Right-of-Ways, Construction Start and In-Service Date, Plant Retirements)

APPROVALS AND PERMITS
SUMMARY SHEET

Franchises required – None

Plan Review and Permit Status - The District has reviewed and approved the Plans and Specifications prepared by Magna Engineers, titled "Taylor Mill Treatment Plant Emergency Generator Phase 1 of WX21117210" dated March 2023, digitally 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.

Estimated Start date of construction – August 2023

Proposed date in service – September 2025

Plant retirements – There are no retirements as a result of this project.

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

November 15, 2022

Kyle Ryan, P.E.
Northern KY Water District
2835 Crescent Springs Rd
P.O. Box 18640
Erlanger, KY 41018

RE: Taylor Mill Treatment Plant
Emergency Generator (Phase 1)
F20-044
Campbell County, KY
Northern KY Water District
AI #: 2485, FGL20200008,
APE20200003

Dear Mr. Ryan:

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. The plans consist of a new 7.5 MVA, 69 KV x 2400V substation, 2000 KW, 2400 V standby diesel generator, 2400 V switchgear, 500 KVA, 2400 V x 480/227 V transformer, associated structures, cabling, terminations, and SCADA system monitoring. 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.

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.

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 agreement. If we can be of further assistance, please call Mike Snyder, at (502) 782-1235.

Sincerely,

Terry Humphries, P.E.
Supervisor, Engineering Section
Water Infrastructure Branch
Division of Water

TH:MS
Enclosures

Eligible List, Ineligible List, Approval Conditions
Project Review and Cost Summary Form
1 set plans and specification

C: Magna Engineers
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.

SRF INELIGIBLE ITEMS:

No ineligible items.

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	

EXHIBIT C

BID INFORMATION AND BOARD APPROVAL

EXHIBIT C-1

BID TABULATION

BID TAB

Northern Kentucky Water District
Taylor Mill Treatment Plant Emergency Generator - Phase 1 of WX21117210
April 6, 2023

CONTRACTOR	AMOUNT Non-SRF Scenario	AMOUNT SRF Scenario
Glenwood Electric Inc.	$6,699,500.00	$6,937,500.00
ESI, Inc.	$7,985,709.00	$8,034,709.00

4/13/23

EXHIBIT C-2

ENGINEER'S RECOMMENDATION OF AWARD

Magna ENGINEERS
Electrical • Mechanical • Instrumentation

April 13, 2023

Mr. Kyle Ryan
Northern Kentucky Water District
2835 Crescent Springs Road
P.O. Box 18640
Erlanger, KY 41018

RE: Award Recommendation
Taylor Mill Treatment Plant Emergency Generator - Phase 1 of WX21117210

Dear Mr. Ryan:

We have reviewed the two bids received on April 6, 2023 for the subject project.

Upon review of the bids received, and documents attached thereto, we recommend award to the apparent low bidder, Glenwood Electric, Inc., in the amount of $6,937,500.00 for Alternate 1, SRF Funding.

- The Engineer's estimate was $5,635,504.00. Although the bid exceeded the engineer's estimate, Magna Engineers and District staff have reviewed the bids and they appear to be reasonable and competitive. It is apparent after completing this review that the engineer's estimate did not accurately escalate the costs of various work items to account for recent increases in material and labor prices. Additionally, with current supply chain issues and long lead times on materials and equipment, vendors will not guarantee pricing. Because material and equipment costs are likely to continue to escalate between now and when the contractor can lock in pricing, contractors are inflating their bid prices to account for this risk.

Glenwood Electric's bid included deducts for alternates for the generator and for the generator paralleling switchgear. The alternate manufacturer listed for the generator is Generac. The alternate manufacturer listed for the paralleling switchgear is Cummins. We do not recommend accepting either alternate. Our research shows that for the specified KW rating, the Generac equipment does not have an SKVA rating which is equal to the base bid manufacturers. For the paralleling switchgear, our research shows that the Cummins switchgear does not include hardwired controls and monitoring in addition to the PLC based controls. The hardwired controls allow the system to continue to function in the event of a failure of the PLC and/or OIT.

Thank you for the opportunity to work with you on this project. If you have any questions, or need additional information, please do not hesitate to call.

Sincerely,

T. Michelle Howlett, P.E. LEED AP
President

Enclosures

EXHIBIT C-3

BOARD MEETING MINUTES

Northern Kentucky Water District
Board of Commissioners
Regular Meeting
April 20, 2023

A regular meeting of the Board of Commissioners of the Northern Kentucky Water District was held on April 20, 2023 at the District's facility located at 2835 Crescent Springs Road in Erlanger, Kentucky and via video teleconference in accordance with KRS 61.826. All Commissioners were present. Also present were Lindsey Rechtin, Amy Stoffer, Stacey Kampsen, Tom Edge, Kim Clemons, Chris Bryant, Kristin Leadingham, Jason Miller, Mike Flynn, Matt Piccirillo, Mark Raffenberg, Steve Broering, Jenna Bareswilt, Kyle Ryan, Barry Miller, Fred Macke and Adam Smith.

Commissioner Koester called the meeting to order at 12:00 p.m., and Amy Stoffer led the pledge of allegiance.

The Commissioners reviewed correspondence received and articles published since the last regular Board meeting on March 16, 2022.

On motion of Commissioner Lange, seconded by Commissioner Winnike, the Board unanimously approved the minutes for the regular Board meeting held on March 16, 2022.

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 March 1, 2022 through March 31, 2022. On motion of Commissioner Wagner, seconded by Commissioner Macke, and after discussion, the Board unanimously approved the expenditures of the District for the month of March 2022.

Kristin Leadingham, CPA, with VonLehman CPA and Advisory Firm gave a presentation on the 2022 Audit Report.

On motion of Commissioner Cunningham, seconded by Commissioner Lange, the Board unanimously Board accept the December 31, 2022, audit report as presented.

On motion of Commissioner Wagner, seconded by Commissioner Cunningham, the Board unanimously accepted the bid from Bray Trucking, Inc., and authorized staff to execute the applicable contract documents.

On motion of Commissioner Wagner, seconded by Commissioner Winnike, the Board unanimously authorized the purchase of the street flushing truck from Brown Equipment Company for $221,500 and authorized staff to execute any agreements or documents necessary to effectuate this transaction.

On motion of Commissioner Winnike, seconded by Commissioner Lange, the Board unanimously accepted the bids and awarded contracts for the lowest and second lowest bidders for each item on the bid tabulation for the purchase of chemicals and authorized staff to execute the appropriate contract documents for a six-month term, with staff option to extend for an additional six-month term.

On motion of Commissioner Wagner, seconded by Commissioner Winnike, the Board unanimously accepted the bid from Hydro Controls Inc. to purchase and deliver the Ohio River Pumping Station #2 Rotary Pump Control Valve.

On motion of Commissioner Lange, seconded by Commissioner Wagner, the Board unanimously accepted the bid of Rector Excavating and awarded a contract for the Ft. Henry Drive Main Replacement Project with a total project budget of $495,000, and authorized staff to execute the applicable contract documents.

On motion of Commissioner Winnike, seconded by Commissioner Macke, the Board unanimously accepted the bid of $278,155.00 and awarded a contract to Rector Excavating, Inc. for the Hunters Green Drive Water Main Replacement project with a total project budget of $315,000, and authorized staff to execute the applicable contract documents.

On motion of Commissioner Wagner, seconded by Commissioner Lange, the Board unanimously accepted the bid of $71,420 from Larry Smith Inc., and awarded a contract for the Taylor Mill Treatment Plant Sanitary Sewer Relocation and authorized staff to execute the applicable contract documents.

On motion of Commissioner Lange, seconded by Commissioner Macke, the Board unanimously authorized staff to execute a contract with the Kentucky Transportation Cabinet for the betterment/improvement costs of $1,191,915 for replacing the water main along KY 236.

On motion of Commissioner Wagner, seconded by Commissioner Lange, the Board unanimously accepted the bid of $6,937,500 from Glenwood Electric, Inc. and awarded a contract for the Taylor Mill Treatment Plant Emergency Generator Project with a revised total project budget of $7,850,000 and authorized staff to execute the applicable contract documents subject to approval by the Kentucky Public Service Commission.

On motion of Commissioner Wagner, seconded by Commissioner Lange, the Board unanimously approved Resolution No. 044-042023, which authorized the Board Chair, or his designee, to make application for and, upon approval, to execute an agreement with the Kentucky Office of Homeland Security (KOHS), to execute any documents which are deemed necessary by KOHS to facilitate and administer the project and to act as the authorized correspondent for this project, and also to establish necessary procurement requirements.

The Board reviewed the District's financial reports and Department reports.

Vice President of Finance & Support Services Stacey Kampsen updated the Board on revenues and expenses and on the 2022 Audit, 2022 PSC Annual Report, and main breaks.

Director of Human Resources, Communications, Facilities & Fleet Kim Clemons provided the Board with an update on Drinking Water Week (May 7-13, 2023) event on May 11, 2023 at the FTTP.

Legal Counsel, Manager of Legal, Compliance, and Regulatory Affairs Tom Edge provided the Board an update on PSC Case No. 2022-00161 – Rate Case, and PSC Case No. 2023-00109 – Commissioner Training.

Vice President of Engineering, Production & Water Quality Amy Stoffer reviewed with the Board the status of on-going projects within the 2023 5-Year Capital Budget, including highlighting 3 change orders and expenses incurred to date and provide an update on water loss.

On a motion of Commissioner Koester, seconded by Commissioner Macke, the Board unanimously agreed to go into executive session under the provisions of KRS 61.810(1)(c) to discuss pending or proposed litigation on behalf of the public agency regarding claims of damage to its properties along KY 6335.

Other matters of a general nature were discussed.

Executive Session began at 1:44 p.m. and ended at 3:03 p.m. No other action taken.

The meeting was adjourned at 3:03 p.m.

CHAIRMAN SECRETARY

EXHIBIT D

PROJECT FINANCE INFORMATION

Exhibit D

Customers Added and Revenue Effect: There are no new customers anticipated.

Debt Issuance and Source of Debt: The project will be funded using $4,065,000 from State Revolving Fund Loan F20-044, $1,000,000 from Cleaner Water Program Grant 21CWW105, and $2,785,000 from a future Bond Anticipation Note. The total budget of $7,850,000 includes design, contingencies, and miscellaneous costs. The District will have some labor expense to inspect the project. A summary of the project costs is provided below:

○ Engineering	$ 165,563.00
○ Contractor Bid	$ 6,937,500.00
○ Misc. & Contingencies	$ 746,937.00
Total Project Cost	**$ 7,850,000.00**

USoA Accounts: The anticipated amounts for the project cost of $7,850,000 will fall under the following Uniform System of Accounts Codes:

Code 304 "Structures & Improvements" (sitework)	$ 1,192,415
Code 310 "Power Generation Equipment"	$ 6,657,585

Additional Costs and O&M: Additional annual operating and maintenance costs incurred for the project are estimated at $140,000 per year.

Depreciation and Debt Service: Annual depreciation and debt service after construction are as follows:

Depreciation: $31,797.73/year over 37.5 years for Code 304 Structures & Improvements
$332,879.25/year over 20 years for Code 310 Power Generation Equipment

Debt Service: $242,645 over 20 years for 1.75% State Revolving Fund Loan and
$178,273 over 25 years for 4.00% conventional loan (BAN).

EXHIBIT E

MORTGAGES, BONDS, NOTES, AND OTHER INDEBTEDNESS

EXHIBIT E-1

SCHEDULE OF MORTGAGES, BONDS, NOTES, AND OTHER INDEBTEDNESS

Northern Kentucky Water District
Bonds & Notes
March 31, 2023

Existing bonds are secured through the pledge of future revenues of the water system

Bonds

Bond Identification	Amount Authorized	Par Amount Issued	Amount Outstanding 3/31/2023	Date of Issue	Rate of Interest	Date of Maturity	Interest Paid Year 2022
2013A	28,165,000	26,400,000	19,175,000	6/27/2013	4.250 - 5.000%	2/1/2038	891,650
2013B	26,570,000	24,120,000	8,555,000	9/25/2013	5.000 - 4.000%	2/1/2028	489,450
2014A	1,733,000	1,733,000	1,623,000	12/11/2017	2.750%	2/1/2057	45,801
2014B	16,965,000	15,805,000	3,260,000	12/23/2014	3.125 - 4.000%	2/1/2029	135,253
2016A	47,335,000	41,905,000	25,695,000	11/22/2016	5.000 - 3.000%	2/1/2031	1,235,900
2019	19,600,000	17,845,000	15,900,000	9/26/2019	3.000 - 5.000%	2/1/2044	560,750
2020	25,195,000	22,325,000	18,780,000	11/5/2020	5.000 - 2.000%	2/1/2035	746,950
2021B	32,395,000	27,730,000	18,430,000	12/14/2021	4.000%	2/1/2027	603,112
2023A	27,335,000	17,615,000	17,615,000	1/26/2023	5.000 - 4.125%	2/1/2048	
			129,033,000				

Notes

Note Identification	Date of Issue	Par Amount Issued	Amount Outstanding 3/31/2023	Date of Maturity	Rate of Interest	In Whose Favor	Interest Paid Year 2022
KIA Loan F08-07	11/1/2008	4,000,000	2,099,668	12/1/2032	1.2000%	KIA	28,110
KIA Loan F09-02	6/1/2010	24,000,000	13,783,216	6/1/2033	2.2500%	KIA	329,876
KIA Loan F14-015	6/1/2015	3,545,910	2,852,195	6/1/2038	2.0000%	KIA	59,431
KIA Loan F15-011	3/1/2016	3,535,094	2,843,495	6/1/2038	2.0000%	KIA	59,249
KIA Loan B15-003	7/1/2016	1,392,195	1,064,616	12/1/2037	0.9500%	KIA	10,590
KIA Loan F13-012*	8/1/2014	8,000,000	4,523,000	N/A	2.0000%	KIA	90,460
KIA Loan F16-027*	1/1/2019	4,000,000	1,558,035	N/A	2.0000%	KIA	27,785
KIA Loan F20-044*	N/A	8,000,000	-	N/A	1.7500%	KIA	-
**not yet closed*			28,724,225				

Other Notes

	Amount Outstanding 3/31/2023
Deferred Note Kenton County	100,000

EXHIBIT E-2

ASSISTANCE AGREEMENT

KENTUCKY INFRASTRUCTURE AUTHORITY
ASSISTANCE AGREEMENT

FUND F

PROJECT NUMBER:	F20-044
GOVERNMENTAL AGENCY (Borrower):	Northern Kentucky Water District
GOVERNMENTAL AGENCY'S ADDRESS:	2835 Crescent Springs Road Erlanger, Kentucky 41018
DATE OF ASSISTANCE AGREEMENT:	February 16, 2023
CFDA NO:	66.468

ASSISTANCE AGREEMENT

TABLE OF CONTENTS

ASSISTANCE AGREEMENT

This Assistance Agreement made and entered into as of the date set forth on the cover page hereof (the "Assistance Agreement") by and between the KENTUCKY INFRASTRUCTURE AUTHORITY, a body corporate and politic, constituting a public corporation and governmental agency and instrumentality of the Commonwealth of Kentucky (the "Authority") and the NORTHERN KENTUCKY WATER DISTRICT, the Governmental Agency identified on the cover of this Assistance Agreement (the "Governmental Agency"):

WITNESSETH

WHEREAS, the General Assembly of the Commonwealth of Kentucky, being the duly and legally constituted legislature of Kentucky at its 1988 Regular Session, enacted House Bill 217 amending Chapter 224A of the Kentucky Revised Statutes (the "Act"), creating the "Kentucky Infrastructure Authority" to serve the public purposes identified in the Act; and

WHEREAS, the Authority has established its Program, as hereinafter defined, for the purpose of providing financial assistance to Governmental Agencies, as defined in the Act, in connection with the acquisition and construction of Projects, as defined in the Act, in order to preserve, protect, upgrade, conserve, develop, utilize and manage the resources of the Commonwealth of Kentucky (the "Commonwealth") for the protection and preservation of the health, safety, convenience, and welfare of the Commonwealth and its citizens, and in that respect to assist and cooperate with Governmental Agencies in achieving such purposes; and

WHEREAS, the Program is funded in part, pursuant to the Capitalization Grant Operating Agreement between the Authority and the U.S. Environmental Protection Agency dated as of November 1, 1998, as amended, supplemented or restated from time to time (the "Federal Agreement") under which the Authority is responsible for providing certain "match funding" described in the Federal Agreement; and

WHEREAS, the Authority has issued, and will issue from time to time, its revenue bonds pursuant to a General Trust Indenture dated as of February 1, 2000 (the "Indenture") between the Authority and U.S. Bank Trust Company, National Association, as the ultimate successor in interest to National City Bank of Kentucky (the "Trustee"), in order to provide the "match funding" for the Program; and

WHEREAS, the Governmental Agency has determined that it is necessary and desirable to acquire, construct, and finance the Project, as hereinafter defined, and the Authority has determined that the Project is a Project within the meaning of the Act and the Indenture, thereby qualifying for financial assistance from the Authority; and

WHEREAS, the Governmental Agency desires to enter into this Assistance Agreement with the Authority for the purpose of securing from the Authority the repayable Loan hereinafter identified; and

WHEREAS, the Authority is willing to cooperate with the Governmental Agency in making available the Loan pursuant to the Act and the Indenture to be applied to the Project upon the conditions hereinafter enumerated and the covenants by the Governmental Agency herein

contained to levy, collect, and enforce and remit adequate Service Charges, as hereinafter defined, for the services provided by the Governmental Agency's System, as hereinafter defined, and to apply the necessary portion of said Service Charges to the repayment of the Loan and the interest thereon, as hereinafter specifically provided; and

WHEREAS, the Authority and the Governmental Agency have determined to enter into this Assistance Agreement pursuant to the terms of the Act and the Indenture and to set forth their respective duties, rights, covenants, and obligations with respect to the acquisition, construction, and financing of the Project and the repayment of the Loan and the interest thereon;

NOW, THEREFORE, FOR AND IN CONSIDERATION OF THE MUTUAL COVENANTS HEREIN SET FORTH, THE LOAN HEREBY EFFECTED AND OTHER GOOD AND VALUABLE CONSIDERATION, THE RECEIPT OF WHICH IS HEREBY ACKNOWLEDGED BY EACH PARTY, THE PARTIES HERETO MUTUALLY COVENANT AND AGREE, EACH WITH THE OTHER AS FOLLOWS:

ARTICLE I
DEFINITIONS

All of the terms utilized in this Assistance Agreement will have the same definitions and meaning as ascribed to them in the Act and the Indenture, which Act and Indenture are hereby incorporated in this Assistance Agreement by reference, the same as if set forth hereby verbatim; provided, however, that those definitions utilized in the Act and the Indenture having general application are hereby modified in certain instances to apply specifically to the Governmental Agency and its Project.

"*Act*" shall mean Chapter 224A of the Kentucky Revised Statutes, as amended.

"*Administrative Fee*" means the charge of the Authority for the servicing of the Loan, which is the annual percentage charged against the unpaid principal balance of the Loan as identified in the Loan Term Schedule.

"*Amortization Commencement Date*" means the date set forth on the Loan Term Schedule when the first payment of principal of and interest on the Loan is due under the Schedule of Payments.

"*Assistance Agreement*" shall mean this agreement made and entered into by and between a Governmental Agency and the Authority, as authorized by the Act, providing for a Loan to the Governmental Agency by the Authority, and for the repayment thereof to the Authority by the Governmental Agency.

"*Authority*" shall mean the Kentucky Infrastructure Authority created by the Act, a body corporate and politic, constituting a public corporation and a governmental agency and instrumentality of the Commonwealth of Kentucky, or such other designation as may be effected by future amendments to the Act.

"*Bond*" or "*Bonds*" shall mean any Kentucky Infrastructure Authority Bond or Bonds, or the issue of such Bonds, as the case may be, authenticated and delivered under the Indenture.

"*Business Day*" shall mean any day other than a Saturday, Sunday or other legal holiday on which the general offices of the Commonwealth are closed.

"*Cabinet*" means the Energy and Environment Cabinet of the Commonwealth.

"*Code*" shall mean the Internal Revenue Code of 1986, as amended, and shall include the Regulations of the United States Department of the Treasury promulgated thereunder.

"*Commonwealth*" shall mean the Commonwealth of Kentucky.

"*Construction*" shall mean construction as defined in the Act.

"*Debt Obligations*" shall mean those outstanding obligations of the Governmental Agency identified in the Project Specifics outstanding as of the date of this Assistance Agreement or issued in the future in accordance with the terms hereof, payable from the income and revenues of the System.

"*Default Rate*" means the rate of interest identified in the Loan Term Schedule to accrue on the amount of the Loan that is in default under this Assistance Agreement.

"*Drinking Water Supply Project*" shall mean the planning, design and construction of drinking water treatment and distribution systems, including expenditures to address Federal Act health goals, or to address situations where compliance standards have been exceeded or to prevent future violations of rules, and may further include drinking water treatment plants, including basins for rapid mix, flocculation, coagulation, filtration, pre-treatment disinfection, and disinfection prior to entry to the distribution system; distribution systems; storage tanks; intake lines and short-term water storage; clearwells; drilled wells and wellhead areas; and any other structure or facility considered necessary by the Cabinet to the efficient and sanitary operation of a public water system and complies with the requirements of the Federal Act.

"*Effective Date*" means the date set forth on the cover page of this Assistance Agreement.

"*Engineers*" means the firm of consulting engineers employed by the Governmental Agency in connection with the Project identified in the Project Specifics.

"*Federal Act*" shall mean the Federal Safe Drinking Water Act, as amended, 42 U.S.C. Section 1401, et seq.

"*Federal Agreement*" shall mean the Capitalization Grant Operating Agreement between the Authority and the U.S. Environmental Protection Agency dated as of November 1, 1998, as amended, supplemented or restated from time to time.

"*Governmental Agency*" shall mean any agency or unit of government within the Commonwealth, now having or hereafter granted the authority and power to finance, acquire, construct, and operate a Project, including specifically but not by way of limitation, incorporated cities, counties, including any counties containing a metropolitan sewer district, sanitation districts, water districts, public authorities, sewer construction districts, metropolitan sewer districts, sanitation taxing districts, and any other agencies, commissions, districts, or authorities (either

acting alone, or in combination with one another pursuant to any regional or area compact, or multi-municipal agreement), now or hereafter established pursuant to the laws of the Commonwealth having and possessing such described powers; and for the purposes of this Assistance Agreement shall mean the Governmental Agency identified on the front cover of this Assistance Agreement and in the Project Specifics.

"*Indenture*" shall mean the General Trust Indenture dated as of February 1, 2000 between the Authority and the Trustee, as amended and supplemented from time to time.

"*Interagency Agreement*" means the Memorandum of Understanding dated as of July 1, 1999 between the Authority and the Cabinet, as the same may be amended or supplemented from time to time.

"*Loan*" shall mean the loan effected under this Assistance Agreement from the Authority to the Governmental Agency in the principal amount set forth in the Loan Term Schedule, for the purpose of defraying the costs incidental to the Construction of the Project.

"*Loan Payment Date*" shall mean the dates principal of and/or interest on the Loan are due as set forth in the Loan Term Schedule.

"*Loan Rate*" means the rate per annum of interest identified in the Loan Term Schedule.

"*Loan Term Schedule*" shall mean the payment information and terms of the Loan identified and set forth in Exhibit F attached hereto and includes any amendments or supplements thereto.

"*Person*" shall mean any individual, firm, partnership, association, limited liability company, corporation or Governmental Agency.

"*Program*" shall mean the program authorized by KRS 224A.1115 and the Indenture as the "federally assisted drinking water revolving fund" for financing Projects through Loans by the Authority to Governmental Agencies and shall not be deemed to mean or include any other programs of the Authority.

"*Project*" shall mean, when used generally, a Drinking Water Supply Project, and when used in specific reference to the Governmental Agency, the Project described in the Project Specifics.

"*Project Specifics*" means those specific details of the Project identified in Exhibit A hereto, all of which are incorporated by reference in this Assistance Agreement.

"*Requisition for Funds*" means the form attached hereto as Exhibit B to be utilized by the Governmental Agency in obtaining disbursements of the Loan from the Authority as construction of the Project progresses.

"*Resolution*" means the resolution or ordinance of the Governmental Agency in the form of the resolution attached hereto as Exhibit D authorizing the execution of this Assistance Agreement.

"*Schedule of Payments*" means the debt service schedule of the Loan as set forth in the Loan Term Schedule.

"*Schedule of Service Charges*" shall mean those general charges to be imposed by the Governmental Agency for services provided by the System, as set forth in Exhibit C hereto, which Schedule of Service Charges shall be in full force and effect to the satisfaction of the Authority prior to the disbursement of any portion of the Loan hereunder.

"*Service Charges*" shall mean any monthly, quarterly, semi-annual, or annual charges, surcharges or improvement benefit assessments to be imposed by a Governmental Agency, or by the Authority, in respect of the System, which Service Charges arise by reason of the existence of, and requirement of, any Assistance Agreement: and for the purposes of this Assistance Agreement said Service Charge shall be no less than those set forth in the Schedule of Service Charges.

"*System*" shall mean the water system owned and operated by the Governmental Agency of which the Project shall become a part.

"*Trustee*" shall mean U.S. Bank Trust Company, National Association, and its successors or assigns.

ARTICLE II
REPRESENTATIONS AND WARRANTIES

Section 2.1. Representations and Warranties of Authority.

The Authority represents and warrants for the benefit of the Governmental Agency as follows:

(A) The Authority is a body corporate and politic constituting a governmental agency and instrumentality of the Commonwealth, has all necessary power and authority to enter into, and perform its obligations under, this Assistance Agreement, and has duly authorized the execution and delivery of this Assistance Agreement.

(B) Neither the execution and delivery hereof, nor the fulfillment of or compliance with the terms and conditions hereof, nor the consummation of the transactions contemplated hereby, conflicts with or results in a breach of the terms, conditions and provisions of any restriction or any agreement or instrument to which the Authority is now a party or by which the Authority is bound, or constitutes a default under any of the foregoing.

(C) To the knowledge of the Authority, there is no litigation or proceeding pending or threatened against the Authority or any other person affecting the right of the Authority to execute or deliver this Assistance Agreement or to comply with its obligations under this Assistance Agreement. Neither the execution and delivery of this Assistance Agreement by the Authority, nor compliance by the Authority with its obligations under this Assistance Agreement, require the approval of any regulatory body or any other entity, and any such approval has not been obtained.

(D) The authorization, execution and delivery of this Assistance Agreement and all actions of the Authority with respect thereto, are in compliance with the Act and the Federal Act and any regulations issued thereunder.

Section 2.2. Representations and Warranties of the Governmental Agency.

The Governmental Agency hereby represents and warrants for the benefit of the Authority as follows:

(A) The Governmental Agency is a duly organized and validly existing Governmental Agency, as described in the Act, with full power to own its properties, conduct its affairs, enter into this Assistance Agreement and consummate the transactions contemplated hereby.

(B) The negotiation, execution and delivery of this Assistance Agreement and the consummation of the transactions contemplated hereby have been duly authorized by all requisite action of the governing body of the Governmental Agency.

(C) This Assistance Agreement has been duly executed and delivered by the Governmental Agency and is a valid and binding obligation of the Governmental Agency enforceable in accordance with its terms, except to the extent that the enforceability hereof may be limited by equitable principles and by bankruptcy, reorganization, moratorium, insolvency or similar laws heretofore or hereafter enacted relating to or affecting the enforcement of creditors' rights or remedies generally.

(D) To the knowledge of the Governmental Agency, there is no controversy or litigation of any nature pending or threatened in any court or before any board, tribunal or administrative body, to challenge in any manner the authority of the Governmental Agency or its governing body to make payments under this Assistance Agreement or to acquire and construct the Project; or to challenge in any manner the authority of the Governmental Agency or its governing body to take any of the actions that have been taken in the authorization or delivery of this Assistance Agreement or the construction of the Project; or in any way contesting or affecting the validity of this Assistance Agreement, or in any way questioning any proceedings taken with respect to the authorization or delivery by the Governmental Agency of this Assistance Agreement, or the application of the proceeds thereof or the pledge or application of any monies or security provided therefor; or in any way questioning the due existence or powers of the Governmental Agency, or otherwise wherein an unfavorable decision would have an adverse impact on the transactions authorized in connection with this Assistance Agreement.

(E) The authorization and delivery of this Assistance Agreement and the consummation of the transactions contemplated hereby will not constitute an event of default or violation or breach, or an event which, with the giving of notice or the passage of time or both, would constitute an event of default or violation or breach, under any contract, agreement, instrument, indenture, lease, judicial or administrative order, decree, rule or regulation or other document or law affecting the Governmental Agency or its governing body.

(F) Pursuant to the Resolution of the governing body, the Governmental Agency has approved and authorized the execution and delivery of this Assistance Agreement. Such Resolution was duly enacted or adopted at a duly called meeting, held in accordance with the law

of the governing body of the Governmental Agency at which a quorum was present and acting throughout; is in full force and effect; and has not been superseded, altered, amended or repealed as of the date hereof.

(G) All actions taken by the Governmental Agency in connection with this Assistance Agreement, the Loan, and the Project have been in full compliance with the provisions of the Kentucky Open Meeting Law, KRS Sections 61.805 to 61.850.

(H) The Governmental Agency has all licenses, permits and other governmental approvals (including but not limited to all required approvals of the Kentucky Public Service Commission) required to own, occupy, operate and maintain the System and the Project, to charge and collect the Service Charges, and to enter into this Assistance Agreement. The Governmental Agency is not in violation of and has not received any notice of an alleged violation of any zoning or land use laws applicable to the Project and has full right, power and authority to perform the acts and things as provided for in this Assistance Agreement.

(I) Legal counsel to the Governmental Agency has duly executed and delivered the opinion of legal counsel substantially in the form set forth in Exhibit E hereto.

(J) The Governmental Agency is in full compliance with all federal and state labor and procurement laws in connection with the planning, design, acquisition and construction of the Project.

(K) Project is consistent with the water supply plan developed pursuant to 401 KAR 4:220 for the county in which the Governmental Agency is located.

ARTICLE III
AUTHORITY'S AGREEMENT TO MAKE LOAN; TERMS

Section 3.1. Determination of Eligibility.

Pursuant to the terms of the Act and the Indenture, the Authority has determined that the Governmental Agency's Project is a Drinking Water Supply Project under the Act and the Governmental Agency is entitled to financial assistance from the Authority in connection with financing the Construction of the Project.

Section 3.2. Principal Amount of Loan Established; Loan Payments; Disbursement of Funds.

The principal amount of the Loan shall be the Loan Amount as identified in the Loan Term Schedule, subject to such adjustments as may be set forth in any amendment or supplement to said Loan Term Schedule. Principal payments shall be made in the amounts and on the Loan Payment Dates established by the Schedule of Payments, which Schedule of Payments shall provide for approximately level debt service payments over the repayment term set forth in the Schedule of Payments, commencing on the Amortization Commencement Date.

The outstanding principal balance of the Loan shall bear interest, payable on the Loan Payment Dates, at the Loan Rate identified in the Loan Term Schedule. Beginning on the

Amortization Commencement Date, principal and interest on the Loan shall be payable in the amounts and on the Loan Payment Dates set forth in the Schedule of Payments; provided that, should an Event of Default occur, such Loan payments, in such amounts as determined in the sole discretion of the Authority, shall be made on the first day of each month during the continuation of such Event of Default.

The Authority shall advance the proceeds of the Loan as Construction of the Project progresses upon the submission by the Governmental Agency of a Requisition for Funds in substantially the same form as Exhibit B hereto. Each disbursement under a Requisition for Funds representing a portion of the principal amount of the Loan shall bear interest at the Loan Rate from the date of the disbursement. The Governmental Agency shall pay interest on the unpaid balance of disbursements at the Loan Rate payable on each Loan Payment Date prior to the Amortization Commencement Date.

Interest on the Loan shall be calculated on the actual number of days and an assumed 360-day year.

Payments of principal and interest on the Loan shall be payable in lawful money of the United States of America at the principal office of the Authority or the Trustee, as designated by the Authority. If so requested by the Authority, Loan payments hereunder shall be made by the Governmental Agency pursuant to the ACH Debit Direct Payment Method (the "ACH Debit Direct Payment Method") as described and detailed in the ACH Debit Direct Payment Authorization Form (the "ACH Authorization Form") as provided by the Authority or the Trustee to the Governmental Agency, which ACH Authorization Form shall be completed, signed and forwarded to the Authority or the Trustee prior to the Governmental Agency receiving any disbursement of the proceeds of the Loan.

Section 3.3. Governmental Agency's Right to Prepay Loan.

The Governmental Agency shall have the right to prepay and retire the entire amount of the Loan at any time without penalty upon written notice to the Authority no less than five (5) Business Days in advance of said prepayment.

Notwithstanding the foregoing, upon the determination by the Authority that it intends to issue Bonds secured by a pledge of the payments on the Loan, the Authority shall advise the Governmental Agency (i) of its intention to proceed with the authorization of such Bonds (ii) of the limitation on prepayments after such Bonds are issued, and (iii) that the Governmental Agency has thirty (30) days from its receipt of said notice to exercise its option to prepay the Loan. Upon the expiration of said thirty-day period the Governmental Agency's right to prepay the Loan shall be limited to the terms described in such notice.

Section 3.4. Subordination of Loan.

The Authority hereby agrees that, subject to compliance by the Governmental Agency with the covenants and conditions set forth in this Assistance Agreement, the source of payment for the Loan shall be inferior and subordinate to the security interest and source of payment for the Debt Obligations of the Governmental Agency payable from the revenues of the System outstanding at the time this Assistance Agreement is executed as identified in the Project Specifics and all such

Debt Obligations that may hereafter be issued on a parity with the Debt Obligations identified in the Project Specifics; provided, however, the Authority shall receive notice of any additional financings in accordance with Section 5.6(C) hereof.

ARTICLE IV
CONDITIONS PRECEDENT TO DISBURSEMENT; REQUISITION FOR FUNDS

Section 4.1. Covenants of Governmental Agency and Conditions of Loan.

By the execution of this Assistance Agreement, the Governmental Agency agrees that prior to any requests for the disbursement of all or a portion of the Loan made hereunder, the Governmental Agency shall supply the Authority and the Cabinet appropriate documentation, satisfactory to the Authority indicating the following:

(A) That the Authority and the Cabinet and any appropriate regulatory agency of the Commonwealth as may be designated by the Authority or the Cabinet, and their respective duly authorized agents, shall have the right at all reasonable times, subject to prior notice to the Governmental Agency, to enter upon the Project and its site during construction of the Project and to examine and inspect same, and the Governmental Agency will assure that the contractor or contractors will provide facilities for such access and inspection.

(B) All real estate and interest in real estate and all personal property constituting the Project and the Project sites heretofore or hereafter acquired shall at all times be and remain the property of the Governmental Agency and constitute a part of the System.

(C) In the event the Governmental Agency is required to provide financing for the Project from sources other than the Authority (as described in the Project Specifics), the Authority shall have the right to receive such reasonable proofs as it may require of the ability of the Governmental Agency to finance the costs of Construction of the Project over and above the Loan, prior to the disbursement by the Authority of any portion of the Loan.

(D) The Governmental Agency shall do all things necessary to acquire all proposed and necessary sites, easements and rights of way necessary or required in respect of the Project and demonstrate its ability to construct the Project in accordance with the plans, design and specifications prepared for the Governmental Agency by the Engineers.

(E) Actual construction and installation incident to the Project shall be performed by either the lump sum (fixed price) or unit price contract method and adequate legal methods of obtaining public, competitive bidding will be employed prior to the awarding of the construction contract for the Project in accordance with Kentucky law.

(F) Unless construction of the Project has already been initiated as of the Effective Date, pursuant to due compliance with Kentucky law and applicable regulations, the Project will not be advertised or placed on the market for construction bidding by the Governmental Agency until the final plans, designs and specifications therefor have been approved by such state and federal agencies and authorities as may be legally required, and until written notification of such approvals has been received by the Governmental Agency and furnished to the Cabinet.

(G) The construction contract or contracts shall require the contractor to comply with all provisions of federal and Kentucky law legally applicable to such work, and any amendments or modifications thereto, together with all other applicable provisions of law, to cause appropriate provisions to be inserted in subcontracts to insure compliance therewith by all subcontractors subject thereto, and to be responsible for the submission of any statements required of subcontractors thereunder.

(H) A work progress schedule utilizing a method of standard acceptance in the engineering community shall be prepared prior to the institution of construction in connection with each construction contract, or, if construction has already been initiated as of the date of this Assistance Agreement, at the earliest practicable date, to indicate the proposed schedule as to completion of the Project and same shall be maintained monthly thereafter to indicate the actual construction progress of the Project.

(I) Prior to the award of the construction contract and prior to the commencement of construction, the Governmental Agency will arrange and conduct a conference as to the Project said conference to include representatives of the Authority, the Governmental Agency, the Cabinet and any other participating federal or state agency, the Engineers, and all construction contractors. Such conference shall be held in accordance with guidelines established by the Authority and the Cabinet. A written brief of said conference summarizing the construction schedule, fund requirements schedule, payment authorizations, responsible parties for approval of all facets of the construction work and payment therefor, and other pertinent matters shall be prepared and distributed to each party involved, and all construction contractors and Engineers. Provided, however, that in the event construction shall have been initiated as of the date of this Assistance Agreement, this provision may be waived.

(J) All construction contracts will be so prepared that federal participation costs, if any, and state participation costs may be readily segregated from local participation costs, if any, and from each other, and in such manner that all materials and equipment furnished to the Governmental Agency may be readily itemized.

(K) Any change or changes in a construction contract will be promptly submitted to the Authority, the Cabinet and any required state or federal agencies.

(L) The Construction, including the letting of contracts in connection therewith, will conform in all respects to applicable requirements of federal, state and local laws, ordinances, rules and regulations.

(M) The Governmental Agency will proceed expeditiously with and complete the Project in accordance with the approved surveys, plans, specifications, and designs or amendments thereto, prepared by the Engineers for the Governmental Agency and approved by state and federal agencies.

(N) If requested, the Governmental Agency will erect at the Project sites, signs satisfactory to the Authority and the United States Environmental Protection Agency noting the participation of the Authority and the U.S. Government in the financing of the Project.

(O) Except as otherwise provided in this Assistance Agreement, the Governmental Agency shall have the sole and exclusive charge of all details of the Construction.

(P) The Governmental Agency shall keep complete and accurate records of the costs of acquiring the Project sites and the costs of Construction. The Governmental Agency shall permit the duly authorized representatives of the Authority, the Cabinet and any Kentucky or federal agencies to inspect all books, documents, papers and records relating to the Project at any and all reasonable times for the purpose of audit and examination. The Governmental Agency shall submit to the Authority and the Cabinet such documents and information as such may reasonably require in connection with the administration of any federal or state assistance.

(Q) The Governmental Agency shall require that each construction contractor or contractors furnish a performance and a payment bond in an amount at least equal to one hundred percent (100%) of the contract price or the portion of the Project covered by the particular contract as security for the faithful performance of such contract.

(R) The Governmental Agency shall require that each of its contractors and all subcontractors maintain during the life of the construction contract, worker's compensation insurance, public liability insurance, property damage insurance and vehicle liability insurance in amounts and on terms satisfactory to the Authority. Until the Project is completed and accepted by the Governmental Agency, the contractor shall maintain builders risk insurance (fire and extended coverage) on a one hundred percent (100%) basis (completed value form) on the insurable portion of the Project, such insurance to be made payable to the order of the Authority, the Governmental Agency, the prime contractor, and all subcontractors, as their interests may appear.

(S) The Governmental Agency shall provide and maintain competent and adequate resident engineering services covering the supervision and inspection of the development and construction of the Project and bearing the responsibility of assuring that Construction conforms to the approved plans, specifications and designs prepared by the Engineers. Such resident engineer shall certify to the Authority, the Cabinet, any involved state or federal agencies, and the Governmental Agency at the completion of construction that construction is in accordance with the approved plans, specifications and designs, or, approved amendments thereto.

(T) The Governmental Agency shall demonstrate to the satisfaction of the Authority the legal capability of the Governmental Agency to enact, adopt, levy, charge, collect, enforce and remit to the Authority and the Cabinet the Service Charges of the Governmental Agency described in the Schedule of Service Charges attached to and made a part of this Assistance Agreement as Exhibit C and submit proof satisfactory to the Authority that the Service Charges are in full force and effect as of the submission of the initial Requisition for Funds.

(U) The Governmental Agency shall require all laborers and mechanics employed by contractors and subcontractors on the Project shall be paid wages at rates not less than prevailing on projects of a character similar in the locality as determined by the Secretary of Labor in accordance with subchapter IV of Chapter 31 of title 40, United States Code.

(V) The Governmental Agency shall comply with all federal requirements applicable to the Loan (including those imposed by P.L. 113-76, Consolidated Appropriations Act, 2014 (the

"2014 Appropriations Act") and related Program policy guidelines) which the Governmental Agency understands includes, among other requirements, that all of the iron and steel products used in the Project are to be produced in the United States ("American Iron and Steel Requirement") unless (i) the Governmental Agency has requested and obtained a waiver from the United States Environmental Protection Agency pertaining to the Project or (ii) the Authority has otherwise advised the Governmental Agency in writing that the American Iron and Steel Requirement is not applicable to the Project.

(W) The Governmental Agency shall comply with all record keeping and reporting requirements under the Federal Act, including any reports required by a Federal agency or the Authority such as performance indicators of program deliverables, information on costs and Project progress. The Governmental Agency understands that (i) each contract and subcontract related to the Project is subject to audit by appropriate federal and state entities and (ii) failure to comply with the Federal Act and this Agreement may be a default hereunder that results in a repayment of the Loan in advance of the maturity and/or other remedial actions.

Notwithstanding anything in this Assistance Agreement to the contrary, if the Governmental Agency fails to comply, at any time, with the provisions of Section 4.1(V) or Section 4.1(W) hereof, the Authority may, at its sole discretion, withhold the disbursements of any proceeds of the Loan to the Governmental Agency or its designee.

Section 4.2. Additional Conditions to Disbursement Required Under the Federal Agreement.

The Governmental Agency, in order to comply with the terms and conditions of the Federal Agreement, further covenants and further agrees to additional conditions to disbursement, as follows:

(A) That the Project shall be completed no later than the Amortization Commencement Date.

(B) Notwithstanding any other agreements contained herein regarding the maintenance of books and records, that it shall maintain Project accounts in accordance with generally accepted governmental accounting standards, as required by the Federal Agreement. The Governmental Agency shall retain such records for no less than three (3) years following the final payment by the Governmental Agency under this Assistance Agreement or if any portion of the Project is disposed of, until at least three (3) years after such disposition; provided that if any litigation, claim, appeal or audit is commenced prior to the end of such period such records shall be maintained until the completion of such action or until three (3) years after such commencement, whichever is later.

(C) That it has not and will not apply any other federal funding to the Project in a manner that would cause it to receive "double benefits" as described in Section 603 of the Water Quality Act of 1987.

(D) That all real property or property rights required for the completion of the Project shall be obtained, by easement, purchase or other means acceptable to the Authority, prior to

commencement of construction and that the relocation of any Person resulting therefrom be in accordance with 49 CFR 24 for Uniform Relocation Assistance and Real Property Acquisition Act of 1970.

(E) That all Project contractors shall be required to retain Project records for the periods established for the retention of the Governmental Agency's records in Section 4.2(B) hereof.

(F) That no more than fifty percent (50%) of the proceeds of the Loan shall be disbursed until the Cabinet has approved the final plan for operation for the Project.

(G) That no more than ninety percent (90%) of the proceeds of the Loan shall be disbursed until the Cabinet has approved the draft operations and maintenance manual.

(H) That final disbursement will not be remitted before the Cabinet has approved a final operations and maintenance manual.

(I) That, as required by 40 CFR 35.2218, all engineering services regarding construction and regarding the first year of operation of the Project shall be provided for, including the following:

(1) The operation of the Project and the revision of the operations and maintenance manual as necessary to accommodate actual operating experience;

(2) The training of operating personnel, including preparation of curricula and training material for operating personnel; and

(3) Advice as to whether the Project is meeting the Project performance standards (including three quarterly reports and one Project performance report).

(J) That it shall advise the Cabinet and the Authority in writing of the date for initiation of operation of the Project.

(K) That within one year after operation is initiated, it shall certify to the Cabinet and the Authority that the Project is capable of meeting the Project performance standards.

(L) That it shall provide that qualified inspectors are present at the construction site. A summary of such inspector's qualifications and experience shall be submitted to the Cabinet and the Authority.

(M) That it shall notify the Authority and the Cabinet of the completion date of the Project.

(N) That it agrees to the terms and conditions of its application for assistance and the Authority's commitment to provide assistance, the terms of which are incorporated herein by reference.

(O) That all measures required to minimize water pollution to affected waters shall be employed in the construction of the Project including compliance with Section 404 of PL 92-500,

as amended, it being understood that approval of the Project does not constitute sanction or approval of any changes or deviations from established water quality standards, criteria implementation dates, or dates established by enforcement proceedings.

Section 4.3. Disbursements of Funds; Requisition for Funds.

The Governmental Agency shall submit to the Authority (or the Trustee acting on behalf of the Authority, if so designated) and the Cabinet a Requisition for funds prior to the fifth (5^{th}) day of each month (or such other designated period as is acceptable to the Authority), in substantially the same form as that attached to this Assistance Agreement as Exhibit B and made a part hereof, accompanied by, to the extent requested by the Authority, the following documentation:

(A) A full and complete accounting of the costs of the Project to be obligated by contract or otherwise during the month in question, or already obligated and not included in any previous accounting.

(B) A full and complete accounting of any costs of the Project paid by the Governmental Agency from its own funds with the approval of the Authority and not included in any previous accounting for which it seeks reimbursement.

(C) A full and complete accounting of any costs of the Project paid or requisitioned under any other financing, loan, bond, grant or similar agreement or paid from its own funds for which it does not seek reimbursement and which have not been identified in any previous requisition form.

(D) The contractor's estimate of work performed during the preceding month pursuant to construction contracts for the Project and payment due thereunder, together with the Engineer's and Governmental Agency's approval thereof for disbursement by the Authority.

Upon the Authority's receipt of the Requisition for Funds and such additional documentation as it may require, and subject to certification by the Cabinet, the Authority may direct the Trustee to remit the amount requested to the Governmental Agency as a draw upon the Loan. If directed by the Authority, the Governmental Agency shall establish, with the Trustee, an electric fund transfer system, which may be an ACH Payment Method.

The Authority may disburse proceeds of the Loan directly to the Governmental Agency. The Governmental Agency, if so directed by the Authority, shall establish itself as a vendor under the eMars system of the Commonwealth of Kentucky.

ARTICLE V
CERTAIN COVENANTS OF THE GOVERNMENTAL AGENCY; PAYMENTS TO BE MADE BY GOVERNMENTAL AGENCY TO THE AUTHORITY

Section 5.1. Imposition of Service Charges.

The Governmental Agency hereby irrevocably covenants and agrees to comply with all of the terms, conditions and requirements of this Assistance Agreement, pursuant to which the Loan

is to be made by the Authority to the Governmental Agency as specified herein and in the Act and the Indenture. The Governmental Agency hereby further irrevocably covenants and agrees that it already has, or will, to the extent necessary, immediately impose Service Charges upon all persons, firms and entities to whom or which services are provided by the System; such Service Charges to be no less than as set forth in Exhibit C annexed hereto. If so required, the Service Charges shall be in addition to all other rates, rentals and service charges of a similar nature of the Governmental Agency now or hereafter authorized by law, and now or hereafter being levied and collected by the Governmental Agency and shall be levied and collected solely for the purpose of repaying the Loan.

Section 5.2. Governmental Agency's Obligation to Repay Loan.

The obligation of the Governmental Agency to repay the Loan from the Service Charges shall not be revocable, and in the event that services supplied by the Project shall cease, or be suspended for any reason, the Governmental Agency shall continue to be obligated to repay the Loan from the Services Charges. In the event the Governmental Agency defaults in the payment of the Loan to the Authority, the amount of such default shall bear interest at the per annum rate of interest equal to the Default Rate set forth in the Loan Term Schedule, from the date of the default until the date of the payment thereof.

Section 5.3. Covenant to Adjust Service Charges.

In the event, for any reason, the Schedule of Service Charges shall prove to be insufficient to (i) provide for the required coverage of all debt service payments on obligations payable from the revenues of the System as set forth in Section 5.4 hereof, (ii) provide for the operation of the System as required under this Assistance Agreement, and (iii) make the required deposits to the Maintenance and Replacement Reserve; the Governmental Agency hereby covenants and agrees that it will, upon notice by the Authority, to the full extent authorized by law, both federal and Kentucky, immediately adjust and increase such Schedule of Service Charges or immediately commence proceedings for a rate adjustment and increase with all applicable regulatory authorities so as to provide funds sufficient to pay the debt service requirements set forth in the Schedule of Payments and the Authority's Administrative Fee, to provide for the operation of the System as required under this Assistance Agreement, and to make required deposits to the Maintenance and Replacement Reserve.

Section 5.4. Adequacy of Service Charges.

The Service Charges herein covenanted to be imposed by the Governmental Agency shall be fixed at such rate or rates (and it is represented that the Schedule set forth in Exhibit C hereto so qualifies) as shall be at least adequate to provide revenues equal to the sum of (i) 110% of the debt service coming due during each fiscal year on this Loan and all other obligations secured and payable from the revenues of the System, in each case computed as of the beginning of such fiscal year (except to the extent the Governmental Agency has by binding ordinance or resolution committed reserves to the payment of such debt service), (ii) the amounts required to provide for the operation of the System during each fiscal year as required under this Assistance Agreement, and (iii) the amounts to be deposited hereunder to the Maintenance and Replacement Reserve in each fiscal year.

The Service Charges imposed by the Governmental Agency shall be paid by the users of the System, both existing and new users, and accordingly the Project. The Governmental Agency shall deliver to the Authority, on or before each Loan Payment Date, a report of all collections and any delinquencies.

Section 5.5. Covenant to Establish Maintenance and Replacement Reserve.

The Governmental Agency shall establish a special account identified as a "Maintenance and Replacement Reserve". The Governmental Agency shall deposit into the Maintenance and Replacement Reserve an amount equal to the amount set forth in the Project Specifics at the times set forth in the Project Specifics. Funds in the Maintenance and Replacement Reserve may be used for extraordinary maintenance expenses related to the System or for the unbudgeted costs of replacing worn or obsolete portions of the System, subject to approval of the Authority.

Section 5.6. Reports; Inspection.

The Governmental Agency hereby irrevocably covenants and agrees with the Authority:

(A) That it will furnish to the Authority and the Cabinet not less than annually reports of the operations and income and revenues of the System and will permit authorized agents of the Authority to inspect all records, accounts and data of the System at all reasonable times.

(B) That it will collect, account for and promptly remit to the Authority those specific revenues, funds, income and proceeds derived from the revenues of the System incident to this Assistance Agreement.

(C) That it will notify the Authority in writing of its intention to issue bonds or notes payable from the revenues of the System not less than thirty (30) days prior to the sale of said obligations.

Section 5.7. Segregation of Funds.

The Governmental Agency shall at all times account for the income and revenues of the System and distinguish same from all other revenues, moneys and funds of the Governmental Agency, if any.

ARTICLE VI
OTHER COVENANTS OF THE GOVERNMENTAL AGENCY

Section 6.1. Further Assurance.

At any time and all times the Governmental Agency shall, so far as it may be authorized by law, pass, make, do, execute, acknowledge and deliver, all and every such further resolutions, acts, deeds, conveyances, assignments, transfers and assurances as may be necessary or desirable for the better assuring, conveying, granting, assigning and confirming all and singular the rights, assets and revenues herein pledged or assigned, or intended so to be, or which the Governmental Agency may hereafter become bound to pledge or assign.

Section 6.2. Completion of Project.

The Governmental Agency hereby covenants and agrees to proceed expeditiously with and promptly complete the Project in accordance with the plans, designs and specifications prepared by the Engineers for the Governmental Agency.

Section 6.3. Establishment of Completion Date.

The completion date for the Project shall be evidenced to the Authority by a certificate signed by the Engineer and an authorized representative of the Governmental Agency stating that, except for amounts retained by the Authority for costs of the Project not then due and payable, (i) the Construction has been completed and all labor, services, materials, supplies, machinery and equipment used in such Construction have been paid for, (ii) all other facilities necessary in connection with the Project have been acquired, constructed, equipped and installed and all costs and expenses incurred in connection therewith have been paid, and (iii) the Project and all other facilities in connection therewith have been acquired, constructed, equipped and installed to its satisfaction.

Section 6.4. Commitment to Operate.

The Governmental Agency hereby covenants and agrees to commence operation of the Project immediately on completion of Construction and not to discontinue operations or dispose of such Project without the approval of the Authority.

Section 6.5. Continue to Operate.

The Governmental Agency hereby covenants and agrees to continuously operate and maintain the Project and the System in accordance with applicable provisions of federal and Kentucky law and to maintain adequate records relating to said operation; said records to be made available to the Authority upon its request at all reasonable times.

Section 6.6. Tax Covenant.

In the event the Authority issues Bonds which are intended to be excludable from gross income for federal income tax purposes to provide the funds for the Loan, the Governmental Agency shall at all times do and perform all acts and things permitted by law and necessary or desirable in order to assure such exclusion and shall take such actions as may be directed by the Authority in order to accomplish the foregoing. The Governmental Agency shall not permit (i) the proceeds of the Loan to be used directly or indirectly in any trade or business, (ii) its payments hereunder to be secured directly or indirectly by property to be used in a trade or business, (iii) any management agreement for the operation of the System, or (iv) any federal guarantee of its obligations hereunder without the prior written consent of the Authority. The Governmental Agency will not acquire or pledge any obligations which would cause the Bonds to be "arbitrage bonds" within the meaning of the Code.

Section 6.7. Accounts and Reports.

The Governmental Agency shall at all times keep, or cause to be kept, proper books of record and account in accordance with the "Uniform System of Accounts" established by the Commonwealth, in which complete and accurate entries shall be made of all its transactions relating to the System and which shall at all reasonable times be subject to the inspection of the Authority.

Section 6.8. Audit Requirements.

Within one hundred eighty (180) days after the end of each fiscal year of the Governmental Agency, the Governmental Agency shall provide to the Authority, itemized financial statements of income and expense and a balance sheet in reasonable detail, including disclosure of the Maintenance and Replacement Reserve, certified as accurate by a firm of independent certified public accountants or the Auditor of Public Accounts of the Commonwealth. All financial information must be satisfactory to the Authority as to form and content and be prepared in accordance with generally accepted accounting principles on a basis consistent with prior practice unless specifically noted thereon. With such financial statements, the Governmental Agency shall furnish to the Authority a certificate stating that, to the best knowledge of the authorized representative signing such certificate, no default under this Assistance Agreement exists on the date of such certificate, or if any such default shall then exist, describing such default with specificity. All recipients and subrecipients expending $750,000 or more in a year in Federal awards must have a single or program-specific audit conducted for that year in accordance with 2 CFR Part 200.

Section 6.9. General Compliance with all Duties.

The Governmental Agency shall faithfully and punctually perform all duties with reference to the System required by the Constitution and laws of the Commonwealth, and by the terms and provisions of the Act, the Federal Act and this Assistance Agreement and any other Debt Obligations.

Section 6.10. System Not to Be Disposed Of.

The Governmental Agency covenants and agrees that, until satisfaction in full of its obligations hereunder, it will not, without the prior written consent of the Authority, which consent shall not be unreasonably withheld, sell, mortgage, or in any manner dispose of, or surrender control or otherwise dispose of any of the facilities of the System or any part thereof (except that the Governmental Agency may retire obsolete and worn out facilities, and sell same, if appropriate).

Section 6.11. Further Covenants under the Federal Agreement.

The Governmental Agency shall comply with all further requirements or conditions which may arise from time to time in order to assure compliance with the Federal Act, and with the agreements of the Authority set forth in the Federal Agreement, including but not limited to the following:

(A) The Governmental Agency shall provide all information requested of it by the Authority or the Cabinet so that (i) the Grants Information Control System, referred to in the Federal Agreement, can be maintained, (ii) the accounting and auditing procedures required by the Federal Act can be maintained and (iii) the Authority can furnish the information required of it under the Federal Agreement.

(B) Qualified operating personnel, properly certified by the Cabinet, shall be retained by the Governmental Agency to operate the System during the entire term of this Assistance Agreement. An approved plan of operating and an operations and maintenance manual for the System shall be provided by the Governmental Agency to the Cabinet and the Authority. The System shall be operated and maintained in an efficient and effective manner.

(C) All residents in the service area of the System must be offered the same opportunity to become users of the System regardless of race, religion, color, national origin, sex, disability or level of income.

(D) The Governmental Agency shall comply with provisions contained in the following federal regulations, orders, acts and circulars and the following statutes and regulations of the Commonwealth.

(1) Federal Cross-Cutters

Environmental Authorities

(a) Archeological and Historic Preservation Act of 1974, Pub. L. 86-523, as amended
(b) Clean Air Act, Pub. L. 84-159, as amended
(c) 40 CFR 35.3580 (and Appendix A to Subpart L) – NEPA – Like State Environmental Review Process
(d) Environmental Justice, Executive Order 12898
(e) Floodplain Management, Executive Order 11988 as amended by Executive Order 12148
(f) Protection of Wetlands, Executive Order 11990
(g) Farmland Protection Policy Act, Pub. L. 97-98
(h) Fish and Wildlife Coordination Act, Pub. L. 85-624, as amended
(i) National Historic Preservation Act of 1966, PL 89-665, as amended
(j) Safe Drinking Water Act, Pub. L. 93-523, as amended
(k) Wild and Scenic Rivers Act, Pub. L. 90-542, as amended

Economic and Miscellaneous Authorities

(a) Demonstration Cities and Metropolitan Development Act of 1966, Pub. L. 89-754, as amended, Executive Order 12372
(b) Procurement Prohibitions under Section 306 of the Clean Air Act and Section 508 of the Clean Water Act, including Executive Order 11738, Administration of the Clean Air Act and the Federal Water Pollution Control Act with Respect to Federal Contracts, Grants, or Loans.

(c) Uniform Relocation and Real Property Acquisition Policies Act, Pub. L. 91-646, as amended
(d) Debarment and Suspension, Executive Order 12549

Social Policy Authorities

(a) Age Discrimination Act of 1975, Pub. L. 94-135
(b) Title VI of the Civil Rights Act of 1964, Pub. L. 88-352
(c) Section 13 of the Federal Water Pollution Control Act Amendments of 1972, Pub. L. 92-500 (the Clean Water Act)
(d) Section 504 of the Rehabilitation Act of 1973, Pub. L. 93-112 (including Executive Orders 11914 and 11250)
(e) Equal Employment Opportunity, Executive Order 11246
(f) Women's and Minority Business Enterprise, Executive Orders 11625, 12138, and 12432
(g) Section 129 of the Small Business Administration Reauthorization and Amendment Act of 1988, Pub. L. 100-590

(2) State:

(a) KRS 151
(b) KRS 224
(c) KRS 224A.1115 Federally Assisted Drinking Water Revolving Fund
(d) KRS Chapter 337, Labor Laws
(e) 401 KAR Chapter 8

Section 6.12. Continuing Disclosure Obligation.

The Governmental Agency covenants and agrees that notwithstanding any other provision of this Assistance Agreement to the contrary, upon written notice from the Authority that the Schedule of Payments provides ten percent (10%) or more of the debt service requirements on an issue of the Authority's Bonds and that compliance by the Governmental Agency with the requirements of Securities and Exchange Commission Rule 15c2-12, as amended (the "SEC Rule") is required in connection with the Authority's Bonds, the Governmental Agency shall provide to the Authority such information as may be required by the SEC Rule, within the time periods set out in such notice by the Authority, to enable the Authority to establish to the satisfaction of prospective purchasers of the Authority's Bonds that the requirements of the SEC Rule will be satisfied in connection with the issuance of the Authority's Bonds. The Governmental Agency further understands and agrees that the Authority shall act as the Governmental Agency's disclosure agent for purposes of compliance with the SEC Rule and that upon a failure by the Governmental Agency to provide the information required to be provided under the SEC Rule within the time frame specified in such notice, the Authority and/or the beneficial owners and holders of the Authority's Bonds shall be specifically granted the right of enforcing the provisions of this Section 6.12 by an action in mandamus, for specific performance, or similar remedy to compel performance.

Section 6.13. General.

The Governmental Agency shall do and perform or cause to be done and performed all acts and things required to be done or performed by or on behalf of the Governmental Agency under the provisions of the Act and this Assistance Agreement in accordance with the terms of such provisions including the Additional Covenants and Agreements, if any, set forth in **Exhibit G** hereto.

ARTICLE VII
MAINTENANCE, OPERATION, INSURANCE AND CONDEMNATION

Section 7.1. Maintain System.

The Governmental Agency agrees that during the entire term of this Assistance Agreement, it will keep the Project, including all appurtenances thereto, and the equipment and machinery therein, in good and sound repair and good operating condition at its own cost so that the completed Project will continue to provide the services for which the System is designed.

Section 7.2. Additions and Improvements.

The Governmental Agency shall have the privilege of making additions, modifications and improvements to the sites of the Project, and to the Project itself from time to time provided that said additions, modifications and improvements do not impair the operation or objectives of the Project. The cost of such additions, modifications and improvements shall be paid by the Governmental Agency, and the same shall be the property of the Governmental Agency and shall be included under the terms of this Assistance Agreement as part of the site of the Project, or the Project, as the case may be. Nothing herein contained shall be construed as precluding the Authority and the Governmental Agency from entering into one or more supplementary Assistance Agreements providing for an additional Loan or Loans in respect of additional Projects undertaken by the Governmental Agency.

Section 7.3. Compliance with State and Federal Standards.

The Governmental Agency agrees that it will at all times provide operation and maintenance of the System to comply with the water quality standards, if any, established by any state or federal agency. The Governmental Agency agrees that qualified operating personnel properly certified by the Commonwealth will be retained to operate the System during the entire term of this Assistance Agreement.

Section 7.4. Access to Records.

The Governmental Agency agrees that it will permit the Authority and any state or federal agency and their respective agents to have access to the records of the Governmental Agency pertaining to the operation and maintenance of the System at any reasonable time following completion of construction of the Project, and commencement of operations thereof.

Section 7.5. Covenant to Insure - Casualty.

The Governmental Agency agrees to insure the System facilities in such amount as like properties are similarly insured by political subdivisions similarly situated, against loss or damage of the kinds usually insured against by political subdivisions similarly situated, by means of policies issued by reputable insurance companies duly qualified to do such business in the Commonwealth.

Section 7.6. Authority as Named Insured.

For so long as any amounts are due and payable under this Assistance Agreement, any insurance policy issued pursuant to Section 7.5 hereof, shall be so written or endorsed as to make losses, if any, payable to the Governmental Agency, and to the Authority, as their interests may appear.

Section 7.7. Covenant to Insure - Liability.

The Governmental Agency agrees that it will carry public liability insurance with reference to the System with one or more reputable insurance companies duly qualified to do business in the Commonwealth, insuring against such risks (including but not limited to personal injury, death and property damage) and in such amounts as are set forth in the Project Specifics, and naming the Authority as an additional insured.

Section 7.8. Covenant Regarding Worker's Compensation.

Throughout the entire term of this Assistance Agreement, the Governmental Agency shall maintain worker's compensation coverage, or cause the same to be maintained.

Section 7.9. Application of Casualty Insurance Proceeds.

If, prior to the completion of the term of this Assistance Agreement, the Project shall be damaged or partially or totally destroyed by fire, windstorm or other casualty, there shall be no abatement or reduction in the amount payable by the Governmental Agency pursuant to the terms of this Assistance Agreement and the Governmental Agency will (1) promptly repair, rebuild or restore the Project damaged or destroyed and (2) apply for such purpose so much as may be necessary of any net proceeds of insurance resulting from claims for such losses, as well as any additional moneys of the Governmental Agency necessary therefor. All net proceeds of insurance resulting from claims for such losses shall be paid to the Governmental Agency, and shall be promptly applied as herein provided.

Section 7.10. Eminent Domain.

In the event that title to, or the temporary use of, the Project or any part thereof shall be taken under the exercise of the power of eminent domain by any governmental body or by any Person acting under governmental authority, there shall be no abatement or reduction in the minimum amounts payable by the Governmental Agency to the Authority pursuant to the terms of this Assistance Agreement, and any and all net proceeds received from any award made in such eminent domain proceedings shall be paid to and held by the Governmental Agency in a separate

condemnation award account and shall be applied by the Governmental Agency in either or both of the following ways, as shall be determined by the Governmental Agency in its sole discretion:

(A) The restoration of the improvements located on the Project sites to substantially the same condition as prior to the exercise of said power of eminent domain; or

(B) The acquisition of additional property, if necessary, and the acquisition of additional facilities by construction or otherwise, equivalent to the Project facilities, which property and facilities shall be deemed to be a part of the Project sites and a part of the Project facilities and to be substituted for Project facilities so taken by eminent domain, without the payment of any amount other than herein provided, to the same extent as if such property and facilities were specifically described herein.

Any balance of the net proceeds of the award in such eminent domain proceedings after the carrying out of the mandatory proceedings stipulated in (A) and (B) of this Section 7.10, shall be paid to the Governmental Agency upon delivery to the Authority of a certificate signed by an authorized officer of the Governmental Agency to the effect that the Governmental Agency has complied with either subparagraph (A) or (B), or both, of this Section, and written approval of such certificate by an authorized officer of the Authority. In no event will the Governmental Agency voluntarily settle or consent to the settlement of any prospective or pending condemnation proceedings with respect to the Project or any part thereof without the written consent of the Authority.

Section 7.11. Flood Insurance.

For so long as any amounts are due and payable under this Assistance Agreement, all structures located in flood prone areas shall be covered by flood insurance carried by the Governmental Agency for an amount equal to the replacement cost excluding the cost of land and any uninsurable improvements, or for the maximum limit available under the National Flood Insurance Act of 1968, as amended, whichever is less.

ARTICLE VIII
EVENTS OF DEFAULT AND REMEDIES

Section 8.1. Events of Default Defined.

The following will be "Events of Default" under this Assistance Agreement and the term "Event of Default" or "Default" will mean, whenever it is used in this Assistance Agreement, any one or more of the following events:

(A) Failure by the Governmental Agency to pay any payments at the times specified herein.

(B) Failure by the Governmental Agency to observe or perform any covenant, condition or agreement on its part to be observed or performed, other than as referred to in subsection (A) of this Section, for a period of thirty (30) days after written notice specifying such failure and requesting that it be remedied will have been given to the Governmental

Agency by the Authority unless the Authority agrees in writing to an extension of such time prior to its expiration; provided, however, if the failure stated in the notice cannot be corrected within the applicable period, the Authority will not unreasonably withhold its consent to an extension of such time if corrective action is instituted by the Governmental Agency within the applicable period and diligently pursued until such failure is corrected.

(C) The dissolution or liquidation of the Governmental Agency, or the voluntary initiation by the Governmental Agency of any proceeding under any federal or Kentucky law relating to bankruptcy, insolvency, arrangement, reorganization, readjustment of debt or any other form of debtor relief, or the initiation against the Governmental Agency of any such proceeding which remain undismissed for sixty (60) days, or the entry by the Governmental Agency into an agreement of composition with creditors or the failure generally by the Governmental Agency to pay its debts as they become due.

(D) A default by the Governmental Agency under the provisions of any agreements relating to its Debt Obligations.

Section 8.2. Remedies on Default.

Whenever any Event of Default referred to in Section 8.1 has occurred and is continuing (other than an event of default arising under Section 6.12 of this Assistance Agreement), the Authority may, without any further demand or notice, take one or any combination of the following remedial steps:

(A) Declare the principal of and interest on the Loan, and all other payments due hereunder, to be immediately due and payable.

(B) Exercise all the rights and remedies of the Authority set forth in the Act.

(C) Take whatever action at law or in equity may appear necessary or desirable to enforce its rights under this Assistance Agreement.

(D) Submit a formal referral to the appropriate federal agency, as required by the Federal Agreement.

The sole remedies for an Event of Default under this Assistance Agreement arising by virtue of the failure of the Governmental Agency to comply with the provisions of Section 6.12 hereof shall be those remedies specifically set forth in Section 6.12 hereof

Section 8.3. Appointment of Receiver.

Upon the occurrence of an Event of Default, and upon the filing of a suit or other commencement of judicial proceedings to enforce the rights of the Authority under this Assistance Agreement, the Authority shall be entitled, as a matter of right, to the appointment of a receiver or receivers of the System and all receipts therefrom, pending such proceedings, with such power as the court making such appointment shall confer, provided, however, that the Authority may, with

or without action under this Section, pursue any available remedy to enforce the payment obligations hereunder, or to remedy any Event of Default.

Section 8.4. No Remedy Exclusive.

No remedy herein conferred upon or reserved to the Authority is intended to be exclusive, and every such remedy will be cumulative and will be in addition to every other remedy given hereunder and every remedy now or hereafter existing at law or in equity. No delay or omission to exercise any right or power accruing upon any default will impair any such right or power and any such right and power may be exercised from time to time and as often as may be deemed expedient.

Section 8.5. Consent to Powers of Authority Under Act.

The Governmental Agency hereby acknowledges to the Authority its understanding of the provisions of the Act, vesting in the Authority certain powers, rights and privileges in respect of the Project upon the occurrence of an Event of Default, and the Governmental Agency hereby covenants and agrees that if the Authority should in the future have recourse to said rights and powers, the Governmental Agency shall take no action of any nature whatsoever calculated to inhibit, nullify, void, delay or render nugatory such actions of the Authority in the due and prompt implementation of this Assistance Agreement.

Section 8.6. Waivers.

In the event that any agreement contained herein should be breached by either party and thereafter waived by the other party, such waiver will be limited to the particular breach so waived and will not be deemed to waive any other breach hereunder.

Section 8.7. Agreement to Pay Attorneys' Fees and Expenses.

In the event that either party hereto defaults under any of the provisions hereof and the non-defaulting party employs attorneys or incurs other expenses for the enforcement of performance or observance of any obligation or agreement on the part of the defaulting party herein contained, the defaulting party agrees that it will pay on demand therefor to the non-defaulting party the fees of such attorneys and such other expenses so incurred by the non-defaulting party.

ARTICLE IX
MISCELLANEOUS PROVISIONS

Section 9.1. Approval not to be Unreasonably Withheld.

Any approval of the Authority required by this Assistance Agreement shall not be unreasonably withheld and shall be deemed to have been given on the thirtieth (30th) day following the submission of any matter requiring approval to the Authority, unless disapproved in writing prior to such thirtieth (30th) day. Any provision of this Assistance Agreement requiring the approval of the Authority or the satisfaction or the evidence of satisfaction of the Authority shall be interpreted as requiring action by an authorized officer of the Authority granting, authorizing or expressing such approval or satisfaction, as the case may be, unless such provision expressly provides otherwise.

Section 9.2. Approval.

This Agreement is made subject to, and conditioned upon, the approval of this Assistance Agreement by the Secretary of the Finance and Administration Cabinet.

Section 9.3. Effective Date.

This Assistance Agreement shall become effective on the Effective Date and shall continue in full force and effect until the date the obligations of the Governmental Agency pursuant to the provisions of this Assistance Agreement have been fully satisfied.

Section 9.4. Binding Effect.

This Assistance Agreement shall be binding upon and shall inure to the benefit of the parties hereto, and to any person, officer, board, department, agency, municipal corporation, or body politic and corporate succeeding by operation of law to the powers and duties of either of the parties hereto. This Assistance Agreement shall not be revocable by either of the parties, without the written consent of the other party.

Section 9.5. Severability.

In the event that any provision of this Assistance Agreement will be held invalid or unenforceable by any court of competent jurisdiction, such holding will not invalidate or render unenforceable any other provision hereof.

Section 9.6. Assignability.

The rights of the Authority under this Assistance Agreement shall be assignable by the Authority without the consent of the Governmental Agency, but none of the rights, duties or obligations of the Governmental Agency under this Assistance Agreement shall be assignable by the Governmental Agency without the prior written consent of the Authority.

Section 9.7. Execution in Counterparts.

This Assistance Agreement may be simultaneously executed in several counterparts, each of which will be an original and all of which will constitute but one and the same instrument.

Section 9.8. Applicable Law.

This Assistance Agreement will be governed by and construed in accordance with the laws of the Commonwealth.

Section 9.9. Captions.

The captions or headings herein are for convenience only and in no way define, limit or describe the scope or intent of any provisions or sections of this Assistance Agreement.

[Signature Page Follows]

IN WITNESS WHEREOF, the parties hereto have caused this Assistance Agreement to be executed by their respective duly authorized officers as of the Effective Date.

KENTUCKY INFRASTRUCTURE AUTHORITY

By: _____
Chairman

ATTEST:

By: Margaret F. Link
Margaret F. Link (Mar 7, 2023 12:15 EST)
Secretary of Kentucky Infrastructure Authority

GOVERNMENTAL AGENCY:
NORTHERN KENTUCKY WATER DISTRICT

By: _____
Chair

ATTEST:

By: _____
Secretary of Governmental Agency

APPROVED:

By: patrick McGee
patrick McGee (Mar 7, 2023 13:48 EST)
Secretary/Finance and Administration
Cabinet of the Commonwealth of Kentucky

EXAMINED:

By: _____
Legal Counsel to the
Kentucky Infrastructure Authority

APPROVED AS TO FORM AND LEGALITY:

By: Holly Johnson
Approved, Finance and
Administration Cabinet

EXHIBIT A
NORTHERN KENTUCKY WATER DISTRICT
PROJECT SPECIFICS
F20-044

GOVERNMENTAL AGENCY:

Name: Northern Kentucky Water District
PO Box 18640
Erlanger, KY 41018

Contact Person: Lindsey Rechtin
CFO

SYSTEM: Water

PROJECT:

This project includes two new generators for providing backup electrical power supply to the Taylor Mill Treatment Plant and pumping station during emergencies. The project will also replace treatment process equipment in two basins at the Fort Thomas Treatment Plant that has reached the end of its useful life as well as repair the concrete walls of the basin.

PROJECT BUDGET:

		Total
Administrative Expenses	$	2,000
Engineering Fees - Design		190,000
Engineering Fees - Construction		75,000
Engineering Fees - Inspection		75,000
Construction		8,908,000
Contingency		800,000
Total	**$**	**10,050,000**

FUNDING SOURCES:

		Amount	%
Fund F Loan	$	8,000,000	80%
Local Funds		2,050,000	20%
Total	**$**	**10,050,000**	**100%**

KIA DEBT SERVICE:

Construction Loan	$	8,000,000
Less: Principal Forgiveness		0
Amortized Loan Amount	$	8,000,000
Interest Rate		1.50%
Loan Term (Years)		20
Estimated Annual Debt Service	$	464,482
Administrative Fee (0.25%)		20,000
Total Estimated Annual Debt Service	**$**	**484,482**

AMORTIZATION SCHEDULE OF PAYMENTS: June 1 and December 1

Interest payments will commence within six months from first draw of funds (estimated 06/01/23).

Full principal and interest payments will commence within one year of initiation of operation (estimated 06/01/24). All interest and principal repayments shall be made by Automated Clearing House "ACH" transfers.

REPLACEMENT AND MAINTENANCE RESERVE ACCOUNT: $ 20,000 ANNUAL AMOUNT
$ 400,000 TOTAL AMOUNT

The annual maintenance replacement cost is 5% ($400,000) of the final amount borrowed (prior to principal forgiveness, if any) to be funded annually ($20,000) each December 1 over 20 years and maintained for the life of the loan.

ADMINISTRATIVE FEE: 0.25%

DEFAULT RATE: 8.00%

DEBT OBLIGATIONS CURRENTLY OUTSTANDING:

	Outstanding	Maturity
Revenue Bonds Series 2011	$ 24,505,000	2035
Revenue Bonds Series 2012	41,475,000	2027
Revenue Bonds Series 2013A	23,160,000	2038
Revenue Bonds Series 2013B	15,365,000	2028
Revenue Bonds Series 2014B	8,135,000	2029
Revenue Bonds Series 2016A	37,540,000	2031
RD Loan 91-02	1,741,000	2039
RD Loan 91-03	1,733,000	2057
BAN Series 2017 (i/a/o $26m)	17,325,000	TBD
KIA Loan F08-07	2,882,619	2032
KIA Loan F09-02	18,321,443	TBD
KIA Loan F13-012 (i/a/o $8m)	4,523,000	TBD
KIA Loan F14-015 (i/a/o $4m)	3,471,489	2038
KIA Loan F15-011	3,460,901	2038
KIA Loan B15-003	1,328,896	2037
Kenton County Fiscal Court	100,000	TBD
Bond Premiums	8,118,162	
Total	**$ 213,185,510**	

LIABILITY INSURANCE COVERAGE:

Death or Personal Injury (per person)	$1,000,000
Death or Personal Injury (per occurrence)	$2,000,000
Property Damage on System	$330,367,940

EXHIBIT B

REQUEST FOR PAYMENT AND PROJECT STATUS REPORT

Borrower: _____

WX/SX Number: _____ KIA Loan #
Draw Number _____ Date: _____

The above identified Governmental Agency has entered into an Assistance Agreement with the Kentucky Infrastructure Authority (the "Authority") for the acquisition and construction of facilities described in the Assistance Agreement as the "Project."

Pursuant to the Assistance Agreement, we hereby certify that we have incurred the following expenses in connection with the Project and that the Authority's funding share of these expenses is in the amount so denoted in this request.

Documentation supporting the expenses incurred and identified per this request are attached.

Funds Requested: _____

Project Budget and Expenses

Line Item	Cost	Expenses This Request	Expenses to Date	Project Budget	Balance
1	Administrative				
2	Legal				
3	Land, Appraisals, Easements				
4	Relocation Expense				
5	Planning				
6	Engineering Fees – Design				
7	Engineering Fees - Construction				
8	Engineering Fees – Inspection				
9	Construction				
10	Equipment				
11	Contingency				
12	Other				
	TOTAL				

If expenses to date exceed project budget a revised budget must be submitted to and approved by the Authority before funds will be released.

Project Funding

	Funding Agency	Expenses This Request	Expenses to Date	Project Budget	Balance
1					
2					
3					
4					
5					
6					
7					
8					
9					

10
11
12

TOTAL _____

We certify that the expenses in this draw request were incurred pursuant to local procurement policies which conform to KRS 45A.

Borrower Signature: _____

Project Administrator: _____

Draw # _____

STATUS REPORT:

PROJECT IS:

On schedule	_____
Ahead of schedule	_____
Behind schedule	_____
If ahead or behind, please explain	_____

PROJECT EXPENSES THIS DRAW REQUEST

(Include Invoices for Expenses Listed Below)

Line Item	Draw #	Vender	Amount

CERTIFICATE OF CONSULTING ENGINEERS AS TO PAYMENT REQUEST

The undersigned, a duly qualified and licensed Engineer hereby certifies that he or she represents the Governmental Agency submitting this request in connection with the "Eligible Project" and that all expenses represented in this request were duly incurred for the Construction of the "Project," that the Authority's funding share of these expenses is accurately represented and that such expenses have not been the subject of any request for disbursement previously submitted.

_____

Engineer/Architect

_____

Firm Name

EXHIBIT C

SCHEDULE OF SERVICE CHARGES

(See Attached)

SECTION II – RETAIL WATER RATES

Northern Kentucky Water District Service Area

1. Monthly Service Rate

First	1,500 cubic feet	$4.77 per 100 cubic feet
Next	163,500 cubic feet	$4.44 per 100 cubic feet
Over	165,000 cubic feet	$3.25 per 100 cubic feet

Customers in Subdistrict B *shall be assessed a monthly surcharge in the amount of	$11.96	(R)
Customers in Subdistrict C *shall be assessed a monthly surcharge in the amount of	$11.06	(I)
Customers in Subdistrict D *shall be assessed a monthly surcharge in the amount of	$28.96	
Customers in Subdistrict E *shall be assessed a monthly surcharge in the amount of	$29.41	(R)
Customers in Subdistrict F *shall be assessed a monthly surcharge in the amount of	$13.70	(R)
Customers in Subdistrict G *shall be assessed a monthly surcharge in the amount of	$19.19	(R)
Customers in Subdistrict H *shall be assessed a monthly surcharge in the amount of	$30.00	
Customers in Subdistrict I *shall be assessed a monthly surcharge in the amount of	$28.92	(R)
Customers in Subdistrict K *shall be assessed a monthly surcharge in the amount of	$6.45	(I)
Customers in Subdistrict M *shall be assessed a monthly surcharge in the amount of	$30.00	
Customers in Subdistrict R *shall be assessed a monthly surcharge in the amount of	$4.59	(R)
Customers in Subdistrict RF *shall be assessed a monthly surcharge in the amount of	$20.97	(R)
~~**Customers in Subdistrict RL** *shall be assessed a monthly surcharge in the amount of~~	$0	(D)

*Subdistrict charges are reviewed annually.
*Detailed street listing within each Subdistrict can be found under Section XXIV.
*Service connections on extensions or laterals from a subdistrict street will be assessed the appropriate Subdistrict charge.
~~**Subdistrict RL surcharge ends September 2021.~~ (D)
**Subdistrict R surcharge ends February 2022. (N)

2. Quarterly Rates

First	4,500 cubic feet	$4.77 per 100 cubic feet
Next	490,500 cubic feet	$4.44 per 100 cubic feet
Over	495,000 cubic feet	$3.25 per 100 cubic feet

DATE OF ISSUE: 1/24/2022
DATE EFFECTIVE: 1/1/2022
ISSUED BY: Lindsey Rechtin
TITLE: Incoming President/CEO and VP of Finance & Support Services

KENTUCKY
PUBLIC SERVICE COMMISSION
Linda C. Bridwell
Executive Director
Linda C. Bridwell
EFFECTIVE
1/1/2022
PURSUANT TO 807 KAR 5:011 SECTION 9 (1)

SECTION II – RETAIL WATER RATES – Cont'd

3. Fixed Service Charge (T)

Meter Size	Monthly Service Charge	Quarterly Charge
5/8"	$18.50	$40.50
¾"	$19.00	$42.50
1"	$20.80	$48.80
1 ½"	$23.40	$57.70
2"	$29.60	$80.90
3"	$71.30	$251.80
4"	$89.50	$315.50
6"	$132.40	$466.20
8"	$178.80	$637.10
10" and Larger	$237.80	$831.90

SECTION III – WHOLESALE WATER SALES

(T)

Bullock Pen Water District	$3.98 per 1,000 gallons (or) $2.98 per 100 cubic feet
City of Walton	$3.98 per 1,000 gallons (or) $2.98 per 100 cubic feet
Pendleton County	$3.98 per 1,000 gallons (or) $2.98 per 100 cubic feet

SECTION IV – MISCELLANEOUS SERVICE FEES

(T)

Returned Check Charge	$20.00
Water Hauling Station	$6.38 per 1,000 gallons
Service Charge	$25.00 (See Definitions in Section I-A)
Overtime Charge	$60.00 (To be applied to Customer account for Request for water turned On or Off outside normal business hours.)

DATE OF ISSUE: 3/16/2021
DATE EFFECTIVE: 4/16/2021
ISSUED BY: Lindsey Rechtin
TITLE: Vice-President of Finance & Support Services

KENTUCKY
PUBLIC SERVICE COMMISSION
Linda C. Bridwell
Executive Director
Linda C. Bridwell
EFFECTIVE
4/16/2021
PURSUANT TO 807 KAR 5:011 SECTION 9 (1)

SECTION II – RETAIL WATER RATES

Northern Kentucky Water District Service Area

1. Monthly Service Rate

First	1,500 cubic feet	$4.77 per 100 cubic feet
Next	163,500 cubic feet	$4.44 per 100 cubic feet
Over	165,000 cubic feet	$3.25 per 100 cubic feet

Customers in Subdistrict B *shall be assessed a monthly surcharge in the amount of	$11.96	(R)
Customers in Subdistrict C *shall be assessed a monthly surcharge in the amount of	$11.06	(I)
Customers in Subdistrict D *shall be assessed a monthly surcharge in the amount of	$28.96	
Customers in Subdistrict E *shall be assessed a monthly surcharge in the amount of	$29.41	(R)
Customers in Subdistrict F *shall be assessed a monthly surcharge in the amount of	$13.70	(R)
Customers in Subdistrict G *shall be assessed a monthly surcharge in the amount of	$19.19	(R)
Customers in Subdistrict H *shall be assessed a monthly surcharge in the amount of	$30.00	
Customers in Subdistrict I *shall be assessed a monthly surcharge in the amount of	$28.92	(R)
Customers in Subdistrict K *shall be assessed a monthly surcharge in the amount of	$6.45	(I)
Customers in Subdistrict M *shall be assessed a monthly surcharge in the amount of	$30.00	
Customers in Subdistrict R *shall be assessed a monthly surcharge in the amount of	$4.59	(R)
Customers in Subdistrict RF *shall be assessed a monthly surcharge in the amount of	$20.97	(R)
~~**Customers in Subdistrict RL** *shall be assessed a monthly surcharge in the amount of~~	$0	(D)

*Subdistrict charges are reviewed annually.
*Detailed street listing within each Subdistrict can be found under Section XXIV.
*Service connections on extensions or laterals from a subdistrict street will be assessed the appropriate Subdistrict charge.
~~**Subdistrict RL surcharge ends September 2021.~~ (D)
**Subdistrict R surcharge ends February 2022. (N)

2. Quarterly Rates

First	4,500 cubic feet	$4.77 per 100 cubic feet
Next	490,500 cubic feet	$4.44 per 100 cubic feet
Over	495,000 cubic feet	$3.25 per 100 cubic feet

DATE OF ISSUE: 1/24/2022
DATE EFFECTIVE: 1/1/2022
ISSUED BY: Lindsey Rechtin
TITLE: Incoming President/CEO and VP of Finance & Support Services

KENTUCKY
PUBLIC SERVICE COMMISSION
Linda C. Bridwell
Executive Director
Linda C. Bridwell
EFFECTIVE
1/1/2022
PURSUANT TO 807 KAR 5:011 SECTION 9 (1)

SECTION II – RETAIL WATER RATES – Cont'd

3. Fixed Service Charge (T)

Meter Size	Monthly Service Charge	Quarterly Charge
5/8"	$18.50	$40.50
¾"	$19.00	$42.50
1"	$20.80	$48.80
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2"	$29.60	$80.90
3"	$71.30	$251.80
4"	$89.50	$315.50
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(T)

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(T)

Returned Check Charge	$20.00
Water Hauling Station	$6.38 per 1,000 gallons
Service Charge	$25.00 (See Definitions in Section I-A)
Overtime Charge	$60.00 (To be applied to Customer account for Request for water turned On or Off outside normal business hours.)

DATE OF ISSUE: 3/16/2021
DATE EFFECTIVE: 4/16/2021
ISSUED BY: Lindsey Rechter
TITLE: Vice-President of Finance & Support Services

KENTUCKY
PUBLIC SERVICE COMMISSION
Linda C. Bridwell
Executive Director
Linda C. Bridwell
EFFECTIVE
4/16/2021
PURSUANT TO 807 KAR 5:011 SECTION 9 (1)

EXHIBIT D

RESOLUTION

A RESOLUTION APPROVING AND AUTHORIZING AN ASSISTANCE AGREEMENT BETWEEN THE NORTHERN KENTUCKY WATER DISTRICT AND THE KENTUCKY INFRASTRUCTURE AUTHORITY TO PROVIDE UP TO $8,000,000 OF LOAN FUNDS FOR PROJECT NUMBER F20-044.

WHEREAS, the Board of Commissioners ("Governing Authority") of the Northern Kentucky Water District ("Governmental Agency") has previously determined that it is in the public interest to acquire and construct certain facilities and improvements (the "Project") to the Governmental Agency's water system (the "System");

WHEREAS, the Governmental Agency has made application to the Kentucky Infrastructure Authority (the "Authority") for the purpose of providing monies to for the Project; and

WHEREAS, in order to obtain such monies, the Governmental Agency is required to enter into an Assistance Agreement (the "Assistance Agreement") with the Authority.

NOW, THEREFORE, IT IS RESOLVED by the Board of Commissioners of the Northern Kentucky Water District, as follows:

SECTION 1. That the Governing Authority hereby approves and authorizes the Assistance Agreement between the Governmental Agency and the Authority regarding Project Number F20-044 substantially in the form on file with the Governmental Agency to provide the necessary financing to the Governmental Agency for the Project.

SECTION 2. That the Chair and Secretary of the Governmental Agency be and hereby are authorized, directed and empowered to execute necessary documents or agreements, and to otherwise act on behalf of the Governmental Agency to effect such financing.

SECTION 3. That this resolution shall take effect at the earliest time provided by law.

ADOPTED on February 16, 2023.

GOVERNMENTAL AGENCY:
NORTHERN KENTUCKY WATER DISTRICT

By: _____
Chair

ATTEST:

By: _____
Secretary of Governmental Agency

CERTIFICATE

I, the undersigned, hereby certify that I am the duly qualified and acting Secretary of the Northern Kentucky Water District; that the foregoing is a full, true and correct copy of a Resolution adopted by the Board of Commissioners of the Northern Kentucky Water District at a meeting duly held on February 16, 2023; that said official action appears as a matter of public record in the official records or journal of the governing authority; that said meeting was held in accordance with all applicable requirements of Kentucky law, including KRS 61.810, 61.815, 61.820 and 61.823; that a quorum was present at said meeting; that said official action has not been modified, amended, revoked or repealed and is now in full force and effect.

IN TESTIMONY WHEREOF, witness my signature this February 16, 2023.

_____

Secretary of Governmental Agency

EXHIBIT E

OPINION OF COUNSEL

[Letterhead of Counsel to Governmental Agency]

February 16, 2023

Kentucky Infrastructure Authority
100 Airport Road, Third Floor
Frankfort, Kentucky 40601

Re: Assistance Agreement by and between Kentucky Infrastructure Authority and the Northern Kentucky Water District, regarding Project Number: F20-044.

Ladies and Gentlemen:

The undersigned is an attorney at law duly admitted to the practice of law in the Commonwealth of Kentucky and is legal counsel to the Northern Kentucky Water District ("the "Governmental Agency"). I am familiar with the organization and existence of the Governmental Agency and the laws of the Commonwealth applicable thereto. Additionally, I am familiar with the drinking water supply project (the "Project") with respect to which the Assistance Agreement dated the date hereof by and between the Kentucky Infrastructure Authority ("Authority") and the Governmental Agency (the "Assistance Agreement") is being authorized, executed and delivered.

I have reviewed the form of Assistance Agreement by and between the Authority and the Governmental Agency, the legislation of the governing authority authorizing the execution and delivery of said Assistance Agreement and the plans, designs and specifications prepared by the engineers for the Governmental Agency with respect to the Project.

Based upon my review I am of the opinion that:

1) The Governmental Agency is a duly organized and existing municipal corporation and political subdivision of the Commonwealth of Kentucky validly existing under the Constitution and statutes of the Commonwealth of Kentucky.

2) The Assistance Agreement has been duly executed and delivered by the Governmental Agency and is a valid and binding obligation of the Governmental Agency enforceable in accordance with its terms, except to the extent that the enforceability thereof may be limited by equitable principles and by bankruptcy, reorganization, moratorium, insolvency or similar laws heretofore or hereafter enacted relating to or affecting the enforcement of creditors' rights or remedies generally.

3) The Governmental Agency has all necessary power and authority (i) to enter into, perform and consummate all transactions contemplated by the Assistance Agreement and (ii) to execute and deliver the documents and instruments to be executed and delivered by it in connection with the construction of the Project.

4) The Service Charges, as defined in the Assistance Agreement, are in full force and effect and have been duly and lawfully adopted by the Governmental Agency.

5) The execution and delivery of the Assistance Agreement and the performance by the Governmental Agency of its obligations thereunder does not and will not conflict with, violate or constitute a default under any court or administrative order, decree or ruling, or any law, statute, ordinance or regulation, or any agreement, indenture, mortgage, lease, note or other obligation or instrument, binding upon the Governmental Agency, or any of its properties or assets. The Governmental Agency has obtained each and every authorization, consent, permit, approval or license of, or filing or registration with, any court or governmental department, commission, board, bureau, agency or instrumentality, or any specifically granted exemption from any of the foregoing, that is necessary to the valid execution, delivery or performance by the Governmental Agency of the Assistance Agreement and the imposition of the Service Charges.

6) To the best of my knowledge after due inquiry there is no action, suit, proceedings or investigation at law or in equity before any court, public board or body pending or threatened against, affecting or questioning (i) the valid existence of the Governmental Agency, (ii) the right or title of the members and officers of the Governmental Agency to their respective positions, (iii) the authorization, execution, delivery or enforceability of the Assistance Agreement or the application of any monies or security therefor, (iv) the construction of the Project, (v) the validity or enforceability of the Service Charges or (vi) that would have a material adverse impact on the ability of the Governmental Agency to perform its obligations under the Assistance Agreement.

7) None of the proceedings or authority heretofore taken by the Governmental Agency for the authorization, execution or delivery of the Assistance Agreement have been repealed, rescinded, or revoked.

8) To the best of my knowledge, the Governmental Agency has fully complied with all federal and state labor and procurement laws in connection with the acquisition and construction of the Project.

9) All proceedings and actions of the Governmental Agency with respect to which the Assistance Agreement is to be delivered were taken at meetings properly convened and held in substantial compliance with the applicable provisions of Sections 61.805 to 61.850 of the Kentucky Revised Statutes.

Very truly yours,

EXHIBIT F

LOAN TERM SCHEDULE

Principal Amount of Loan:	$8,000,000
Loan Interest Rate:	1.50%
Default Interest Rate:	8.00%
Authority's Administrative Fee:	0.25%
Loan Payment Dates:	Each June 1 and December 1
Amortization Commencement Date:	June 1, 2024
Schedule of Payments:	See attached

It is understood and agreed by the parties to this Assistance Agreement that this Term Loan Schedule (Exhibit F) is an integral part of the Assistance Agreement between the Governmental Agency and the Authority. This Term Loan Schedule may be amended, supplemented or modified by the mutual agreement of the Governmental Agency and the Authority provided that such amendment, supplement or modification shall be in writing and executed by the respective duly authorized officers of the Governmental Agency and the Authority. Upon the execution and delivery of any amended, supplemented or modified Term Loan Schedule, the Assistance Agreement and the Term Loan Schedule shall be, and be deemed to be, amended, supplemented and modified in accordance therewith, and the respective rights, duties and obligations under the Assistance Agreement of the Governmental Agency and the Authority shall thereafter be determined, exercised and enforced under the Assistance Agreement subject in all respects to such amendments, supplements and modifications.

KENTUCKY INFRASTRUCTURE AUTHORITY
ANTICIPATED REPAYMENT SCHEDULE
LOAN #F20-044
NORTHERN KENTUCKY WATER DISTRICT

1.50% Interest
$232,241.25 P & I Calculation

Payment Date	Principal Due	Interest Due	Interest Rate	Principal & Interest	Servicing Fee	Credit Due	Total Payment	Principal Balance	R & M Reserve	Total Reserve
								$8,000,000.00		
06/01/24	$172,241.25	$60,000.00	1.50%	$232,241.25	$10,000.00	$0.00	$242,241.25	$7,827,758.75	$0.00	$0.00
12/01/24	$173,533.06	$58,708.19	1.50%	$232,241.25	$9,784.70	$0.00	$242,025.95	$7,654,225.69	$20,000.00	$20,000.00
06/01/25	$174,834.56	$57,406.69	1.50%	$232,241.25	$9,567.78	$0.00	$241,809.03	$7,479,391.13	$0.00	$20,000.00
12/01/25	$176,145.82	$56,095.43	1.50%	$232,241.25	$9,349.24	$0.00	$241,590.49	$7,303,245.31	$20,000.00	$40,000.00
06/01/26	$177,466.91	$54,774.34	1.50%	$232,241.25	$9,129.06	$0.00	$241,370.31	$7,125,778.40	$0.00	$40,000.00
12/01/26	$178,797.91	$53,443.34	1.50%	$232,241.25	$8,907.22	$0.00	$241,148.47	$6,946,980.49	$20,000.00	$60,000.00
06/01/27	$180,138.90	$52,102.35	1.50%	$232,241.25	$8,683.73	$0.00	$240,924.98	$6,766,841.59	$0.00	$60,000.00
12/01/27	$181,489.94	$50,751.31	1.50%	$232,241.25	$8,458.55	$0.00	$240,699.80	$6,585,351.65	$20,000.00	$80,000.00
06/01/28	$182,851.11	$49,390.14	1.50%	$232,241.25	$8,231.69	$0.00	$240,472.94	$6,402,500.54	$0.00	$80,000.00
12/01/28	$184,222.50	$48,018.75	1.50%	$232,241.25	$8,003.13	$0.00	$240,244.38	$6,218,278.04	$20,000.00	$100,000.00
06/01/29	$185,604.16	$46,637.09	1.50%	$232,241.25	$7,772.85	$0.00	$240,014.10	$6,032,673.88	$0.00	$100,000.00
12/01/29	$186,996.20	$45,245.05	1.50%	$232,241.25	$7,540.84	$0.00	$239,782.09	$5,845,677.68	$20,000.00	$120,000.00
06/01/30	$188,398.67	$43,842.58	1.50%	$232,241.25	$7,307.10	$0.00	$239,548.35	$5,657,279.01	$0.00	$120,000.00
12/01/30	$189,811.66	$42,429.59	1.50%	$232,241.25	$7,071.60	$0.00	$239,312.85	$5,467,467.35	$20,000.00	$140,000.00
06/01/31	$191,235.24	$41,006.01	1.50%	$232,241.25	$6,834.33	$0.00	$239,075.58	$5,276,232.11	$0.00	$140,000.00
12/01/31	$192,669.51	$39,571.74	1.50%	$232,241.25	$6,595.29	$0.00	$238,836.54	$5,083,562.60	$20,000.00	$160,000.00
06/01/32	$194,114.53	$38,126.72	1.50%	$232,241.25	$6,354.45	$0.00	$238,595.70	$4,889,448.07	$0.00	$160,000.00
12/01/32	$195,570.39	$36,670.86	1.50%	$232,241.25	$6,111.81	$0.00	$238,353.06	$4,693,877.68	$20,000.00	$180,000.00
06/01/33	$197,037.17	$35,204.08	1.50%	$232,241.25	$5,867.35	$0.00	$238,108.60	$4,496,840.51	$0.00	$180,000.00
12/01/33	$198,514.95	$33,726.30	1.50%	$232,241.25	$5,621.05	$0.00	$237,862.30	$4,298,325.56	$20,000.00	$200,000.00
06/01/34	$200,003.81	$32,237.44	1.50%	$232,241.25	$5,372.91	$0.00	$237,614.16	$4,098,321.75	$0.00	$200,000.00
12/01/34	$201,503.84	$30,737.41	1.50%	$232,241.25	$5,122.90	$0.00	$237,364.15	$3,896,817.91	$20,000.00	$220,000.00
06/01/35	$203,015.12	$29,226.13	1.50%	$232,241.25	$4,871.02	$0.00	$237,112.27	$3,693,802.79	$0.00	$220,000.00
12/01/35	$204,537.73	$27,703.52	1.50%	$232,241.25	$4,617.25	$0.00	$236,858.50	$3,489,265.06	$20,000.00	$240,000.00
06/01/36	$206,071.76	$26,169.49	1.50%	$232,241.25	$4,361.58	$0.00	$236,602.83	$3,283,193.30	$0.00	$240,000.00
12/01/36	$207,617.30	$24,623.95	1.50%	$232,241.25	$4,103.99	$0.00	$236,345.24	$3,075,576.00	$20,000.00	$260,000.00
06/01/37	$209,174.43	$23,066.82	1.50%	$232,241.25	$3,844.47	$0.00	$236,085.72	$2,866,401.57	$0.00	$260,000.00
12/01/37	$210,743.24	$21,498.01	1.50%	$232,241.25	$3,583.00	$0.00	$235,824.25	$2,655,658.33	$20,000.00	$280,000.00
06/01/38	$212,323.81	$19,917.44	1.50%	$232,241.25	$3,319.57	$0.00	$235,560.82	$2,443,334.52	$0.00	$280,000.00
12/01/38	$213,916.24	$18,325.01	1.50%	$232,241.25	$3,054.17	$0.00	$235,295.42	$2,229,418.28	$20,000.00	$300,000.00
06/01/39	$215,520.61	$16,720.64	1.50%	$232,241.25	$2,786.77	$0.00	$235,028.02	$2,013,897.67	$0.00	$300,000.00
12/01/39	$217,137.02	$15,104.23	1.50%	$232,241.25	$2,517.37	$0.00	$234,758.62	$1,796,760.65	$20,000.00	$320,000.00
06/01/40	$218,765.55	$13,475.70	1.50%	$232,241.25	$2,245.95	$0.00	$234,487.20	$1,577,995.10	$0.00	$320,000.00
12/01/40	$220,406.29	$11,834.96	1.50%	$232,241.25	$1,972.49	$0.00	$234,213.74	$1,357,588.81	$20,000.00	$340,000.00
06/01/41	$222,059.33	$10,181.92	1.50%	$232,241.25	$1,696.99	$0.00	$233,938.24	$1,135,529.48	$0.00	$340,000.00
12/01/41	$223,724.78	$8,516.47	1.50%	$232,241.25	$1,419.41	$0.00	$233,660.66	$911,804.70	$20,000.00	$360,000.00
06/01/42	$225,402.71	$6,838.54	1.50%	$232,241.25	$1,139.76	$0.00	$233,381.01	$686,401.99	$0.00	$360,000.00
12/01/42	$227,093.24	$5,148.01	1.50%	$232,241.25	$858.00	$0.00	$233,099.25	$459,308.75	$20,000.00	$380,000.00
06/01/43	$228,796.43	$3,444.82	1.50%	$232,241.25	$574.14	$0.00	$232,815.39	$230,512.32	$0.00	$380,000.00
12/01/43	$230,512.32	$1,728.93	1.50%	$232,241.25	$288.14	$0.00	$232,529.39	$0.00	$20,000.00	$400,000.00
Totals	**$8,000,000.00**	**$1,289,650.00**		**$9,289,650.00**	**$214,941.65**	**$0.00**	**$9,504,591.65**		**$400,000.00**	

Created by KIA on 01/03/2023

EXHIBIT G

ADDITIONAL COVENANTS AND AGREEMENTS

(A) Unless otherwise agreed to by the Authority, all Loan proceeds shall be expended by the Governmental Agency no later than six months after the initiation of operation of the Project.

KENTUCKY INFRASTRUCTURE AUTHORITY
Minutes of the Full Board

Meeting Date/Location: **May 7, 2020 – 1:00 p.m.**
Kentucky Infrastructure Authority
Via Video Conference

Members present:
Mr. Dennis Keene, Commissioner, Department for Local Government
Mr. Winston Miller, proxy for. Holly M. Johnson, Secretary, Finance and Administration Cabinet
Mr. Paul Miller, proxy for Rebecca Goodman, Secretary, Energy and Environment Cabinet
Mr. Claude Christensen, representing Kentucky League of Cities
Mr. Ron Lovan, Representing the Kentucky Section of the American Water Works Association
Mr. Kent Chandler, Executive Director, Public Service Commission
Mr. Bobby Aldridge, proxy for Interim Secretary Larry Hayes, Cabinet for Economic Development
Mr. Russell Rose, representing Kentucky Rural Water Association
Mr. David A. Voegele, representing Kentucky Association of Counties
Mr. Robert A. Amato, representing Kentucky Municipal Utilities Association
Mr. Kurt Stafford, representing the For-Profit Water Companies

DLG Staff:
Mr. Eddie Jacobs, Chief of Staff
Mr. Matthew Stephens, General Counsel
Ms. Kim Wooldridge, Executive Assistant

KIA Staff:
Ms. Edith Halbleib, Executive Director
Ms. Linda Bridwell, Deputy Executive Director
Ms. Ashley Adams, Financial Analyst
Mr. Jeff Abshire, Fiscal Officer and KIA Treasurer
Ms. Julie Bickers, Regional Compliance Coordinator
Mr. Bryan Bunch, Systems Engineer IT
Mr. Kelly Cunnagin, Executive Staff Assistant
Mr. Dustin Horn, WRIS Geoprocessing Specialist
Ms. Debbie Landrum, Regional Compliance Coordinator
Ms. Meg Link, Administrative Specialist III and KIA Secretary
Mr. James Nelson, Accountant/Grants
Mr. Don Schierer, WRIS Resource Management Analyst
Ms. Sarah Parsley, Regional Compliance Coordinator
Mr. Tom Schubert, GIS Specialist
Ms. Meili Sun, Financial Analyst

Guests:
Mr. Matt Baker, Cann-Tech Engineers, LLC
Mr. Jory Becker, Division of Water
Mr. John Bunnell, Hart County Industrial Authority
Ms. Barbara Campbell, City of Kuttawa
Mr. Joe Choate, Hart County Judge Executive
Ms. Bethany Couch, Office of Financial Management
Mr. Kyle Cunningham, Pennyrile Area Development District

Ms. Kristie Dodge, Buffalo Trace Area Development District
Mr. Lindsey Flora, Public Service Commission
Mr. Darren Garrison, Maysville Utility Commission
Mr. Patrick Kirby, Community & Economic Development Associates, Inc.
Ms. Amy Kramer, Northern Kentucky Water District
Mr. Charles McCann, Rivercrest Engineering
Ms. Cheryl Moore, South Shore Mayor
Ms. Lindsey Rechtin, Northern Kentucky Water District
Mr. Jeff. Reynolds, HMB Professional Engineers
Ms. Cindy Ring, Buffalo Trace Area Development District
Ms. Cheryl Robbins, City of South Shore
Mr. Kyle Ryan, Northern Kentucky Water District
Mr. Ronnie Slaydon, Crittenden-Livingston Water District
Ms. Sandy Williams, Office of Financial Management

PROCEEDINGS

Commissioner Dennis Keene, called the meeting of the Kentucky Infrastructure Authority (KIA) Board to order. He noted that the press notification distribution had been done appropriately and confirmed a quorum was present. Meg Link, KIA Secretary was asked to call the Roll.

I. BUSINESS (Board Action Required)

1. APPROVAL OF MINUTES
For: KIA Regular Board Meeting of March 5, 2020

Mr. Ron Lovan moved to approve the minutes of the March 5, 2020, regular board meeting. Mr. Russ Rose seconded, and the motion carried unanimously.

B. NEW PROJECTS/ACTION ITEMS

1. A RESOLUTION AND ORDER OF THE BOARD OF DIRECTORS OF THE KENTUCKY INFRASTRUCTURE AUTHORITY AUTHORIZING AN AMENDMENT TO THE CONDITIONAL COMMITMENT FOR A FEDERALLY ASSISTED CLEAN WATER REVOLVING FUND A LOAN (A20-022) INCREASE FOR AN AMOUNT UP TO $1,717,436 TO THE CITY OF KUTTAWA, LYON COUNTY, KENTUCKY

Mr. Jory Becker, DOW, and Ms. Linda Bridwell, and Mr. Charles McCann, Rivercrest Engineering representing the City of Kuttawa. KIA discussed the City's request for a Fund A Loan increase of $453,236, (A20-022 for total amount up to $1,717436 for the Lift Station and Force Main Replacement project. The total loan amount will be $1,717,436. The increase is due to the bids coming in higher than expected. The project will replace the existing Magnolia lift station with a new lift station, sized to handle existing and anticipated future flows, as well as replacement of approximately 1,400 linear feet of existing cast iron force main. This lift station receives flows from the surrounding neighborhoods as well as the Old Kuttawa area. The project will also replace the existing Old Kuttawa lift station with a new lift station, sized to handle existing and anticipated future flows, as well as replacement of approximately 8,000 linear feet of existing cast iron force main. The purpose of the work

is to help the City achieve compliance with an EPA Agreed Order related to sanitary sewer system overflows and pollutant removal at their wastewater treatment plant due to excess infiltration and inflow from their collection system.

The City provides water and wastewater services in Kuttawa, serving 475 customers. The City is a regional provider, treating wastewater from the Lyon County Water District, which is a PSC regulated system.

Mr. Kent Chandler asked Mr. Becker if the requested increase was due to one particular bid coming in higher than expected. Mr. Becker noted prior to the pandemic, most bids were coming in significantly higher than expected. Mr. Charles McCann with Rivercrest Engineering noted the original budget was set some time ago and when they began the process, companies were difficult to secure due to the high demand and pricing was higher than originally budgeted.

Mr. Chandler referenced a slide Ms. Bridwell has presented on no additional subsidizations. Ms. Bridwell noted that some communities are eligible for additional subsidizations. Kuttawa has a fairly high MHI of $53,000, where generally the Commonwealth is $46,000, which would normally be 2.5% interest, but they have an agreed order that allows them the 1.5% and will not be given any principal forgiveness.

Mr. McCann thanked the Board for their support.

Mr. Ron Lovan moved to approve the Fund A Loan increase, (A20-022), in an amount of $453,236 for a total amount up to $1,717,436 with the standard conditions. Mr. Claude Christensen seconded and the motion was unanimously approved.

2. **A RESOLUTION AND ORDER OF THE BOARD OF DIRECTORS OF THE KENTUCKY INFRASTRUCTURE AUTHORITY AUTHORIZING ISSUANCE OF A CONDITIONAL COMMITMENT FOR A FEDERALLY ASSISTED CLEAN WATER REVOLVING FUND A LOAN (A20-034) FOR AN AMOUNT UP TO $850,000 TO THE CITY OF MAYSVILLE, MASON COUNTY, KENTUCKY**

Mr. Jory Becker, DOW, Mr. Jeff Abshire, KIA, discussed the City's request for a Fund A Loan for an amount up to $850,000 for the Wall Street Combined Sewer Elimination project. The project will separate storm sewer lines which are a component of the City's Long Term Control Plan. These improvements will allow the wastewater treatment facility to better accommodate additional flows generated due to the elimination of sewer overflows throughout the system.

The City utility serves approximately 5,100 water customers and 3,700 wastewater customers. They treat waste for the Western Mason County Sanitation District which has approximately 450 customers. They also supply water to the Buffalo Trail Water Association and Western Lewis-Rectorville Water and Gas District, which are regulated by the Kentucky PSC, and the City of Flemingsburg.

Mr. Claude Christensen moved to approve the Fund A Loan (A20-034) for an amount up to $850,000 for with the standard conditions. Mr. Winston Miller seconded and the motion was unanimously approved.

3. **A RESOLUTION AND ORDER OF THE BOARD OF DIRECTORS OF THE KENTUCKY INFRASTRUCTURE AUTHORITY AUTHORIZING ISSUANCE OF A CONDITIONAL COMMITMENT FOR A FEDERALLY ASSISTED CLEAN WATER REVOLVING FUND LOAN (A20-037) FOR AN AMOUNT UP TO $1,035,000 TO THE CITY OF SOUTH SHORE, GREENUP COUNTY, KENTUCKY**

   Mr. Jory Becker, DOW, Ms. Meili Sun, KIA, discussed the City of South Shore's request for a Fund A Loan, (A20-037) for an amount up to $1,035,000 for the Upgrade Forest Heights Collection Lines project. This project will replace approximately 4,300 linear feet of clay sewer lines with 8" PVC lines, replace 19 manholes, and install new service lines and cleanout to 53 customers. The existing system consists of 6" and 8" clay sewer lines that are undersized and plagued with inflow and infiltration, which could result in sanitary sewer overflow. The area impacted includes Mildred Street, Mayfield Street, Maple Street, Christopher Drive, and Forest Avenue.

   The South Shore Wastewater Treatment Plant is a Kentucky Pollution Discharge Elimination Systems (KPDES) utility currently serving approximately 780 retail customers in the City and the surrounding area.

   Judge David Voegele moved to approve the Fund A Loan (A20-037) for an amount up to $1,035,000 to the City of South Shore with the standard conditions. Mr. Kurt Stafford seconded and the motion was unanimously approved.

4. **A RESOLUTION AND ORDER OF THE BOARD OF DIRECTORS OF THE KENTUCKY INFRASTRUCTURE AUTHORITY AUTHORIZING ISSUANCE OF A CONDITIONAL COMMITMENT FOR A FEDERALLY ASSISTED CLEAN WATER REVOLVING FUND A LOAN (A20-069) FOR AN AMOUNT UP TO $853,442 TO THE HART COUNTY INDUSTRIAL AUTHORITY, HART COUNTY, KENTUCKY**

   Mr. Jory Becker, DOW, Ms. Linda Bridwell, KIA and Mr. John Bunnell, representing the Authority, discussed the Authority's request for a Fund A Loan for an amount up to $853,442 for the Progress Park Industrial Park Pretreatment Expansion project. This project will upgrade the pretreatment facility serving the Progress Park Industrial Park in Horse Cave in order to increase the capacity of wastewater treatment and accommodate the planned growth of the industrial park. Specifically, this expansion will support a 120,000 square foot, $50 million expansion at the Sister Schubert's Homemade Rolls Inc. bakery which is expected to bring 70+ additional jobs.

   The project will consist of increasing the average flow of the pretreatment facility from 200,000 gallons per day to 300,000 gallons per day, along with adding two stainless steel equalization tanks at the facility with a combined capacity of 500,000 gallons in order to control high hydraulic flows. The project will also include the following elements: 1) New influent screen that will accept flows up to 2,000 gallons per minute that will be located in a new building; 2) New vacuum press will be installed to handle the extra grease production from the enhancement of the facility's two dissolved air flotation units; 3) Enhancements to the facility's moving bed biofilm reactor (MBBR) treatment tank with the addition of air blowers and treatment media; 4) New sludge holding tanks will be added for sludge reduction; 5) New effluent storage tank; and 6) New, increased-capacity pumping facility with new yard piping and electrical enhancements.

The pretreatment facility supports the T. Marzetti and Sister Schubert's factories located in Progress Park Industrial Park. Caveland Environmental Authority operates and provides maintenance for the pretreatment facility under agreement with the Hart County Industrial Authority.

Mr. Kent Chandler asked Ms. Bridwell about the two customers, neither of which pay rates, but will be paid from the TIF, which is why staff is wanting the special condition voted on as a designated revenue source. Ms. Bridwell said yes, that is correct.

Mr. Russ Rose moved to approve the Fund F Loan (A20-069) in an amount up to $853,442 to the Hart County Industrial Authority with the standard conditions and the following special condition: The Hart County Industrial Authority and/or the Hart County Fiscal Court will make a motion to commit future TIF revenues created by this pretreatment expansion project to repayment of KIA debt service, replacement reserve, maintaining a 1.1 debt coverage ratio, and any other loan conditions for the life of this new KIA loan.. Mr. Ron Lovan seconded and the motion was unanimously approved.

5. **A RESOLUTION AND ORDER OF THE BOARD OF DIRECTORS OF THE KENTUCKY INFRASTRUCTURE AUTHORITY AUTHORIZING ISSUANCE OF A CONDITIONAL COMMITMENT FOR AN INFRASTRUCTURE REVOLVING FUND LOAN (C20-002) FOR AN AMOUNT UP TO $300,000 TO THE CRITTENDEN-LIVINGSTON COUNTY WATER DISTRICT, LIVINGSTON COUNTY, KENTUCKY**

Ms. Meili Sun, KIA, discussed the District's request for a Fund C Loan (C20-002) for an amount up to $300,000 for the Automatic Meter Reading (AMR) Replacement project. This project will replace 1,400 aging customer meters in the Crittenden-Livingston service area, primarily in Livingston County, with radio read meters. The installation of new meters will help the District save operating and maintenance costs by reducing up to 50% of the time and labor required for meter reading.

A PSC regulated system, the District is a regional provider that serves approximately 3,600 retail customers and wholesales to 2 water districts and 4 municipals. All retail and wholesale rates are subject to PSC approval.

Mr. Kent Chandler abstained from voting. Mr. Ron Lovan moved to approve the Fund C Loan (C20-002) for an amount up to $300,000 to the Crittenden-Livingston County Water District with the standard conditions. Mr. Winston Miller seconded and the motion was unanimously approved.

6. **A RESOLUTION AND ORDER OF THE BOARD OF DIRECTORS OF THE KENTUCKY INFRASTRUCTURE AUTHORITY AUTHORIZING ISSUANCE OF A CONDITIONAL COMMITMENT FOR A FEDERALLY ASSISTED DRINKING WATER REVOLVING FUND LOAN (F20-044) FOR AN AMOUNT UP TO $8,000,000 TO THE NORTHERN KENTUCKY WATER DISTRICT, KENTON COUNTY, KENTUCKY**

Mr. Ron Lovan left the meeting. Mr. Jory Becker, DOW, Ms. Linda Bridwell, KIA and Ms. Amy Kramer, Ms. Lindsey Rechtin, and Mr. Kyle Ryan, representing the Northern Kentucky Water District, discussed the District's request for a Fund F Loan (F20-044), for an amount up to $8,000,000 for the Taylor Mill Treatment Plant Emergency Generator/Fort Thomas Treatment Plant Phase 2 Basin Improvements project. The purpose of this project is to improve water

quality and service reliability for customers. This project will include improvements to both the Taylor Mill Treatment Plant and the Fort Thomas Treatment Plant.

The Taylor Mill Treatment Plant was built in the 1950s and is capable of treating up to 10 MGD. Additionally, this plant houses a critical pump station, which transmits water from both the Fort Thomas and Taylor Mill Treatment Plants to about 60% of Kenton County. The pump station and a majority of the plant are fed from a Duke Energy transmission line. In the event of power outage or critical substation/transformer failure, the District would lose the ability to supply water to a majority of Kenton County. This is significant water quality and public health concern. With the proposed standby power project, the plan is to install a generator, switch gear, and new substation. These improvements will be capable of powering the existing treatment plant and one of the larger pumps or potentially two of the smaller pumps within the pump station. This will allow improved system reliability without creating potential water quality concerns.

The preliminary treatment facilities at the Fort Thomas Treatment Plant (FTTP) consists of four uncovered concrete basins. Basins #2 and #3 were constructed in 1936 and underwent extensive rehabilitation in 2015. The current project will address Basins #1 and #4 which were built in 1987 and 1992 respectively. These basins are beginning to show signs of concrete deterioration and the process equipment is worn out requiring frequent repair. To extend the life of these 2 basins, improvements will include concrete repair, reconfiguration of the flocculation process and mixing basins, and replacement of influent/effluent valves and sludge collection equipment. In addition to this work, the existing tube settlers in all 4 basins will be replaced with new plate settlers and the chemical feed manifold piping within the sodium hypochlorite building will be replaced. This will improve water quality and treatment efficiency.

The District serves over 80,000 customers in Kenton, Campbell, and a portion of Boone counties and it is a PSC regulated entity. It is a wholesale water provider to Bullock Pen Water District, Pendleton County Water District #1 North, and Walton Waterworks Department.

Mr. Russ Rose asked if they had existing funds or were they were local grants. Mr. Kyle Ryan noted they were not existing funds; monies are in their Band 2020 plan. They plan to issue a Band in 2020 and a portion will be funded at the time of the receipts. Mr. Kent Chandler asked if these funds would be from all their customers or from certain customers. Ms. Kramer noted it would be from all customers.

Ms. Bridwell noted there are two special conditions for this loan since it is a PSC regulated entity. The debt authorization application should include a forecast for meeting debt service and prior to the assistance agreement being executed the District must receive a Certificate of Public Convenience and Necessity from the Public Service Commission. Mr. Kent Chandler noted this is for loans that go past two years, which started KIA began including a few months ago. This is a statuary requirement, some Utilities neglected to do so previously.

Mr. Ron Lovan abstained from voting. Mr. Winston Miller moved to approve the Fund F Loan (F20-044) for an amount up to $8,000,000 to the Northern Kentucky Water District with the standard conditions and the following special conditions: The District will need to apply to the Public Service Commission (PSC), pursuant to KRS 278.300, for debt authorization for the $8,000,000 million loan. This debt authorization

application should include a forecast for meeting debt service projected through no less than 2025; and Prior to the assistance agreement being executed, the District must receive a Certificate of Public Convenience and Necessity, pursuant to KRS 278.020, from the PSC for any portion of the project that may require it, or provide an opinion from legal counsel or the staff of the PSC, or a declaratory order from the PSC, that a CPCN is not required for any portion of the assets to be constructed as part of the loan agreement. Mr. Winston Miller seconded and the motion was unanimously approved.

Mr. Ron Lovan was invited back into the meeting.

7. **RESOLUTION OF THE KENTUCKY INFRASTRUCTURE AUTHORITY AUTHORIZING AND APPROVING THE ISSUANCE OF OBLIGATIONS OF THE KENTUCKY INFRASTRUCTURE AUTHORITY TO REIMBURSE CAPITAL EXPENDITURES MADE BY GOVERNMENTAL AGENCIES PURSUANT TO LOANS MADE BY THE KENTUCKY INFRASTRUCTURE AUTHORITY TO SUCH GOVERNMENTAL AGENCIES**

This is a routine resolution allowing KIA to reimburse expenses that are paid out of the Authority's funds with bond proceeds. The projects listed below are covered under this resolution:

BORROWER	FUND	AMOUNT UP TO
City of Kuttawa (Increase)	A20-022	$453,236
City of Maysville	A20-034	$850,000
City of South Shore	A20-037	$1,035,000
Hart County Industrial Authority	A20-069	$853,442
Crittenden-Livingston County Water District	C20-002	$300,000
Northern Kentucky Water District	F20-044	$8,000,000

Mr. Bob Amato moved to approve the reimbursement resolution. Mr. Claude Christensen seconded and the motion carried unanimously.

EXECUTIVE DIRECTOR'S REPORT

Executive Director Edith Halbleib noted the May Board meeting is the first meeting in which the KIA Board met by videoconference. Despite the numerous technical hurdles, the KIA videoconference team hosted the Zoom conference, placed the meeting livestream on YouTube, placed an imbedded link on the KIA website, and filed the recorded link to the meeting under the Board Meetings.

KIA has been working on concluding fiscal year 2020 projects. The list of KIA Board approved projects, which has concluded with a signed assistance agreement, is located in the status report on page 101-102 of the Board Book. With the upheaval of the past two months, the question of whether to proceed with the project has been a difficult one for a couple of the entities as they face uncertainties in their income streams.

KIA is currently preparing the Intended Use Plans (IUP), the two plans for the funds available under its state revolving fund program. As a recap, the Kentucky Infrastructure Authority loans

funds through its state revolving fund program. The EPA has awarded a grant for approximately $18 million for Drinking Water and $20 million for Clean Water. The Commonwealth provides a match for 20%. The balance of the funds are from the revolving fund program.

This year, the Clean Water Stater Revolving Fund (CWSRF) will have approximately $98 million available for $290 million in requests. The KIA will send about 20 first round invitations from approximately 70 project requests.

This year, the Drinking Water Stater Revolving Fund (DWSRF) will have approximately $67 million available for $221 million in requests. KIA will send approximately 20 first round invitations from approximately 75 projects.

The Division of Water has submitted its rankings for projects. We are working together to put together the plan for the upcoming year. The target for publishing the draft IUP is the first week of June, with a special meeting approximately ten days later.

KIA has moved forward with getting electronic signatures on the KIA Assistance Agreements, in order to move documentation along in a timely manner while working remotely.

Ms. Halbleib noted that Financial Analyst Ashley Adams had given her notice and will be leaving KIA on May 8th. She wished Ashley the best in her future endeavors.

Mr. Ron Lovan thanked all the essential employees, including all the city and county water and sewer employees that have been doing a terrific job during this trying time.

Mr. Lovan also asked if there had been any consideration on Utilities financially struggling with no cut-offs and allowing people to continue to use services without payment, ultimately responsible for payment. He feels like there are going to be difficulties in collecting those monies. Some smaller utilities will be struggling. Is there any flexibility and/or the ability to assist some of these small utilities? Ms. Halbleib said she had been looking into the SRF Funding parameters that will need to be met. There could possibly be some FEMA funds available and there is a possibility for some stimulus funding to assist. KIA staff is working the Council on Infrastructure Financing Authorities for ways to address those needs. Will work with directly with any borrowers experiencing issues. Ms. Bridwell noted that KIA staff has meet with several Area Development District's during their Water Management Council meetings, along with DOW. This was brought up KIA is sufficiently funded to make our debt payment in August. Two have already approached KIA to discuss. KIA cannot loan money for operations.

ANNOUNCEMENTS/NOTIFICATIONS

- Next scheduled KIA board meeting:
  Thursday, June 4, 2020, 1:00 p.m.
  Via Teleconference

There being no further business, Mr. Ron Lovan moved to adjourn. Mr. Russ Rose seconded and the motion carried unanimously. The March 5, 2020 meeting of the Board of the Kentucky Infrastructure Authority was adjourned.

Submitted by:

Margaret F. Link

Margaret F. Link, Secretary
Kentucky Infrastructure Authority

5/28/2020
Date

NKWD Assistance Agr_F20-044

Final Audit Report 2023-04-05

Created:	2023-02-17
By:	Christian Juckett (cljuckett@rubinhays.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAAAhl4qh5YfGQ-fypMtFvk_qKQjwfx65XM

"NKWD Assistance Agr_F20-044" History

Document created by Christian Juckett (cljuckett@rubinhays.com)
2023-02-17 - 8:54:15 PM GMT- IP address: 98.103.10.138

Document emailed to dennis.keene@ky.gov for signature
2023-02-17 - 8:57:05 PM GMT

Email viewed by dennis.keene@ky.gov
2023-02-21 - 6:18:39 PM GMT- IP address: 107.77.235.66

Email viewed by dennis.keene@ky.gov
2023-03-07 - 4:57:02 PM GMT- IP address: 104.47.65.254

Signer dennis.keene@ky.gov entered name at signing as Dennis Keene
2023-03-07 - 4:57:31 PM GMT- IP address: 205.204.186.1

Document e-signed by Dennis Keene (dennis.keene@ky.gov)
Signature Date: 2023-03-07 - 4:57:33 PM GMT - Time Source: server- IP address: 205.204.186.1

Document emailed to meg.link@ky.gov for signature
2023-03-07 - 4:57:36 PM GMT

Email viewed by meg.link@ky.gov
2023-03-07 - 5:11:11 PM GMT- IP address: 104.47.64.254

Signer meg.link@ky.gov entered name at signing as Margaret F. Link
2023-03-07 - 5:15:31 PM GMT- IP address: 205.204.186.1

Document e-signed by Margaret F. Link (meg.link@ky.gov)
Signature Date: 2023-03-07 - 5:15:33 PM GMT - Time Source: server- IP address: 205.204.186.1

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2023-03-07 - 5:15:34 PM GMT

Email viewed by patrick.mcgee@ky.gov

2023-03-07 - 6:48:05 PM GMT- IP address: 104.47.64.254

Signer patrick.mcgee@ky.gov entered name at signing as patrick McGee

2023-03-07 - 6:48:23 PM GMT- IP address: 74.215.208.99

Document e-signed by patrick McGee (patrick.mcgee@ky.gov)

Signature Date: 2023-03-07 - 6:48:25 PM GMT - Time Source: server- IP address: 74.215.208.99

Document emailed to Holly Johnson (hollymccoy.johnson@ky.gov) for signature

2023-03-07 - 6:48:27 PM GMT

Email viewed by Holly Johnson (hollymccoy.johnson@ky.gov)

2023-04-05 - 2:14:02 PM GMT- IP address: 104.47.65.254

New document URL requested by Holly Johnson (hollymccoy.johnson@ky.gov)

2023-04-05 - 2:14:12 PM GMT- IP address: 205.204.186.53

Document e-signed by Holly Johnson (hollymccoy.johnson@ky.gov)

Signature Date: 2023-04-05 - 2:14:57 PM GMT - Time Source: server- IP address: 205.204.186.53

Agreement completed.

2023-04-05 - 2:14:57 PM GMT

Names and email addresses are entered into the Acrobat Sign service by Acrobat Sign users and are unverified unless otherwise noted.

EXHIBIT E-3

CONDITIONAL COMMITMENT LETTER

KENTUCKY INFRASTRUCTURE AUTHORITY

Andy Beshear
Governor

100 Airport Road
Frankfort, Kentucky 40601
(502) 573-0260
https://kia.ky.gov

Sandy Williams
Executive Director

March 17, 2022

Lindsey Rechtin
Acting Vp of Finance & Support Services/CFO
Northern Kentucky Water District
PO Box 18640
Erlanger, KY 41018

KENTUCKY INFRASTRUCTURE AUTHORITY
CONDITIONAL COMMITMENT LETTER
KIA Grant Number 21CWW105
WRIS Project Number WX21117210

Dear Official,

Congratulations on receiving an award of Kentucky Cleaner Water Program (the "CWP") grant funds for your Project! The Kentucky Infrastructure Authority (the "Authority") approved the grant request to the Northern Kentucky Water District (the "Grantee") in the amount of $1,000,000 for the Emergency Power Generation for Taylor Mill Water Treatment Plant and Fort Thomas Treatment Plant Basin Improvements project. We look forward to working with you to successfully complete your Project!

Please be aware that these CWP Grant Project funds are provided through the American Rescue Plan Act of 2021, Coronavirus State Fiscal Recovery Fund and must be obligated by December 31, 2024 and fully expended by December 31, 2026. Any funds not obligated by December 31, 2024 or expended by December 31, 2026 will be forfeited and will not be available for the project.

An Assistance Agreement will be executed between the Authority and the Grantee upon satisfactory performance of the conditions set forth in Attachment A. Funds will be available for disbursement only after execution of the Assistance Agreement.

During the course of implementing your project, please inform the Authority of any changes in the project scope and financing plan as soon as possible.

KENTUCKY INFRASTRUCTURE AUTHORITY

Andy Beshear
Governor

100 Airport Road
Frankfort, Kentucky 40601
(502) 573-0260
https://kia.ky.gov

Sandy Williams
Executive Director

We wish you every success for this project, which will benefit both your community and the Commonwealth as a whole.

Sincerely,

Sandy Williams,
Executive Director

Attachments

cc: Amy Stoffer, Project Administrator
Lindsey Rechtin, Northern Kentucky Water District
Debbie Landrum, KIA Grant Analyst
File

Please sign and return a copy of this letter indicating your acknowledgement and acceptance of the commitment and its terms and conditions incorporated by reference and in the Attachments and Exhibits.

Accepted

8/10/22
Date

TEAM KENTUCKY

An Equal Opportunity Employer M/F/D

ATTACHMENT A

GRANT TERMS AND CONDITIONS

Northern Kentucky Water District

The Conditional Commitment Letter and a subsequent Assistance Agreement between the Grantee and the Kentucky Infrastructure Authority shall be subject, but not limited, to the timely compliance with the following terms and conditions.

Terms

1. The grant award shall not exceed $1,000,000 and shall be used solely for the designated project, unless otherwise permitted in writing by the Authority.

2. The grant funds shall be obligated by December 31, 2024. Any grant funds not obligated by December 31, 2024 will not be available for use by the Grantee and will not be available for the project.

3. Grant funds obligated by December 31, 2024 must be expended by the Grantee by December 31, 2026. Any obligated funds not fully expended by December 31, 2026 will not be available for use by the Grantee and will not be available for the project.

4. The grant must be reviewed and approved by the Capital Projects and Bond Oversight Committee of the Kentucky Legislature prior to the Authority's execution of the Assistance Agreement.

5. The Assistance Agreement must be executed within six (6) months from project bid opening.

6. Grant funds will only be disbursed after execution of the Assistance Agreement as project costs are incurred.

7. All approvals required by the Kentucky Division of Water (DOW) and/or the Kentucky Public Service Commission, if any, shall be obtained by the Grantee prior to project bid.

8. All acquisitions of easements or purchases of land shall be completed prior to commencement of construction.

9. Cleaner Water Program grant funds are federal funds. If more than $750,000 of federal funds including all sources are disbursed to the Grantee in any one fiscal year, the Grantee is required to have a single or program-specific audit conducted for that year in accordance with 2 CFR 200 Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards.

10. If Cleaner Water Program funds are used in conjunction with any other federal funds including but not limited to programs of the EPA, USDA, HUD, CDBG, ARC or other federal agencies, the Cleaner Water Program funds shall comply with these agencies' program requirements, regulations, and laws such as compliance with the Davis-Bacon Act, the Federal Environmental Protection Act and others.

11. SAM.gov Requirements. Grantees are required to have an active registration with the System for Award Management (SAM) (https://www.sam.gov).

12. All correspondence and document sharing between the Authority and the Grantee shall be by email and portable document format (.pdf) attached to email.

Conditions

The following is a list of the standard conditions to be satisfied either prior to execution of the Assistance Agreement or incorporated in the Assistance Agreement. The Grantee shall provide completed documentation marked with the corresponding Exhibit Number related to each condition. Forms and document templates for each condition are provided in Attachment C. All required documentation must be submitted to the staff member of the Authority assigned to the Grantee.

1. The Project Profile (WX21117210) shall be updated to accurately reflect project data and mapping information effective as of the date certified in **Exhibit 1**.

   Documentation of final funding commitments from all parties other than the Authority as identified in the Budget Tab of the updated Project Profile shall be submitted with Exhibit 1. Documentation shall be provided prior to execution of the Assistance Agreement and disbursement of grant funds. Any subsequent changes in the anticipated project funding shall be immediately reported to the Authority and may cause this grant to be subject to further consideration.

2. The Grantee shall obtain a Vendor Number from the Finance and Administration Cabinet of the Commonwealth of Kentucky and provide that Vendor Number to the Authority. **Exhibit 2**

3. The project shall comply with the reporting requirements of the Federal Funding Accountability and Transparency Act (FFATA). The Grantee shall complete the Transparency Act Reporting Information Form and return it to the Authority. **Exhibit 3**

Conditions 1 – 3 must be completed and copies of the respective Exhibits returned to the Authority with this signed Conditional Commitment Letter.

After providing the Authority with the signed Conditional Commitment Letter and Exhibits 1 through 3, the Grantee shall continue to complete Conditions 4 through 11 and return

the associated Exhibits and documentation to the Authority. Upon completion of the Conditions, the Authority will forward the Assistance Agreement to the Grantee for execution. The Authority may incorporate any unsatisfied conditions into the Assistance Agreement.

4. At an official meeting of its governing body, the Grantee shall approve acceptance of the Grant and the Assistance Agreement, amend its annual budget accordingly, and designate an Authorized Official to sign all appropriate documents. **Exhibit 4**

5. Legal Counsel for the Grantee must provide an opinion to the Authority as to the legality of Grantee accepting the grant, approving the Assistance Agreement, designating an Authorized Official, and the certificate of Recording Officer. **Exhibit 5**

6. The Grantee shall contract with an Engineer licensed in Kentucky and agree to the fee amount limitation as determined by the most recent USDA Rural Development Utility Program Fee Guide by jointly signing **Exhibit 6**.

   The Grantee may request 50% of the engineering design fee as budgeted in the Project Profile when the Project plans and specifications are submitted to the Kentucky Division of Water (DOW). The balance of that fee may be requested once the Grantee provides a copy of the plans approval letter from DOW to the Authority.

7. The Grantee shall provide documentation of Kentucky EClearinghouse Endorsement and EClearinghouse Comments. **Exhibit 7**

   Any significant changes or additions to the Project, deviating from the original scope of work described in the Project Profile, may require a new or amended eClearinghouse Endorsement, as determined by the eClearinghouse or the Authority.

8. The Grantee shall submit the DOW Plans approval letter to the Authority. **Exhibit 8**

9. The Grantee shall complete and submit the bid package to the Authority within 14 days of bid opening, which bid package shall include:

   a. Engineer's Approval of "as-bid" project budget, with Engineer's signature;
   b. Affidavit of Publication with Tear Sheet of Advertisement;
   c. Certified Bid Tabs with Engineer's seal, number and signature;
   d. Clear Site Certificates for each parcel of real property and easements, with date and signatures of the Grantee and Title Counsel.

   Exhibit 9

   The Grantee shall certify that its accounting system for water treatment and distribution and sewer service is maintained separately from its accounting for all

other operations, and that its service rates are based on the cost of providing the service and, that its utility operations are audited at least every two years. **Exhibit 10**

10. Upon project completion, the Grantee shall submit, to the Authority, the Certificate of Project Completion, signed by the project Engineer, the Authorized Official and the Project Administrator. **Exhibit 11**

ATTACHMENT B

PROJECT BUDGET

CWP PROJECT BUDGET

Project Title: Emergency Power Generation for Taylor Mill Water Treatment Plant and Fort Thomas Treatment Plant Basin Improvements

WRIS#: WX21117210

Project Budget: Estimated [ ] enter date **As Bid** [ ] enter date **Revised** [ ] enter date

Cost Classification		CWP Grant 21CWW105	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 Expense & Payments									
5	Planning									
6	Engineering Fees - Design									
0	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			
	Total		

Construction Cost Categories	Funding Source	Total Cost
Treatment		
Transmission and Distribution		
Transmission and Distribution: Lead Remediation		
Source		
Storage		
Purchase of Systems		
Restructuring		
Land Acquisition		
TOTAL CONSTRUCTION COSTS		

Total Funding	-

ATTACHMENT C

CWP GRANT CONDITIONS – COMPLIANCE FORMS & EXHIBITS

Note A: Exhibits 1 through 3 must be completed, scanned, and emailed to the Authority on or before the date the Grantee signs the Conditional Commitment Letter. The Conditional Commitment Letter may be signed electronically or manually, then scanned and emailed to the Authority.

Exhibit 1 Notification to the Authority of completed Review / Update of Project Profile

Exhibit 2 Confirmation of Grantee Vendor Number – via KY Finance Cabinet Application

Exhibit 3 Copy of the Transparency Act Reporting Information Form

Note B: Upon receipt of the signed Conditional Commitment Letter and the Authority's verification of Exhibits 1-3, the Authority will forward to the Grantee the Grant Assistance Agreement. The Grantee should proceed to complete Exhibits 4 through 7, scan and send each Exhibit to the Authority by email; and then the Authorized Official may sign the Assistance Agreement, either electronically or by scanning and send attached to email.

Exhibit 4 A) Grantee Resolution (Accepting Grant, Approving Agreement, Amending Budget, Designating an Authorized Official)
B) Certificate of Recording Officer

Exhibit 5 Opinion of Legal Counsel Relating to the Grantee Resolution

Exhibit 6 A) Copy of the Engineering Services Contract; and
B) Grantee & Engineer Fee Confirmation

Note C: The Grantee may request 50% of the engineering design fee (as budgeted in the Project Profile) at this point and may request the balance of the engineering design fee once Exhibit 8 has been sent to the Authority.

Exhibit 7 Copy of the Kentucky eClearinghouse Endorsement Letter with Comments.

Exhibit 8 Copy of the DOW Approval Letter of Project Engineering Plans & Specifications.

Exhibit 9 Copy of the bid package signed by (A) Engineer, (B1) Authorized Official, and (B2) Title Attorney, as appropriate.

Exhibit 10 Certification Regarding Utility Accounting, Cost-Based Rates and Auditing.

Exhibit 11 Certificate of Project Completion.

EXHIBIT 1

CERTIFICATION OF PROJECT PROFILE REVIEW & UPDATE

The Project Profile was reviewed and updated in the Water Resource Information System as of _____ by the Grantee's Authorized Official and Project Administrator.

(date)

Project Administrator: _____

EXHIBIT 2

EZ VENDOR REGISTRATION APPLICATION

A Vendor Number must be obtained on-line though the Kentucky Cabinet for Finance and Administration. This Vendor Number is r*equired for Grantee to receive payments from the Authority.*

Vendor Registration Guide (Revised December 2020)

Link to the Vendor Self Service site

The Grantee's Vendor Number is:

_____.

Project Administrator: _____.

EXHIBIT 3
TRANSPARENCY ACT REPORTING INFORMATION FORM
CLEANER WATER PROGRAM GRANT

This form is required for all utility entities with projects funded in whole or in part from the Cleaner Water Program Grant Fund. Please complete this form if your entity has a DUNS No. or as soon as you receive your DUNS No. and return it with the signed Conditional Commitment Letter you received from the Authority.

Grantee Information:

Grantee Name:	
Data Universal Numbering system (DUNS) No.*:	
KIA Grant Number	21CWW105
CWP Project Number:	WX21117210
Street Address	
City, State and Zip (Zip must include 4-digit extension)	
Federal Congressional District(s) of Grantee Utility Service Area:	

*If the DUNS No. provided above is registered under a different name than the recipient of the grant funding, please provide the registration name below:

DUNS Name	

*If the recipient has not yet obtained a DUNS Number, please do so upon receipt of the Authority's Conditional Commitment letter and provide notification to the Authority of the number once issued. For instructions on DUNS registration, please see information at the bottom of this page.

Physical Location of Project (Primary Place of Performance)

Street Address	
City, State and Zip (Zip must include 4-digit extension)	
Federal Congressional District(s) of Project Location	

Reliance upon Federal Assistance (please answer the below questions Yes or No):

Did recipient receive 80% or more of its annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards) during the last fiscal year?	
Did recipient receive $25 million or more in annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards) during the last fiscal year?	
Does the public have access to compensation of senior executives of the recipient through periodic reports filed under Section 13A or 15D of the Securities Exchange Act of 1934 or Section 6104 of the Internal Revenue Code of 1986?	

DUNS Registration Information: http://fedgov.dnb.com/webform or 1-866-705-5711.
Registration can be completed over the phone or via the web. Phone registration requests take approximately 10 minutes and are free. Internet requests are fulfilled within 24 hours.

EXHIBIT 4

RESOLUTION

RESOLUTION OF THE NORTHERN KENTUCKY WATER DISTRICT ACCEPTING THE GRANT, APPROVING THE GRANT ASSISTENCE AGREEMENT, AUTHORIZING THE AMENDMENT OF THE NORTHERN KENTUCKY WATER DISTRICT'S ANNUAL BUDGET, AND AUTHORIZING A REPRESENTATIVE TO SIGN ALL RELATED DOCUMENTS

WHEREAS, the Kentucky General Assembly has appropriated funds for infrastructure projects in Senate Bill 36 of the 2021 Regular Session of the Kentucky General Assembly for the Cleaner Water Program; and

WHEREAS, the Northern Kentucky Water District (the "Grantee") has previously determined that it is in the public interest to acquire and construct certain facilities and improvements to the Grantee's utility system (the "Project"); and

WHEREAS, the Grantee desires funding from the Kentucky Infrastructure Authority (the "Authority") for the purpose of acquisition and construction of the Project; and

WHEREAS, in order to obtain a grant from the Cleaner Water Program for the Project, and administered by the Authority, the Grantee is required to enter into an assistance agreement (the "Agreement") with the Authority.

NOW, THEREFORE, BE IT RESOLVED by the governing body of the Northern Kentucky Water District as follows:

SECTION 1. The Grantee hereby accepts the grant award and approves the Agreement between the Grantee and the Authority to provide the necessary funds to the Grantee for the Project.

SECTION 2. That _____ is hereby designated to be the Grantee's "Authorized Official" for this Project and is hereby directed and empowered by the Grantee to execute the Agreement, related documents and agreements, and to otherwise act on behalf of the Grantee to effect such grant award.

SECTION 3. That the Grantee hereby agrees and commits to include, by amendment to its annual budget and audit process, the receipts and expenditures of funds subject to the Agreement up to and including the date of Project closeout.

SECTION 4. That this resolution shall take effect at the earliest time provided by law.

ADOPTED on_____, 202___.

NORTHERN KENTUCKY WATER DISTRICT

_____
Authorized Signatory

CERTIFICATE OF RECORDING OFFICER

I, the undersigned, hereby certify that I am the duly qualified and acting Secretary/Clerk of the Grantee, and that the foregoing is a full, true and correct copy of a Resolution adopted by the governing body of said Grantee at a meeting duly held on _____ _____, 202___; and that this official action appears as a matter of public record in the official records or journal of the Grantee; and that said meeting was held in accordance with all applicable requirements of Kentucky law, including Sections 61.810, 61.815, 61.820 and 61.823 of the Kentucky Revised Statutes; and that a quorum was present at the meeting; and that this official action has not been modified, amended, revoked or repealed and is now in full force and effect.

IN TESTIMONY WHEREOF, witness my signature, below, on _____ _____, 202___.

_____
Secretary/Clerk

EXHIBIT 5

OPINION OF LEGAL COUNSEL
RELATING TO GRANTEE RESOLUTION

(Content below to be placed on letterhead of Legal Counsel for Grantee)

(Date)

Kentucky Infrastructure Authority
100 Airport Road, Third Floor
Frankfort, Kentucky 40601

RE: Grant Assistance Agreement by and between Kentucky Infrastructure Authority and Grantee, dated as of _____, 202__.

Ms. Sandy Williams:

The undersigned is an attorney at law duly admitted to the practice of law in the Commonwealth of Kentucky and serves as legal counsel to the Northern Kentucky Water District, hereinafter referred to as the “Grantee”. I am familiar with the organizational structure and operations of the Grantee and the laws of the Commonwealth applicable thereto. Additionally, I am familiar with the utility infrastructure project (the “Project”) for which the Grant Assistance Agreement (the “Agreement”) between the Kentucky Infrastructure Authority (the “Authority”) and the Grantee is being authorized, executed and delivered.

I have reviewed the form of Agreement by and between the Authority and the Grantee and the legislation of the governing body authorizing the execution and delivery of said Agreement.

Based upon my review I am of the opinion that:

1) The Grantee is a (unit of local government, or a special purpose governmental entity or a corporation) of the Commonwealth of Kentucky duly organized and validly existing under the Constitution and statutes of the Commonwealth of Kentucky.

2) The Agreement has been duly executed and delivered by the Grantee and is a valid and binding obligation of the Grantee, enforceable in accordance with its terms, except to the extent that the enforceability thereof may be limited by equitable principles and by bankruptcy, reorganization, moratorium, insolvency, or similar laws heretofore or hereafter enacted relating to or affecting the enforcement of creditors' rights or remedies generally.

3) The Grantee has all necessary power and authority (i) to enter into, perform and consummate all transactions contemplated by the Agreement, and (ii) to execute and deliver the documents and instruments to be executed and delivered by it in connection with the construction of the Project.

4) The execution and delivery of the Agreement and the performance by the Grantee of its obligations thereunder does not and will not conflict with, violate, or constitute a default under any court or administrative order, decree or ruling, or any law, statute, ordinance or regulation, or any agreement, indenture, mortgage, lease, note or other obligation or instrument, binding upon the Grantee, or any of its properties or assets.

5) To the best of my knowledge after due inquiry there is no action, suit, proceedings or investigation at law or in equity before any court, public board or body pending or threatened against, affecting or questioning (i) the valid existence of the Grantee, (ii) the right or title of the members and officers of Grantee to their respective positions, (iii) the authorization, execution, delivery or enforceability of the Agreement or the application of any monies or security therefore, (iv) the construction of the Project, or (v) that would have a material adverse impact on the ability of the Grantee to perform its obligations under the Agreement.

6) None of the proceedings or authority heretofore had or taken by the Grantee for the authorization, execution or delivery of the Agreement has or have been repealed, rescinded, or revoked.

7) All proceedings and actions of the Grantee with respect to which the Agreement is to be delivered were in place or taken at meetings properly convened and held in substantial compliance with the applicable provisions of Sections 61.805 to 61.850 of the Kentucky Revised Statutes.

Respectfully,

EXHIBIT 6

ENGINEERING SERVICES

If the Grantee's Project requires professional engineering services, such services shall be properly procured in accordance with KRS 45A.730 to 45A.750.

A. A copy of the Engineering Contract between the Grantee and the Engineer shall be submitted to the Authority, marked as **Exhibit 6A.**

B. The Authority requires that the Engineer's fee be calculated based on the Engineer's estimated net construction cost of the Project in conformance with the latest version of the USDA Rural Development Utility Program Fee Guide.

Consequently, when services of a professional engineer are required for the Grantee's Project, the Grantee and the Project Engineer must confirm, by signature below, that:

Exhibit 6B The Grantee and the Professional Engineer concur and hereby state that the total dollar amount for all professional engineering services provided to the Grantee by the Engineer relating to the Project, as set out in the Project Profile, to be paid in sum, cumulatively, over the course of Project implementation, shall be less than or not to exceed the fee amounts as set out in the approved Project Profile Budget, as determined by the Engineer. Higher amounts for materials costs and construction costs than those estimated as contained in the Project Profile, as may result from Project bidding, do not warrant an increase in Engineering Fees unless the Project must be re-bid or infrastructure components must be re-designed as a consequence of bid-price overages. Further, it is understood that any proposed amendment to the Engineering Contract, as relates to the Grantee's Project is subject to prior written approval of the Authority.

Grantee Authorized Official: _____
Signature

Professional Engineering Firm: _____

Professional Engineer: _____
Signature

EXHIBIT 7

COPY OF eCLEARINGHOUSE ENDORSEMENT LETTER WITH COMMENTS

Note: In submitting the Project to the Kentucky eClearinghouse, be advised that the source of the Kentucky Cleaner Water Program funds is the American Rescue Plan Act of 2021, which established the Coronavirus State Fiscal Recovery Fund, and were appropriated through Senate Bill 36 of the 2021 Regular Session of the Kentucky General Assembly.

For purposes of the KY eClearinghouse, these funds are listed in the Catalog of Federal Domestic Assistance as ALN 21.027

Link to eClearinghouse

EXHIBIT 8

COPY OF KENTUCKY DIVISION OF WATER APPROVAL LETTER FOR ENGINEER'S PROJECT PLANS & SPECIFICATIONS

EXHIBIT 9

THE BID PACKAGE

Provide a signed copy of each of the following elements of the Bid Package to the Authority within 14 days of bid opening:

1) Engineer's Approval of "as-bid" project budget, with Engineer's signature.

2) Affidavit of Newspaper Publication with Tear Sheet of Advertisement.

3) Certified Bid Tabs with Engineer's seal, number, and signature.

EXHIBIT 9

CLEAR SITE CERTIFICATE – CWP Grantee

I _____, the Authorized Official of the Northern Kentucky Water District, certifies that the Grantee has acquired all real property, including easements and rights-of-way, that are or will be required for construction, (erection, extension, modification, addition) operation and maintenance of the utility infrastructure project identified above.

I certify that the Grantee will not use Cleaner Water Program Funds for the purchase of real property (including easements) unless the purchase is from a willing seller.

I certify that, if another water or wastewater entity is served by the Project identified above, either the Grantee cited above or the entity to be served has acquired real property including easements and rights-of-way required for the proposed service.

I certify that the Title Attorney's Certification given on the attached certificate covers all real property including easements and rights-of way required for construction, operation and maintenance of the Grantee's project identified above.

I further certify that all real property, including easements required for the Grantee's project identified above, was acquired in accordance with the requirements of the Surface Transportation and Uniform Relocation Assistance Act of 1987 as set forth in 49 CFR Part 24.

Dated this___day of_____, 20___

_____

Grantee's Authorized Official

_____

Title (Chairman, Mayor, Commissioner, Manager, Superintendent, etc.)

EXHIBIT 9

CLEAR SITE CERTIFICATE – Title Attorney

I, _____, an Attorney at Law, acting as Title Counsel to the Northern Kentucky Water District (the "Grantee"), the owner of the Project cited above, do hereby certify:

1. That I have investigated and ascertained the location of and am familiar with the legal description of the site or sites being provided by the Grantee for all elements of the Project identified above to be constructed (modified, extended, improved, altered) operated and maintained in and upon such site or sites.

2. That I have examined the deed records of the county or counties in which such Project is to be located, and in my opinion the Grantee has a legal and valid fee simple title or such other estate or interest in the site of the Project, including necessary easements and rights-of-way sufficient to assure undisturbed use and possession for the purpose of construction, operation and maintenance for the estimated life of the Project.

3. That any deeds or documents required to be recorded in order to protect the title of the owner and the interest of the Grantee have been duly recorded and filed of record wherever necessary.

4. If applicable, that the title to real property for which the Kentucky Infrastructure Authority funded the cost has been encumbered in accordance with the requirements of State and local law to adequately protect the interest of the Kentucky Infrastructure Authority.

5. Remarks:

Dated this _____day of _____, 20___.

Attorney at Law**:** **_____**

Address**:** **_____**

EXHIBIT 10

CERTIFICATION REGARDING UTILITY ACCOUNTING , COST-BASED RATES AND AUDITING

I, the Authorized Official of the Northern Kentucky Water District (the "Grantee"), hereby certify that the Grantee agrees, as a condition of its Cleaner Water Program fund award, as follows:

a) to establish and use a financial accounting system that accounts for the operations of water treatment and distribution separately from all other operations of the Grantee;

b) to establish service rates based upon the cost of providing the service; and

c) that the Authority may require an audit to be conducted of the Grantee's utility at least once every two (2) years.

Northern Kentucky Water District

_____
Printed Name of Authorized Official

_____
Signature of Authorized Official

_____
Date

EXHIBIT 11

CERTIFICATE OF PROJECT COMPLETION

Pursuant to the Grant Assistance Agreement between the Kentucky Infrastructure Authority (the "Authority") and the Northern Kentucky Water District (the "Grantee"), this certificate, signed by the Grantee's Engineer and the Grantee, confirms that the following Project implementation activities are complete.

1. The Project construction has been completed and payment in full has been made to all vendors and/or contractors for labor, services, materials, supplies, machinery, and equipment included in the Project, as appropriate.

2. The Project is complete and is available for the provision of services which are expected to commence on or about _____.

3. A set of Project construction plans, with hand-drawn illustrations and notations reflecting any changes and variances from the original plans, if any, has been delivered to the Project Administrator for use in updating the Water Resources Information System appropriately.

Project Engineer: _____

Date: _____

4. All lands, easements, rights of ways, temporary or permanent permits or other authorizations or clearances as well as necessary constructed structures or facilities in connection with the Project have been acquired, constructed, equipped, and installed and all costs and expenses incurred in connection therewith have been paid in full.

Authorized Official: _____

Project Administrator: _____

Date: _____

EXHIBIT E-4

NOTICE TO STATE LOCAL DEBT OFFICER

Northern Kentucky Water District

September 22, 2022

Commissioner and State Local Debt Officer
1024 Capital Center Drive, Suite 340
Frankfort, Kentucky 40601

Re: Northern Kentucky Water District, PSC Case No. 2022-00319
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 Kentucky Infrastructure Authority Loan, KIA Loan No. F20-044 in the amount of $8,000,000.

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

Stacey Kampsen

By: Stacey Kampsen
Acting VP of Finance and Support Services

EXHIBIT F

FINANCIAL STATEMENTS
(Balance Sheet and Income Statement)

NORTHERN KENTUCKY WATER DISTRICT
STATEMENT OF NET POSITION
March 31, 2023

ASSETS AND DEFERRED OUTFLOWS OF RESOURCES

Current Assets		
Cash and Cash Equivalents	$	37,742,232
Investments		4,448,511
Accounts Receivable		
Customers, Net		6,138,057
Unbilled Customers		9,100,000
Others		182,457
Assessments Receivable		185,400
Lease Receivable - Current		117,382
Inventory Supplies for New Installation		
and Maintenance, at Cost		2,534,920
Prepaid Items		1,810,299
Restricted Assets - Cash and Cash Equivalents		
Bond Proceeds Fund		8,386
Debt Service Account		1,044,583
Improvement, Repair & Replacement		731,165
Total Current Assets		64,043,392
Noncurrent Assets		
Restricted Assets - Cash and Cash Equivalents		
Bond Proceeds Fund		11,187,015
Debt Service Account		10,424,121
Improvement, Repair and Replacement		7,360,058
Restricted Assets - Investments		
Debt Service Reserve Account		19,006,017
Miscellaneous Deferred Charges		8,666,839
Lease Receivable - Non Current		5,074,517
Capital Assets		
Land, System, Buildings and Equipment		539,610,817
Construction in Progress		14,200,962
Total Capital Assets		553,811,779
Less Accumulated Depreciation		211,520,784
Total Capital Assets, Net of Accumulated Depreciation		342,290,995
Total Noncurrent Assets		404,009,563
Total Assets		468,052,956
Deferred Outflows of Resources		
Deferred Outflows Related to Pension		2,207,924
Deferred Outflows Related to OPEB		2,469,945
Deferred Loss on Refundings		2,276,080
Total Deferred Outflows of Resources		6,953,949
Total Assets and Deferred Outflows of Resources	$	475,006,905

NORTHERN KENTUCKY WATER DISTRICT
STATEMENT OF NET POSITION
March 31, 2023

LIABILITIES, DEFERRED INFLOWS OF RESOURCES, AND NET POSITION

Liabilities and Deferred Inflows of Resources		
Current Liabilities		
Bonded Indebtedness	$	13,381,773
Notes Payable		1,782,998
Accounts Payable		94,718
Accrued Payroll and Taxes		528,674
Compensated Absences		199,476
Other Accrued Liabilities		269,270
Liabilities Payable-Restricted Assets		
Accrued Interest Payable		1,044,583
Accounts Payable		739,551
Total Current Liabilities		18,041,042
Long-Term Liabilities (Net of Current Portion)		
Liabilities Payable-Restricted Assets		
Accounts Payable		989,737
Compensated Absences		1,464,414
Arbitrage Liability		82,768
Bond Indebtedness		126,038,738
Notes Payable		27,041,227
Net Pension Liability		24,663,515
Net Unfunded OPEB Liability		6,732,760
Total Long-Term Liabilities		187,013,158
Total Liabilities		205,054,200
Deferred Inflows of Resources		
Deferred Inflows Related to Pension		656,657
Deferred Inflows Related to OPEB		2,640,933
Deferred Inflows Related to Leases		5,074,275
Deferred Inflows Related to Refundings		2,127,030
Total Deferred Inflows of Resources		10,498,895
Total Liabilities and Deferred Inflows of Resources		215,553,096
Net Position		
Net Investment in Capital Assets		174,195,309
Restricted For		
Debt Service Funds		29,430,139
Capital Improvement Projects		17,557,337
Unrestricted		38,271,025
Total Net Position		259,453,810
Total Liabilities, Deferred Inflows of Resources, and Net Position	$	475,006,905

NORTHERN KENTUCKY WATER DISTRICT
STATEMENT OF REVENUES, EXPENSES AND CHANGES IN NET POSITION
12 MONTH PERIOD ENDED MARCH 31, 2023

Operating Revenues		
Water Sales	$	59,965,828
Forfeited Discounts		980,462
Rents From Property		377,503
Other Water Revenues		276,253
Total Operating Revenues		61,600,046
Operating Expenses		
Operating and Maintenance Expense		34,401,448
Depreciation Expense		12,547,980
Total Operating Expenses		46,949,428
Net Operating Income		14,650,618
Non-Operating Income (Expense)		
Investment Income		2,870,871
Miscellaneous Non-Operating Income/(Expense)		247,192
Loss on Abandonment of Mains		(139,273)
Gain/(Loss) on Disposal of Fixed Assets		20,899
Interest on Long Term Debt		(4,996,747)
Pension Expense		(40,243)
Other Post Employment Benefit Expense		(560,705)
Arbitrage Expense		(261,842)
Amortization of Debt Premiums and Defeasance Costs		1,547,727
Bond Issuance Costs		(308,753)
Total Non-Operating Income (Expenses)		(1,620,874)
Change in Net Position Before Capital Contributions		13,029,744
Capital Contributions		2,430,314
Change in Net Position		15,460,058
Net Position - Beginning of Year		243,993,752
Net Position - End of Year	$	259,453,810

EXHIBIT G

AFFIDAVIT

Northern Kentucky Water District

AFFIDAVIT

Comes now the affiant, STACEY KAMPSEN, after first being duly sworn and cautioned, states as follows:

1. That she is the Vice President of Finance and Support Services;

2. That she is authorized to submit this Application on behalf of the Northern Kentucky Water District;

3. That the information contained in the Application and its Exhibits are true and correct to the best of her knowledge and belief except as to those matters that are based on information provided to her and as to those she believes to be true and correct.

Further Affiant sayeth naught.

April 26, 2023
Date

Stacey Kampsen
Name: Stacey Kampsen

COMMONWEALTH OF KENTUCKY :
: SS
COUNTY OF KENTON :

The foregoing instrument was subscribed and sworn before me by Stacey Kampsen this 26th day of April, 2023.

Notary Public, Kentucky at Large
Notary ID Number: KYNP17828
My Commission Expires: December 21, 2024