

COMMONWEALTH OF KENTUCKY  
BEFORE THE PUBLIC SERVICE COMMISSION

RECEIVED

AUG 03 2006

PUBLIC SERVICE  
COMMISSION

In the Matter of:

APPLICATION OF NORTHERN KENTUCKY )  
WATER DISTRICT FOR APPROVAL OF ) CASE NO. 2006- 372  
CONSTRUCTION OF STANDBY POWER )  
GENERATORS AND ISSUANCE OF A )  
CERTIFICATE OF CONVENIENCE )  
AND NECESSITY )

**APPLICATION FOR APPROVAL OF CONSTRUCTION**

Northern Kentucky Water District (NKWD), by counsel, petitions for an order approving the construction of standby power generators at the Ohio River Pump Station pursuant to KRS 278.020.

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

1. NKWD's office address is 2835 Crescent Springs Rd., Erlanger, KY 41018-0640. Its principal officers are listed in its current Annual Report on page 6, which is filed with the Commission as are its prior years Reports;
2. NKWD is a non-profit water district organized under Chapter 74 and has no separate articles of incorporation;
3. A description of NKWD's water system and its property stated at original cost by accounts is contained in its Annual Report, which is attached as Exhibit E.
4. NKWD serves retail customers in Kenton, Boone and Campbell Counties and

sells water at wholesale to non-affiliated water distribution systems in Kenton, Boone, Pendleton and Campbell Counties.

5. It proposes to construct standby power generators at its Ohio River Pump Station as described in Exhibit A (Two copies of the Maps, Plans, Specifications and Bid Documents are provided as a separate bound document). The District is financing the project with \$95,000 of bonds approved in Case No. 2005-00148 and from \$1,705,000 to be included as part of a BAN to be issued.

6. The construction is in the public interest and is required to allow NKWD to continue to provide adequate service to its customers. As a result of a Vulnerability Assessment in May, 2004, it was determined that a power failure at the Pump Station would disrupt water into the plant. The generators will allow two pumps with a combined flow of approximately 25 MGD to operate during times of power failure. The project, its cost, need and other details are contained in Exhibit A.

7. The total project cost is approximately \$1,800,000 see Exhibits C and D.

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

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

10. The proposed project, identified in Exhibit A, is scheduled to begin construction in October, 2006 and be completed by November, 2007. Board approval of the project was given on July 26, 2006, attached as Exhibit C. Bid information is included with Exhibit C. Bids expire on October 5, 2006.

11. No new franchises are required. No DOW or other permits are required. See Exhibit B.

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

13. Maps of the area showing location of the proposed facilities are in Exhibit A.

14. The construction costs have been funded by the issuance of \$95,000 general parity bonds and the remaining portion will be funded with a BAN.

15. Estimated operating costs for operation and maintenance, depreciation and debt service after construction to the extent that there are any are shown in Exhibit D.

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

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

18. The start date for construction; proposed in-service date; and total estimated cost of construction at completion are included in Exhibits A and B.

19. CWIP at end of test year is listed in Exhibit E.

20. Plant retirements are listed in Exhibit B and E. No salvage values are included as booked.

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

22. No rate adjustment is being proposed.

23. The following information is provided in response to 807 KAR 5:001 (8):

a. Articles of Incorporation – None. NKWD is a statutorily created water district under KRS Chapter 74;

24. The following information is supplied pursuant to 807 KAR 5:001(9):

a. Facts relied upon to show that the application is in the public interest:  
See Exhibit A.

25. The following information is provided as required by 807 KAR 5:001 (11):

a. A general description of the property is contained in the Annual Report,

Exhibit E.

- b. No stock is to be issued; No bonds are to be issued in this case;
- c. There is no refunding or refinancing;
- d. The proceeds of the financing are to construct the property described in

Exhibit A

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

26. The following exhibits are provided pursuant to 807 KAR 5:001 (11)(2):

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

b. Property is to be constructed is described in Exhibit A.

27. The following information is provided pursuant to 807 KAR 5:001(6):

a. No stock is authorized.

b. No stock is issued.

c. There are no stock preferences.

d. Mortgages are listed in Exhibit F.

e. Bonds are listed in Exhibit F.

f. Notes are listed in Exhibit F.

g. Other indebtedness is listed in Exhibit F.

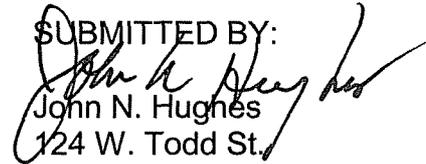
h. No dividends have been paid.

i. Current balance sheet; income statement and debt schedule are attached as Exhibits F and G.

For these reasons, the District requests authorization to construct the facilities and

for any order or authorization that may be necessary to obtain Commission approval for construction.

SUBMITTED BY:



John N. Hughes  
124 W. Todd St.  
Frankfort, KY 40601

Attorney for Northern  
Kentucky Water District

NORTHERN KENTUCKY  
WATER DISTRICT

*Project*

*Ohio River Pump Station No. 1 Standby Generators*

Campbell County

184-437

**NORTHERN KENTUCKY WATER DISTRICT**  
**Ohio River Pump Station No. 1 Standby Generators**  
**184-43**

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<b><u>EXHIBIT</u></b>	<b><u>TITLE</u></b>
A	ENGINEERING REPORTS AND INFORMATION Copy of project map, Preliminary Engineering Report; Engineer's opinion of probable total construction cost; Quest plans titled "Ohio River Pump Station No. 1 Standby Generators" dated June, 2006, sealed by a P.E.; Quest specifications titled "Ohio River Pump Station No. 1 Standby Generators" dated June, 2006 and sealed by a P.E.
B	Certified statement from an authorized utility Official confirming:  (1) Affidavit  (2) Franchises  (3) Plan review and permit status  (4) Easements and Right-Of-Way status  (5) Construction dates and proposed date in service  (6) Plant retirements
C	BID INFORMATION AND BOARD RESOLUTION Bid tabulation, Engineer's recommendation of award, Board resolution.
D	PROJECT FINANCE INFORMATION Customers added and revenue effect, Debt issuance and source of debt, Additional costs and operating and maintenance, Depreciation cost and debt service after construction.
E	PSC ANNUAL REPORT - 2005
F	SCHEDULE OF MORTGAGES, BONDS, NOTES, AND OTHER INDEBTEDNESS
G	CURRENT BALANCE SHEET AND INCOME STATEMENT

## **Ohio River Pump Station No.1 Standby Generators**

Project 184-437

### **Project Description:**

The proposed project involves the construction of standby power generators at the Ohio River Pump Station. The Pump Station was constructed in 1997 and supplies water to the Ft. Thomas Treatment Plant, which treats approximately 80% of the water used in the system. The original design of the Ohio River Pump Station did not include backup power capabilities. If a power outage is experienced, no water can be pumped to the treatment plant. In May 2004, a Vulnerability Assessment was performed for the District which ranked the Ohio River Pump Station and the Ft. Thomas Treatment Plant as the District's number one critical asset. The assessment recommended that the District install backup power generators to its most critical facilities, including this facility. The generators will permit two pumps (combined flow of 2 pumps is around 25 MGD) to run on standby power.

Bids were opened July 7, 2006 and will expire in 90 days or October 5, 2006.



NORTHERN KENTUCKY  
WATER DISTRICT

**Project**

**Ohio River Pump Station No. 1 Standby Generators**

Campbell County  
184-437

ENGINEERING REPORTS AND INFORMATION

Project Map

Preliminary Design Memorandum

Engineer's Opinion of Probable Total Construction Cost

Plans prepared by Quest titled "Ohio River Pump Station No. 1 Standby  
Generators" dated June, 2006

Specifications prepared by Quest titled "Ohio River Pump Station No. 1 Standby  
Generators" dated June, 2006

Case No. 2006-\_\_\_\_  
Exhibit \_\_\_\_\_ A \_\_\_\_\_

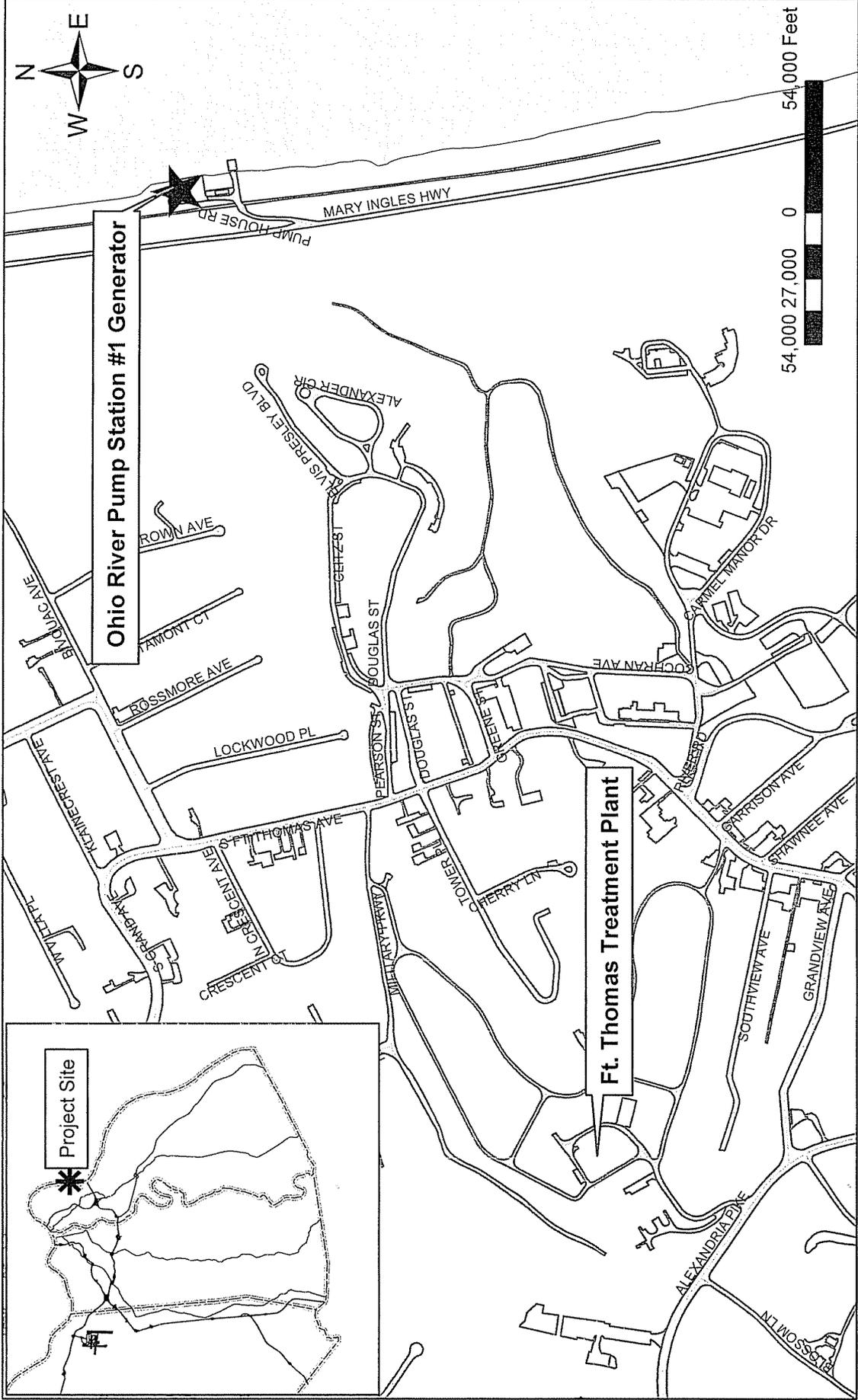
NORTHERN KENTUCKY  
WATER DISTRICT

*Project*

*Ohio River Pump Station No. 1 Standby Generators*

Campbell County  
184-437

Project Map



# Ohio River Pump Station #1 Emergency Generator

Case No. 2006-\_\_\_\_\_  
Exhibit \_\_\_\_\_ A \_\_\_\_\_

NORTHERN KENTUCKY  
WATER DISTRICT

*Project*

*Ohio River Pump Station No. 1 Standby Generators*

Campbell County  
184-437

Preliminary Design Memorandum

**Preliminary Engineering Report  
Ohio River Pump Station No. 1  
Standby Generator  
Northern Kentucky Water District**

**September 2005**

*Prepared by:*

*Quest Engineers, Inc.  
2517 Sir Barton Way  
Lexington, Kentucky 40509  
(859) 223-3755*

**Preliminary Engineering Report**  
**Ohio River Pump Station No. 1 Standby Generator**  
**Northern Kentucky Water District**

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*Attachments*

- A Existing One-line Diagram
- B Option No. 1 - Two Generators/Two ATS at 4.16 KV
- C Option No. 2 - Two Generators in Parallel/Two ATS at 4.16 KV
- D Electrical Site Plan
- E Existing Pad Mount Switchgear Detail
- F New Generator Pad Details
- G Option No. 1 Cost
- H Option No. 2 Cost
- I Generator Cutsheets
- J Generator Enclosure Cutsheets
- K External Fuel Tank Cutsheets

# Preliminary Engineering Report Ohio River Pump Station No. 1 Standby Generator Northern Kentucky Water District

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## Objective

The Ohio River Pump Station No. 1 (ORPS1) is critical to Northern Kentucky Water District (NKWD) in terms of providing raw water to the Fort Thomas Water Treatment Plant (WTP). In order to maintain a maximum of two pumps in operation at ORPS1 during a power outage from Cinergy, it is necessary that NKWD install a standby generator for on-site emergency power.

## Background

The ORPS1 was placed into service in 1997 and supplies water to the Fort Thomas Treatment Plant, with a firm pumping capacity of approximately 60 million gallons a day (MGD). Currently, the original pumps at the station are being replaced or scheduled for replacement.

The ORPS1 has dual overhead, 12.47 KV feeders from Cinergy to outdoor service switchgear. The pump station is energized from one of the Cinergy feeders, with the fuses on the second feeder open and serving as a backup. In the event of a power failure on the main feeder, Cinergy must manually open the fuses on the main feeder and close the fuses on the backup feeder to restore power to the pump station. The outdoor switchgear has two main switches with metering and a tie switch. Each switch is key interlocked to prevent connecting the two Cinergy feeders together.

The 12.47 KV outdoor service switchgear feeds two separate outdoor 5,000 KVA transformers. The secondary side of each transformer is 4.16 KV. One transformer feeds indoor switchgear MCLU-1; the other feeds MCLU-2. Each MCLU is located in the electrical room inside the pump station. Reduced-voltage, auto-transformer (RVAT) starters for each raw water pump are located in either MCLU-1 or MCLU-2. For additional information, refer to the existing one-line diagram, Attachment A.

A site visit was conducted to verify existing equipment information. The following data was obtained:

### *Pump Motor*

- 1250 HP, 3-phase, 60 Hz
- Frame: 6808P WP1
- Type: HVE4

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*Pump Motor (continued)*

- Temperature Rating: 40 degrees C Ambient
- Service Factor: 1.15
- RPM: 1785
- High Thrust Motor
- Manufacturer for Pumps 1 through 5: U.S. Motors
- Manufacturer for Pump 6: GE Motor
- Voltage: 4160 volt

*Pump Starter*

- Type: RVAT
- Manufacturer: Cutler-Hammer
- Catalog No.: S602A4G 11-96 (Pumps 1 through 5)
- Catalog No.: S610SCE 7-99 (Pump 6)
- Voltage: 4160 volt

*Transformers*

- KVA: 5000/6250 OA/FFA, 65 degrees C Rise
- Voltage: 12470 – 4160Y/2400 volt
- Impedance: 6.58%
- Weight: 4826 lbs.
- Tap: 12470 volt (Tap C)
- Contains less than 1 PPM PCBs
- Manufacturer: Cutler-Hammer

*12.47 Switches*

- Amp: 600 A
- Fault Rating: 40 KA
- Voltage Rating: 13.8 KV
- Manufacturer: Cutler-Hammer

## **Project Requirements**

The design will consider the need for the following items at a minimum:

- Operate any two pumps concurrently.
- Lightning and surge protection.
- Above ground diesel fuel tank storage with two days operating capacity.
- Site security and accessibility.
- Site work and access.
- Maintaining new equipment above the 100-year flood elevation.
- Coordination with Cinergy.

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## Resources

Information necessary to evaluate the requirements for a standby generator has been obtained from the following:

- NKWD/Quest Professional Services Agreement, Exhibit A.
- Ohio River Pump Station Buildings 34 and 12 demolition dated 8/16/00 by Black & Veatch.
- Ohio River Intake design drawings dated 4/98 by Black & Veatch.
- Generator proposal from Buckeye Power dated 2/21/05.
- Twelve-month electrical billing history.
- Partial "Draft Vulnerability Assessment."
- Subsurface report from G. J. Thelen dated 8/21/95.
- Means Cost Estimating Guide.
- Site visit on 7/6/05.
- Kickoff Meeting on 6/21/05.

## Evaluation

The electrical distribution system at the ORPS1 was evaluated in terms of adding emergency power. Three major issues considered in this evaluation were physical location; size and number of generators; and electrical tie-in to the existing system.

Consideration for locating the generator was based on:

- 100-year flood elevation.
- Maintaining access to the site and new generator(s).
- Subsurface conditions in and around the old pump station.
- Avoiding existing underground utilities.

Consideration for size and number of generators was based on:

- Maximum continuous load (lighting, screens, valves, chemical pumps, etc.) to be connected to emergency power would be 150 KW.
- Maximum number of raw water pumps connected to emergency power would be two.
- Each of the six raw water pumps is rated at 1250 HP, 4160 volt, with a reduced-voltage, auto-transformer starter. The first step on the starter would be at 80 percent voltage.
- Maintaining 20 percent maximum voltage drop during pump startup.
- After a power failure, each raw water pump will be restarted manually, one at a time.
- The transfer to emergency power will be automatic and the continuous load (lighting, screens, valves, chemical pumps, etc.) at the pump station will restart automatically.
- Maintaining up to a two-day supply of diesel fuel.

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Consideration for the electrical tie-in to the existing system was based on:

- Minimizing down time at the pump station.
- Accessibility to the existing electrical distribution system.
- Avoid replacement of any existing switchgear.

### ***Option No. 1***

Option No. 1 involves two 2000 KW generators and two automatic transfer switches (ATS). One generator and ATS would be installed on the 4.16 KV feeder between Transformer T-1 and Switchgear MCLU-1. The other generator and ATS would be installed on the 4.16 KV feeder between Transformer T-2 and Switchgear MCLU-2. Each generator/ATS would operate independently of the other and would only come on when it senses a power failure on the feeder to which it is connected. Each generator would be sized to operate one raw water pump and the miscellaneous load. With the tie breakers between MCLU-1 and MCLU-2, either generator could run any one pump; however, it would take both generators to operate two pumps. For additional information, refer to Attachment B.

#### *Advantages*

- Lower cost.
- Simple, straight-forward solution.
- Operators could manually de-energize one generator to save fuel consumption if only one pump is needed.

#### *Disadvantages*

- Generator must be oversized for pump startup.
- It takes both generators running to operate two pumps.
- For Pumps 1 through 3, only one could be running at a time because a single generator feeds MCLU-1.
- For Pumps 4 through 6, only one could be running at a time because a single generator feeds MCLU-2.
- Voltage drop on startup of a pump may exceed 20 percent.
- Potential higher fuel consumption because of the oversized generators.

### ***Option No. 2***

Option No. 2 involves two 1500 KW generators, paralleling switchgear and two ATS's. The generators would provide emergency power to each ATS via the paralleling switchgear. One ATS would be installed on the 4.16 KV feeder between Transformer T-1 and Switchgear MCLU-1. The other ATS

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would be installed on the 4.16 KV feeder between Transformer T-2 and Switchgear MCLU-2. Each ATS would operate independently of the other and would only transfer the load when it senses a power failure on the feeder to which it is connected. When either ATS senses a power failure, both engine/generators will start. The first one to reach 90 percent of rated voltage and frequency will be connected to the emergency circuit (normally, this will happen within seven seconds). The second generator will automatically synchronize with the first and then be connected to the emergency circuit. The parallel generators will be sized to operate two pumps and any miscellaneous loads. For additional information, refer to Attachment D.

#### *Advantages*

- This option can run any two pumps at one time.
- System can operate with one generator off line.
- Acceptable voltage drop during pump startup.

#### *Disadvantages*

- Higher cost.
- More elaborate setup with paralleling switchgear, therefore, increasing chances of potential failures.
- *cannot start pump unless two generators functioning.*

#### **Option No. 3**

Consideration was given to using a single generator, distribution breakers and two ATS's. At this time, neither of the generator manufacturers we contacted provide a single generator large enough to operate two 1250 HP pumps. Kohler has a 2800 KW unit, but the voltage drop during startup would be unacceptable. The largest unit Caterpillar builds is 2250 KW. By the end of the year, Caterpillar will have a larger unit available that may work in this application; however, there is no information available at this time to substantiate whether or not this approach would work.

#### **Option No. 4**

Consideration was given to connecting a standby generator at 12.47 KV instead of 4.16 KV. However, this was not considered a viable option for the following reasons:

- 12.47 KV equipment (generators, switchgear and transfer switches) typically cost 15 to 20 percent more than 4.16 KV equipment.
- The 4.16 KV feeders are inside the manhole which allows access. The 12.47 KV feeders are either bus connections or imbedded in the concrete, making them difficult to access.

- 12.47 KV equipment is typically larger and requires more clearance, resulting in larger space requirements.

**Opinion of Probable Cost**

An opinion of probable cost for each option is included as Attachments G and H. It is broken down by labor and materials for each option, then adds percentages for contingencies, miscellaneous job factors, bonding, insurance, overhead and profit. The following is a summary of the estimated cost for each option:

<i>Option</i>	<i>Generator with Subbase Tank</i>	<i>Generator with External Fuel Tank</i>
No. 1	\$1,505,112	\$1,549,247
No. 2	\$1,578,482	\$1,618,403

For the fuel supply, two alternatives were considered in the cost evaluation:

***Alternative No. 1***

Each generator could be supplied with a subbase fuel tank. The tank would be built into the support frame of the generator. This would allow us to eliminate the external tank and save money and space requirements. Based on the physical dimensions of each generator, a 4000 gallon subbase fuel tank could be installed which would maintain a 48-hour fuel supply, with two pumps running. Since the generator would sit on top of the fuel tank, this alternative would require some steps to access the enclosure door.

***Alternative No. 2***

Each generator set could be supplied with a double-wall, concrete lined fuel tank, sized to maintain 48-hour fuel supply. The disadvantage to this alternative is the cost, additional space required for the fuel tank, and fuel piping between the tank and generator with heat tracing.

**Recommendation**

Each option considered represents an effective means of providing backup power in the event of a power failure from Cinergy. Option No. 2 appears to be the best approach for the following reasons:

- Option No. 2 would allow operators to run any two pumps at one time.
- With two generators running in parallel, voltage drop during startup is acceptable.

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Each generator will be equipped with the following features:

- Fuel priming pump and fuel line.
- Cooling system.
- Batteries and battery charger.
- Jacket water heater.
- Control panel.
- Main circuit breaker.
- Weather protective enclosure with doors.
- Muffler.
- Plant exerciser with ten seven-day events, programmable for any day of the week and twenty-four calendar events, programmable for any month/day, to automatically exercise the generator in one minute increments. Also included will be the ability to select either “no load” or “load” exercise period. All setup requirements will be via keypad. At a minimum, it is recommended that each generator be exercised “under load” for 30 minutes each month. Exercising the generator with load will prevent a condition known as “wet stacking.” Operating the generator with no load allows unburned fuel to accumulate in the exhaust system, which can foul the fuel injectors, valves, and exhaust system.

Because of the reduced space requirements and lower cost, it is also recommended that a subbase fuel tank be utilized.

For cutsheet information on the generator, generator enclosure, and fuel tank, refer to Attachments I, J, and K.

NORTHERN KENTUCKY  
WATER DISTRICT

*Project*

*Ohio River Pump Station No. 1 Standby Generators*

Campbell County  
184-437

Engineer's Opinion of Probable Total Construction Cost



Case No. 2006-\_\_\_\_  
Exhibit \_\_\_\_\_ A \_\_\_\_\_

NORTHERN KENTUCKY  
WATER DISTRICT

*Project*

*Ohio River Pump Station No. 1 Standby Generators*

Campbell County  
184-437

Plans and specifications prepared by Quest titled  
"Ohio River Pump Station No. 1 Standby Generators"

Submitted as separate attachments

Northern Kentucky  
**Water District**

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The following items are enclosed separately from this volume.

- Plans prepared by Quest titled "Ohio River Pump Station No. 1 Standby Generators" dated June, 2006. (5 sets)
- Specifications prepared by Quest titled "Ohio River Pump Station No. 1 Standby Generators" dated June, 2006. (5 sets)



NORTHERN KENTUCKY  
WATER DISTRICT

*Project*

*Ohio River Pump Station No. 1 Standby Generators*

Campbell County  
184-437

CERTIFIED STATEMENTS

Affidavit

Franchises

Plan Review and Permit Status

Easements and Right-of-Way Status

Construction Dates and Proposed Date In Service

Plant Retirements

**AFFIDAVIT**

**Ohio River Pump Station No. 1 Standby Generators**

Affiant, Jack Bragg, Jr., being the first duly sworn, deposes and says that he is the Vice President of Finance of the Northern Kentucky Water District, which he is the Applicant in the proceeding styled above; that he has read the foregoing "Ohio River Pump Station No. 1 Standby Generators" Application and knows the contents thereof, and that the same is true of his own knowledge, except as to matters which are therein stated on information or belief, and that as to those matters he believes them to be true.



Jack Bragg, Jr.  
Vice President - Finance  
Northern Ky. Water District

Subscribed and sworn to before me in said County to be his act and deed by Jack Bragg, Jr., Vice President of Finance of the Northern Kentucky Water District, this 31 day of JANUARY 2006.



NOTARY PUBLIC  
Campbell County, Kentucky  
My commission expires 1-14-2007

# Northern Kentucky Water District

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Franchises required – None

Plan Review and Permit Status - The District has reviewed and approved the plans and specifications prepared by Quest titled “Ohio River Pump Station No. 1 Standby Generators” dated June 2006.

The District received the attached e-mail dated May 31, 2006 from Division of Water indicating plan review is not required.

Easements and Right-of-Way Status - Easement and Right-of-Way statements are not required.

Start date of construction – assumed October 2006

Proposed date in service – assumed November 2007

Plant retirements – None

Case No. 2006-\_\_\_\_\_  
Exhibit     B    

NORTHERN KENTUCKY  
WATER DISTRICT

*Project*

*Ohio River Pump Station No. 1 Standby Generators*

Campbell County  
184-437

PLAN REVIEW AND PERMIT STATUS

Approval Status from Kentucky Division of Water

**Amy Kramer**

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**From:** "Riley, Mike (EPPC DEP DOW)" <jmike.riley@ky.gov>  
**To:** <landerson@questeng.com>  
**Cc:** <akramer@nkywater.org>  
**Sent:** Wednesday, May 31, 2006 9:30 AM  
**Subject:** Northern Kentucky Water District Emergency Power Generation

In response to your May 25, 2006 letter regarding adding diesel powered emergency generators and associated transfer switches to the Ohio River Pump Station No. 1, plan review and permitting by the Drinking Water Branch will not be required.

James M. (Mike) Riley, PE  
Supervisor, Permits and Plans Review Section  
Drinking Water Branch  
Division of Water  
502/564-2225, Ext. 592  
jmike.riley@ky.gov



NORTHERN KENTUCKY  
WATER DISTRICT

**Project**  
**Ohio River Pump Station No. 1 Standby Generators**

Campbell County  
184-437

BID INFORMATION AND BOARD RESOLUTION

Bid Tabulation

Engineer's Recommendation of Award

Board Resolution

Case No. 2006-\_\_\_\_  
Exhibit     C    

NORTHERN KENTUCKY  
WATER DISTRICT

*Project*  
*Ohio River Pump Station No. 1 Standby Generators*

Campbell County  
184-437

Bid Tabulation

**Ohio River Pump Station No. 1  
Standby Generators  
Northern Kentucky Water District**

Bids Received: July 7, 2006/2:00 p.m.

Topic	Bidder			
	Lake Erie Electric	SECO Electric Co., Inc.	Glenwood Electric, Inc.	Northern Kentucky Electrical
Lump Sum Items (a)	\$1,545,000.00	\$1,614,000.00	\$1,664,980.50	\$1,909,737.00

Item No.	Description	Unit	Est. Qty.	Lake Eric Electric*		SECO Electric Co., Inc.**		Glenwood Electric, Inc.		Northern Kentucky Electrical	
				Unit Price	Total Item Amount	Unit Price	Total Item Amount	Unit Price	Total Item Amount	Unit Price	Total Item Amount
1	30-inch Diameter Reinforced Concrete Caissons in Soil (Specification Section 02370)	940	LF	\$117.00	\$109,980.00	\$33.60	\$31,584.00	\$36.80	\$34,592.00	\$133.00	\$125,020.00
2	30-inch Diameter Reinforced Concrete Caissons in Rock (Specification Section 02370)	110	LF	136.00	14,960.00	833.70	91,707.00	873.40	96,074.00	155.00	17,050.00
3	36-inch Diameter Reinforced Concrete Caissons in Soil (Specification Section 02370)	265	LF	118.00	31,270.00	40.00	10,600.00	51.70	13,700.50	133.00	35,245.00
4	36-inch Diameter Reinforced Concrete Caissons in Rock (Specification Section 02370)	30	LF	147.00	4,410.00	1,198.00	35,940.00	1,255.10	37,653.00	168.00	5,040.00
<b>TOTAL BID OF UNIT PRICES (b)</b>					<b>160,620.00</b>		<b>169,831.00</b>		<b>182,019.50</b>		<b>182,355.00</b>

\*Denotes a mathematical error in line item No. 1, No. 4.

\*\*Denotes a mathematical error in line item No. 3.

Ohio River Pump Station No. 1  
Standby Generators  
Northern Kentucky Water District

Bids Received: July 7, 2006/2:00 p.m.

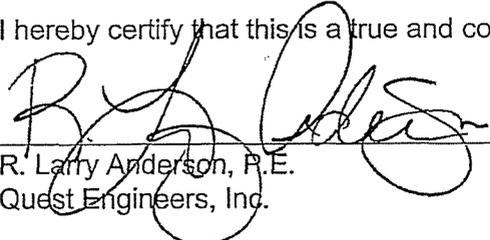
Topic	Bidder			
	Lake Erie Electric***	SECO Electric Co., Inc.****	Glenwood Electric, Inc.	Northern Kentucky Electrical
COMBINED BID TOTAL OF a AND b	\$1,705,620.00	\$1,783,831.00	\$1,847,000.00	\$2,092,092.00

\*\*\*Denotes a mathematical error in combined bid total of a and b.

\*\*\*\*Denotes a mathematical error in combined bid total of a and b.

Topic	Bidder			
	Lake Erie Electric	SECO Electric Co., Inc.	Glenwood Electric, Inc.	Northern Kentucky Electrical
TOTAL BID FOR ALTERNATIVE NO. 1	(\$180,000.00)	(\$203,000.00)	\$150,000.00	(\$145,657.00)
TOTAL BID FOR ADDITIVE ALTERNATIVE NO. 2	\$0.00	\$0.00	\$39,000.00	\$0.00
TOTAL BID FOR DEDUCTIVE ALTERNATIVE NO. 3	\$77,000.00	\$85,000.00	\$67,000.00	\$74,515.00

I hereby certify that this is a true and correct tabulation of the bids

  
 \_\_\_\_\_  
 R. Larry Anderson, P.E.  
 Quest Engineers, Inc.

Case No. 2006-\_\_\_\_  
Exhibit \_\_\_\_\_ C \_\_\_\_\_

NORTHERN KENTUCKY  
WATER DISTRICT

*Project*

*Ohio River Pump Station No. 1 Standby Generators*

Campbell County  
184-437

Engineer's Recommendation of Award



July 27, 2006

Ms. Amy Kramer, P.E.  
Design Engineering Manager  
Northern Kentucky Water District  
2835 Crescent Springs road  
Erlanger, Kentucky 41018

RE: Recommendation for Award  
Ohio River Pump Station No. 1 Standby Generators  
Northern Kentucky Water District

Quest Engineers, Inc.

*Lexington:*  
2517 Sir Barton Way  
Lexington, KY 40509  
859-223-3755  
859-223-3150 (Fax)

*Louisville:*  
One Riverfront Plaza  
401 West Main Street  
Suite 500  
Louisville, KY 40202  
502-584-4118  
502-589-3009 (Fax)

*Cincinnati:*  
1251 Kemper Meadow Drive  
Suite 600  
Cincinnati, OH 45240  
513-851-9774  
513-851-9207 (Fax)

Dear Ms. Kramer:

We have reviewed the bid submitted on July 7, 2006, on the above referenced project by Lake Erie Electric in the amount of \$1,705,620.00. The bid package was in order and acceptable.

We have also reviewed the alternatives and recommend acceptance of:

<i>Alternative</i>	<i>Amount</i>
Additive Alternative No. 2	\$0 (no cost)
Deductive Alternative No. 3	(\$77,000)

We are recommending at this time that the Contract be awarded to Lake Erie Electric.

We look forward to working with you during construction of this project. If you have any questions, please give us a call.

Sincerely,

R. Larry Anderson, P.E.  
Senior Vice President

Case No. 2006-\_\_\_\_\_  
Exhibit     C    

NORTHERN KENTUCKY  
WATER DISTRICT

*Project*

*Ohio River Pump Station No. 1 Standby Generators*

Campbell County  
184-437

Board Resolution

**Northern Kentucky Water District  
Board of Commissioners Meeting  
July 26, 2006**

A regular meeting of the Board of Commissioners of the Northern Kentucky Water District was held on July 26, 2006 at the District's facility at 2835 Crescent Springs Road in Erlanger, Kentucky. All Commissioners were present. Also present were Ron Lovan, Richard Harrison, Bari Joslyn, Mark Lofland, Jack Bragg, Bill Wulfeck, Amy Kramer, Don Gibson, Bob Buhrlage, Jim Dierig, Mary Carol Wagner, Frances Robinson, Barbara Northcutt, Jack Hughes and Charles Pangburn.

Commissioner Koester called the meeting to order.

Ms. Kramer of the District staff led those in attendance in the Pledge of Allegiance.

Ms. Joslyn of the District staff delivered a presentation to the Board on Plant Flow and Redundancy.

The Board reviewed articles published and correspondence received since the last regular Board meeting on June 23, 2006.

On motion of Commissioner Wagner, seconded by Commissioner Jackson, the Board unanimously approved the minutes for the regular Board meeting held on June 23, 2006.

On motion of Commissioner Macke, seconded by Commissioner Sommerkamp, and after discussion, the Board unanimously approved the expenditures of the District for the month of June, 2006.

On motion of Commissioner Wagner, seconded by Commissioner Collins, and after discussion, the Board unanimously agreed to award the Four Mile Pike 8-inch water main extension project to J. Daniel and Co. and to authorize the District staff to execute appropriate contract documents.

On motion of Commissioner Sommerkamp, seconded by Commissioner Collins, and after discussion, the Board unanimously agreed to authorize the District staff to execute an agreement with the City of Fort Wright for the Marcella Drive and St. Anthony Drive water main replacement project.

On motion of Commissioner Jackson, seconded by Commissioner Collins, and after discussion, the Board unanimously agreed to award the Glenn Avenue redundancy and water main replacement project to RFH Construction and to authorize the District staff to execute appropriate contract documents.

 On motion of Commissioner Wagner, seconded by Commissioner Sommerkamp, and after discussion, the Board unanimously agreed to award the Ohio River Pump Station standby

generators project to Lake Erie Electric and to authorize the District staff to execute appropriate contract documents.

On motion of Commissioner Sommerkamp, seconded by Commissioner Collins, and after discussion, the Board unanimously agreed to reject all bids received for the replacement of the discharge line at the Ohio River Pump Station 2.

On motion of Commissioner Wagner, seconded by Commissioner Collins, and after discussion, the Board unanimously agreed to authorize the purchase of the following vehicles from the vendors indicated:

3/4 ton HD pickup truck with service body 4x2	Countryside Motors, Inc.
3/4 ton pickup truck with service body 4x4	Countryside Motors, Inc.
3/4 ton pickup truck with extended cab 4x2	Walt Sweeney Ford

The Board reviewed the District's financial reports and Department reports.

The Board unanimously agreed to move the December, 2006 regular Board meeting to December 14, 2006 at 12:30 p.m.

Mr. Pangburn excused himself and departed the Board meeting.

On motion of Commissioner Sommerkamp, seconded by Commissioner Wagner, the Board unanimously agreed to go into executive session under the provisions of KRS 61.810(1)(c) to discuss proposed or pending litigation.

The Board returned to open session.

On motion of Commissioner Sommerkamp, seconded by Commissioner Wagner, the Board unanimously agreed to authorize the District's legal counsel to file an appeal of the Public Service Commission's order of July 12, 2006 in Case 2004-00309 in the matter of the District's tariff filing to amend its cross-connection control policy.

There being no further business to come before the Board, the meeting was adjourned.

---

CHAIR

---

SECRETARY



RECYCLED PAPER MADE FROM 20% POST CONSUMER CONTENT

NORTHERN KENTUCKY  
WATER DISTRICT

*Project*  
*Ohio River Pump Station No. 1 Standby Generators*

Campbell County  
184-437

PROJECT FINANCE INFORMATION

Customers Added and Revenue Effect

Debt Issuance and Source of Debt

Additional Costs for Operating and Maintenance

Depreciation Cost and Debt Service After Construction

# Northern Kentucky Water District

---

There will be zero new customers added and no revenue effect as a result of the Ohio River Pump Station No. 1 Standby Generators Project.

The amount of debt issuance and source is \$95,000 for engineering design that was part of Rate Case 2005-00148 and \$1,705,000 from a future BAN for a total project budget of \$1,800,000. A summary of the project costs is provided below:

Engineering (design and construction phase)	\$ 74,400
Contractor's base bid for construction	\$1,705,620
Miscellaneous & Contingencies	<u>\$ 19,980</u>
Total Project Cost	\$1,800,000

Additional operating and maintenance costs incurred for the Ohio River Pump Station No. 1 Standby Generators are anticipated to be as follows:

#### Annual O&M

Labor	\$3,000
Operation	\$2,000
Maintenance	<u>\$30,000</u>
	\$35,000

Annual depreciation and debt service after construction are as follows:

Depreciation	\$72,000/year over 25 years
Debt Service	\$141,750/year



Case No. 2006-\_\_\_\_  
Exhibit     E    

NORTHERN KENTUCKY  
WATER DISTRICT

*Project*

*Ohio River Pump Station No. 1 Standby Generators*

Campbell County  
184-437

PSC ANNUAL REPORT - 2005

---

Water Districts & Associations-Class A&B

**Annual Report**

Of

**Northern Kentucky Water District  
2835 Crescent Springs Road  
Erlanger, KY 41018**

To The

**Public Service Commission**

Of The

**Commonwealth of Kentucky**

211 Sower Boulevard  
P.O. Box 615  
Frankfort, Kentucky 40602

For the Calendar Year Ended December 31, 2005

CHECKLIST FOR THE ANNUAL REPORT  
 FOR CLASS A AND B WATER DISTRICTS AND WATER ASSOCIATIONS  
 TO BE COMPLETED AND RETURNED WITH THE ANNUAL REPORT

<u>Page No.</u>	<u>Account No.</u>		<u>Page No.</u>		Yes	No	If No, Explain Why
4-6	The identification pages have been completed				X		
7	101-106	agrees with	13	Total 101-106	X		
7	108-110	agrees with	15	Total 301-348 Cols c & h	X		
7	114-115	agrees with	16	Net Balance 114-115	X		
7	123	agrees with	17	Total 123	X		
7	124-125	agrees with	17	Total 124 and Total 125	X		
7	126	agrees with	17	Total 126	X		
7	127	agrees with	17	Total 127	X		
7	141-144	agrees with	18	Net Balance 141-144	X		
7	151-153	agrees with	19	Total 151-153	X		
7	162	agrees with	19	Total 162	X		
8	181	agrees with	20	Total 181	X		
8	182	agrees with	21	Total 182	X		
8	186	agrees with	20	Total 186	X		
9	214	agrees with	12	Total 214	X		
9	215.1	agrees with	12	Total 215.1	X		
9	215.2	agrees with	12	Total 215.2	X		
9	221	agrees with	23	Total Col 4	X		
9	221	agrees with	23	Total Col 12	X		
9	224	agrees with	22	Total Col f	X		
9	232	agrees with	24	Total 232	X		

CHECKLIST FOR THE ANNUAL REPORT  
 FOR CLASS A AND B WATER DISTRICTS AND WATER ASSOCIATIONS  
 TO BE COMPLETED AND RETURNED WITH THE ANNUAL REPORT

Page No.	Account No.		Page No.		Yes	No	If No, Explain Why
9	233	agrees with	24	Total 233	X		
9	234	agrees with	24	Total 234	X		
9	236	agrees with	25	Beginning and Ending Balance 236	X		
9	237	agrees with	25	Total 237 Cols b & e	X		
9	242	agrees with	26	Total 242	X		
9	251	agrees with	20	Total 251	X		
9	252	agrees with	21	Beginning and Ending Balance 252	X		
10	400	agrees with	27	Total Water Operating Revenue Col e	X		
10	401	agrees with	28	Total 601-675, Col c	X		
10	408.1 & 408.2	agrees with	25	Total Taxes Accrued 408.10-408.20	X		
11	427	agrees with	25	Total Interest Accrued Col c	X		
11	Net Income Before Contributions	agrees with	12	Balance Trans From Inc Col c	X		
13	101	agrees with	14	Total Water Plant Col f	X		
14	The analysis of water utility plant accounts Cols c through k has been completed				X		
15	The analysis of accumulated depreciation and amortization by primary account has been completed.				X		
20	186.1	agrees with	26	Total 186.1 Col c	X		
22	Schedule of Long-Term Debt has been completed				X		
23	Schedule of Bond Maturities has been completed				X		
27	Taxes collected (example: school tax, sales tax, franchise tax) have been excluded from Revenue and Expenses				X		
27	The analysis of water operating revenue Cols c, d, and e has been completed.				X		

CHECKLIST FOR THE ANNUAL REPORT  
 FOR CLASS A AND B WATER DISTRICTS AND WATER ASSOCIATIONS  
 TO BE COMPLETED AND RETURNED WITH THE ANNUAL REPORT

Page 3 of 3

Page No.	Account No.	Page No.	Yes	No	If No, Explain Why
28	The analysis of water utility expense Cols c through k has been completed.		X		
29	Schedule of Pumping and Purchased Water Statistics has been completed.		X		
29	Total Col (d) agrees with	30			Line 4, Total Produced and Purchased
29	Total Col (e) agrees with	30			Line 13, Total Water Sales
30	466 Total Gals agrees with	30			Line 11, Sales For Resale (466)
	Oath page has been completed.		X		



---

Additional Requested Information

Utility Name Northern Kentucky Water District

Contact Person Jack Bragg, Jr.

Contact Person's E-Mail Address jbragg@nkywater.org

Utility's Web Address www.nkywater.org

Additional Information Required by Commission Orders

Provide any special information required by prior commission orders, as well as any narrative explanations necessary to fully explain the data. Examples of the types of Special information that may be required by commission orders include surcharge amounts collected, refunds issued, and unusual debt repayments.

Case No.	Date of Order	Item/Explanation	
96-234	8/26/1996	Merger of Campbell Co. Water District and Kenton Co. Water District No. 1. Effective date of Merger 1/1/97.	
97-330	9/2/1997	Defeasance of the former Campbell Co. KY Water District Bonds. Principal of the Issue	9,630,000
92-482	3/14/1992	Subdistrict A	
		a. Number of Customers as of 12/31/2003	433
		b. Total surcharge billed during 2003	66,918
		c. Accumulated surcharge billed.	1,012,473
		d. Remaining Debt service on debt which NKWD issued to finance facilities.	789,265
94-409	1/26/1995	Subdistrict B	
		a. Number of Customers as of 12/31/2003	262
		b. Total surcharge billed during 2003	62,154
		c. Accumulated surcharge billed.	524,278
		d. Remaining Debt service on debt which NKWD issued to finance facilities.	1,706,371
95-582	2/8/1996	Subdistrict R	
		a. Number of Customers as of 12/31/2003	232
		b. Total surcharge billed during 2003	51,391
		c. Accumulated surcharge billed.	390,284
		d. Remaining Debt service on debt which NKWD issued to finance facilities.	1,091,016
95-582	2/8/1996	Subdistrict RL	
		a. Number of Customers as of 12/31/2003	86
		b. Total surcharge billed during 2003	38,695
		c. Accumulated surcharge billed.	313,969
		d. Remaining Debt service on debt which NKWD issued to finance facilities.	755,488

97-468	9/4/1998	Per itm 7 on the order. See attached exhibit ML 1	
2000-329	7/21/2000	Subdistrict C	
		a. Number of Customers as of 12/31/2003	845
		b. Total surcharge billed during 2003	232,169
		c. Accumulated surcharge billed.	768,790
		d. Remaining Debt service on debt which NKWD issued to finance facilities.	6,769,039
2000-171	5/5/2000	Subdistrict D	
		a. Number of Customers as of 12/31/2003	58
		b. Total surcharge billed during 2003	23,925
		c. Accumulated surcharge billed.	47,910
2001-198	6/27/2001	Defeasance of the former Kenton County Water District Bonds and Newport WW Purchase Principal of the Issue.	45,485,000
2002-00363	10/1/2002	Defeasance of the former Kenton County Water District Bonds. Principal of the Issue.	10,575,000
2002-00468	3/1/2003	Defeasance of 1995 C Bonds with Issuance of 2003 A Bonds	1,615,000
2002-00105	4/30/2003	Water Rate Increase	
2002-00105	6/1/2003	Issue of 2003 B Bonds	30,270,000
2003-00404	12/2/2003	Defeasance of 1993, 1995 A and 1995 B Bonds with the Issuance of 2003 C Bonds	23,790,000

## Major Water Projects

Instructions: Provide details about each major water project which is planned but has not yet been submitted for approval to the Public Service Commission. For the limited purpose of this report a "Major Project" is defined as one which is not in the ordinary course of business, and which will increase your current utility plant by at least 20%.

Brief Project Description (improvement, replacement, building construction, expansion. If expansion, provide the estimated number of new customers):

N/A

Projected Costs and Funding Sources/Amounts:

Approval Status: (Application for financial assistance filed, but not approved; or application approved, but have not advertised for construction bids)

Location: (community, area or nearby roads)

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Investments and Special Funds	17		
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Materials & Supplies	19		
Prepayments	19		
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Advances for Construction	21		
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Accounts Payable to Associated Co.	24		
Accrued Taxes	25		
Accrued Interest	25		
Misc. Current & Accrued Liabilities	26		
Regulatory Commission Expense	26		

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*HISTORY*

1. Exact name of utility making this report. (Use the words: "The, Company, Incorporated or Incorporated" only when a part of the corporate name.)

**Northern Kentucky Water District**

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2. Give location including city, street and number, of the executive office:

**2835 Crescent Springs Road**

**P.O. Box 18640**

**Erlanger, KY 41018**

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3. Give name, title, address, and telephone number of the officer to whom correspondence concerning this report should be addressed:

**Jack Bragg, Jr.**

**P.O. Box 18640, Erlanger, Kentucky 41018**

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4. Date of organization: **January 1, 1997**

5. If a consolidated or merger company, name all contingent and all merged companies. Give reference to charters or general laws governing each and all amendments of same:

**N/A**

---

6. Date and authority for each consolidation and each merger:

**N/A**

---

7. State whether respondent is a corporation, a joint stock association, a firm or partnership or an individual:

**Non-profit water utility**

**Special District – State of Kentucky**

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*History - Continued*

8. Name all other operating departments:

**N/A**

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9. Name of counties in which you furnish water service:

**Campbell County, Kenton County, Boone County  
Wholesale: Pendleton County**

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**COMPARATIVE BALANCE SHEET - ASSETS AND OTHER DEBITS**

Account No. (a)	Account Name (b)	Ref. Page ©	Previous Year (d)	Current Year (e)
<b>UTILITY PLANT</b>				
101-106	Utility Plant	13	\$ 251,475,930	\$ 268,102,484
108-110	Less: Accumulated Depreciation and Amortization	13,15-16	(48,288,707)	(53,201,141)
	Net Plant		\$ 203,187,223	\$ 214,901,343
114-115	Utility Plant Acquisition Adjustments (Net)	16	4,469,711	4,268,591
116	Other Utility Plant Adjustments			
	Total Net Utility Plant		\$ 207,656,934	\$ 219,169,934
<b>OTHER PROPERTY &amp; INVESTMENTS</b>				
121	Nonutility Property		\$	\$
122	Less: Accumulated Depreciation and Amortization			
	Net Nonutility Property		\$	\$
123	Investment in Assn. Companies	17		
124	Utility Investments	17	21,535,260	21,911,383
125	Other Investments	17	3,680,638	3,783,211
126-127	Special Funds	17		
	Total Other Property & Investments		\$ 25,215,898	\$ 25,694,594
<b>CURRENT AND ACCRUED ASSETS</b>				
131	Cash		\$ 831,017	\$ 3,909,589
132	Special Deposits			
133	Other Special Deposits		11,453,379	17,997,953
134	Working Funds			
135	Temporary Cash Investments			
141-144	Accounts Receivable, Less Accumulated Provision for Uncollectible Accounts	18	4,717,008	3,732,614
145	Accounts Receivable from Associated Companies			
146	Notes Receivable from Associated Companies			
151-153	Materials & Supplies	19	1,241,337	1,150,975
161	Stores Expense			
162	Prepayments	19	2,894,399	2,340,939
171	Accrued Interest & Dividends Receivable			
172	Rents Receivable			
173	Accrued Utility Revenues		4,900,000	4,900,000
174	Misc. Current & Accrued Assets			
	Total Current & Accrued Assets		\$ 26,037,140	\$ 34,032,070

COMPARATIVE BALANCE SHEET - ASSETS AND OTHER DEBITS (CONT'D)

Account No. (a)	Account Name (b)	Ref. Page c	Previous Year (d)	Current Year (e)
<b>DEFERRED DEBITS</b>				
181	Unamortized Debt Discount & Expense	20	\$ 3,045,263	\$ 2,956,387
182	Extraordinary Property losses	21		
183	Preliminary Survey & Investagation Charges			
184	Clearing Accounts			
185	Temporary Facilities			
186	Misc. Deferred Debits	20	5,216,390	6,924,182
187	Research & Development Expenditures			
	Total Deferred Debits		\$ 8,261,653	\$ 9,880,569
	<b>TOTAL ASSETS AND OTHER DEBITS</b>		\$ 267,365,378	\$ 288,777,167

COMPARATIVE BALANCE SHEET - EQUITY CAPITAL AND LIABILITIES

Account No. (a)	Account Name (b)	Ref. Page c	Previous Year (d)	Current Year (e)
<b>Equity Capital</b>				
214	Appropriated Retained Earnings	12	\$ 31,029,357	\$ 39,336,654
215.1	Retained Earnings from Income Before Contributions	12	\$ 30,416,476	\$ 25,534,918
215.2	Donated Capital	12	\$ 40,195,514	\$ 43,095,791
	Total Equity Capital		\$ 101,641,347	\$ 107,967,363
<b>LONG-TERM DEBT</b>				
221	Bonds	23	\$ 153,125,000	\$ 148,701,000
222	Reacquired Bonds			
223	Advances from Asso. Companies			
224	Other Long-Term Debt	22	2,625,000	2,375,000
	Total Long-Term Debt		\$ 155,750,000	\$ 151,076,000
<b>CURRENT &amp; ACCRUED LIABILITIES</b>				
231	Accounts Payable		\$ 1,799,189	\$ 3,620,486
232	Notes Payable	24	3,705,000	21,685,000
233	Acts. Payable to Asso. Co.	24		
234	Notes Payable to Asso. Co.	24		
235	Customer Deposits		2,250	2,949
236	Accrued Taxes	25		
237	Accrued Interest	25	2,593,452	2,737,097
239	Matured Long-Term Debt			
240	Matured Interest			
241	Tax Collections Payable			
242	Misc. Current & Accrued Liabilities	26	1,810,263	1,629,323
	Total Current & Accrued Liabilities		\$ 9,910,154	\$ 29,674,855
<b>DEFERRED CREDITS</b>				
251	Unamortized Premium on Debt	20	\$ 63,877	\$ 58,949
252	Advances for Construction	21		
253	Other Deferred Credits			
	Total Deferred Credits		63,877	58,949
<b>OPERATING RESERVES</b>				
Accumulated Provision for:				
261	Property Insurance		\$	\$
262	Injuries & Damages			
263	Pensions & Benefits			
265	Miscellaneous Operating Reserves			
	Total Operating Reserves		\$	\$
	<b>TOTAL EQUITY CAPITAL &amp; LIABILITIES</b>		\$ 267,365,378	\$ 288,777,167

**COMPARATIVE OPERATING STATEMENT**

Acct. No. (a)	Account Name (b)	Ref. Page c	Previous Year (d)	Current Year (e)
<b>Utility Operating Income</b>				
400	Operating Revenues	27	\$ 32,185,250	\$ 34,846,622
401	Operating Expenses	28	\$ 19,429,652	\$ 20,479,276
403	Depreciation Expenses		5,128,169	5,361,019
406	Amortization of Utility Plant			
	Acquisition Adjustment		201,120	201,120
407	Amortization Expense		378,960	378,960
408.1	Taxes Other Than Income	25	519,707	544,011
	Utility Operating Expenses		\$ 25,657,608	\$ 26,964,386
	Utility Operating Income		\$ 6,527,642	7,882,236
413	Income From Utility Plant Leased to Others			
414	Gains (Losses) From Disposition of Utility Property		-	(7,249)
	Total Utility Operating Income		\$ 6,527,642	\$ 7,874,987
<b>Other Income and Deductions</b>				
415	Revenues From Merchandising, Jobbing and Contract Deductions		\$	\$
416	Costs and Expenses of Merchandising, Jobbing and Contract Work			
419	Interest & Dividend Income		791,405	1,862,615
420	Allowance for Funds Used During Construction			
421	Nonutility Income		31,138	12,681
426	Miscellaneous Nonutility Expense			
	Total Other Income & Deductions		\$ 822,543	1,875,296
<b>TAXES APPLICABLE TO OTHER INCOME</b>				
408.2	Taxes Other Than Income		\$	\$
	Total Taxes Applic. To Other Income		\$	\$

**COMPARATIVE OPERATING STATEMENT**

Acct. No. (a)	Account Name (b)	Ref. Page c	Previous Year (d)	Current Year (e)
<b>Utility Operating Income</b>				
400	Operating Revenues	27	\$ 32,185,250	\$ 34,846,623
401	Operating Expenses	28	\$ 19,429,652	\$ 20,479,098
403	Depreciation Expenses		5,128,169	5,361,019
406	Amortization of Utility Plant			
	Acquisition Adjustment		201,120	201,120
407	Amortization Expense		378,960	378,960
408.1	Taxes Other Than Income	25	519,707	544,011
	Utility Operating Expenses		\$ 25,657,608	\$ 26,964,208
	Utility Operating Income		\$ 6,527,642	7,882,415
413	Income From Utility Plant Leased to Others			
414	Gains (Losses) From Disposition of Utility Property			(7,249)
	Total Utility Operating Income		\$ 6,527,642	\$ 7,875,166
<b>Other Income and Deductions</b>				
415	Revenues From Merchandising, Jobbing and Contract Deductions		\$	\$
416	Costs and Expenses of Merchandising, Jobbing and Contract Work			
419	Interest & Dividend Income		791,405	1,862,615
420	Allowance for Funds Used During Construction			
421	Nonutility Income		31,138	12,681
426	Miscellaneous Nonutility Expense			
	Total Other Income & Deductions		\$ 822,543	1,875,296
<b>TAXES APPLICABLE TO OTHER INCOME</b>				
408.2	Taxes Other Than Income		\$	\$
	Total Taxes Applic. To Other Income		\$	\$

\$ +174 transports

COMPARATIVE OPERATING STATEMENT - Continued

Account No. (a)	Account Name (b)	Ref. Page ©	Previous Year (d)	Current Year (e)
<b>INTEREST EXPENSE</b>				
427	Interest Expense		\$ 5,344,406	\$ 6,126,890
428	Amortization of Debt Discount & Exp.		150,663	202,582
429	Amortization of Premiun on Debt		4,928	4,928
	Total Interest Expense		\$ 5,490,141	\$ 6,324,544
<b>EXTRAORDINARY ITEMS</b>				
433	Extraordinary Income		\$	\$
434	Extraordinary Deductions			
	Total Extraordinary Items		\$ -	\$ -
	NET INCOME		\$ 1,860,044	\$ 3,425,739

Statement of Retained Earnings

ACCT. No. (a)	(b)	Amount (c)
214	Appropriated Retained Earnings (state balance and purpose of each appropriated amount at year end):	
	Bond Proceeds	\$ 17,242,047
	Debt Service and Reserve	\$ 19,020,505
	Improvement, Repair and Replacement	\$ 3,074,102
	Total Appropriated Retained Earnings.....	\$ 39,336,654

215.1	Retained Earnings From Income Before Contributions:	
	Balance Beginning of Year.....	\$ 30,416,472
435	Balance Transferred from Net Income Before Contributions.....	\$ 3,425,739
	Other Changes to Account:	
436	Appropriations of Retained Earnings.....	\$ (8,307,293)
439	Adjustments to Retained Earnings (requires Commission approval prior to use):	
	Credits (explain) _____	\$ _____
	Debits (explain) _____	\$ _____
	Balance End of Year.....	\$ 25,534,918

215.2	Donated Capital:				
		Tapping Fees	Grants	Other	Total
	Balance Beginning of Year.....	4,735,018	5,759,358	29,701,138	40,195,514
	Credits:				
432	Proceeds from capital contributions.....	1,007,222	374,015	1,519,040	2,900,277
	Other Credits (explain)				
	Debits: (explain - Requires Commission Approval)				
	Balance End of Year.....	5,742,240	6,133,373	31,220,178	43,095,791

NET UTILITY PLANT (ACCTS. 101 - 106)

Account No.	Plant Accounts	Total
101	Utility Plant in Service	\$ 248,118,189
102	Utility Plant Leased to Others	
103	Property Held for Future Use	
104	Utility Plant Purchased or Sold	
105	Construction Work in Progress	19,984,295
106	Completed Construction Not Classified	
	<b>Total Utility Plant</b>	\$ 268,102,484

ACCUMULATED DEPRECIATION (ACCT. 108)

Description	Total
Balance first of year	\$ 48,288,707
Credit during year:	
Accruals Charged to Account 108.1	5,361,019
Accruals Charged to Account 108.2	
Accruals Charged to Account 108.3	
Accruals Charged to Other Accounts (specify)	
_____	
_____	
Salvage	
Other Credits (specify)	
_____	
_____	
<b>Total Credits</b>	\$ 5,361,019
Debits during year:	
Book Cost of Plant Retired	\$ 448,585
Cost of Removal	
Other Debits (specify)	
_____	
_____	
<b>Total Debits</b>	\$ 448,585
<b>Balance end of year</b>	\$ 53,201,141

Water Utility Plant Accounts

Acct. No. Acct.	Account Name b	Previous Year Year c	Additions d	Retirement e	Current Year f	Intangible Plant g	Source of Supply & Pumping h	WT Plant i	Trans. & Distribu Plant J	General Plant K
301	Organization	\$								
302	Franchises									
303	Land and Land Rights	605,416	-	-	605,416		29,200	72,496	205,403	298,317
304	Structure & Improvements	65,516,438	202,104		65,718,542		16,869,144	35,671,419	7,661,242	5,516,737
305	Collecting & Impounding Reservoirs									
306	Lake River & Other Intakes	1,524,592			1,524,592		1,524,592			
307	Wells & Springs									
308	Infiltration on Galleries & Tunnels									
309	Supply Mains	2,307,853			2,307,853		2,307,853			
310	Power Generation Equipment									
311	Pumping Equipment	8,661,832	19,805	4,666	8,676,971		2,496,219	833,197	5,347,555	
320	Water Treatment Equipment	9,285,428	181,449	750	9,466,127			9,466,127		
330	Distribution Reservoirs & Standpipes-	7,500,741			7,500,741				7,500,741	
331	Transmission & Distribution Mains	106,184,511	4,360,534	418,823	110,126,222				110,126,222	
333	Services	18,787,274	868,458		19,655,732				19,655,732	
334	Meters & Meter Installation	6,537,668	542,601		7,080,269				7,080,269	
335	Hydrants	4,550,842	458,146		5,008,988				5,008,988	
339	Other Plant & Misc. Equipment	3,374,076	12,708	1,683	3,385,101					3,385,101
340	Office Furniture & Equipment	2,352,529	187,553	18,954	2,521,128					2,521,128
341	Transportation Equipment	2,512,074	249,256	157,485	2,603,845					2,603,845
342	Stores Equipment									
343	Tools, Shop & Garage Equip.	284,376	-		284,376					284,376
344	Laboratory Equipment	-	60,600	-	60,600					60,600
345	Power Operated Equipment	542,549	158,059		700,608					700,608
346	Communication Equipment									
347	Miscellaneous Equipment									
348	Other Tangible Plant	891,078			891,078					891,078
	<b>Total Water Plant</b>	<b>241,419,277</b>	<b>7,301,272</b>	<b>602,361</b>	<b>248,118,189</b>	<b>-</b>	<b>23,227,008</b>	<b>46,043,239</b>	<b>162,586,152</b>	<b>16,261,790</b>

Analysis of Accumulated Depreciation and Amortization by Primary Account

Acct. No. (a)	Account (b)	Balance Beginning of Year c	Credits During the Year		Charges During The Year		Balance End of Year (h)
			Charges to Dep. Exp. (d)	Other Credits (e)	Plant Retirements (f)	Other Charges (g)	
301	Organization	\$	\$	\$	\$	\$	\$
302	Franchises						
303	Limited Term Interest in Land and Land Rights						
304	Structures & Improvements	11,350,180	1,636,856		64		12,986,973
305	Collecting & Impounding Reservoirs						
306	Lake River & Other Intakes	601,663	77,488				679,151
307	Wells & Springs						
309	Supply Mains	339,414	23,312				362,726
310	Power Generating Equip.						
311	Pumping Equipment	3,408,410	378,605		1,711		3,785,305
320	Water Treatment Equip.	2,717,676	401,104		750		3,118,030
330	Distribution Reservoirs & Standpipes	2,542,407	133,754				2,676,161
331	Transmissions & Distribution Mains	12,557,965	1,178,856		272,235		13,464,586
333	Services	5,832,871	402,138				6,235,009
334	Meters & Meter Installations	1,490,420	163,288				1,653,708
335	Hydrants	1,193,249	95,598				1,288,847
339	Other Plant & Misc. Equip.	1,143,633	327,355		1,666		1,469,322
340	Office Furniture & Equip.	1,756,251	242,311		14,676		1,983,886
341	Transportation Equip.	1,833,191	228,190		157,485		1,903,896
342	Service Equipment	-					
343	Tools, Shop & Garage Equip.	273,713	3,348				277,061
344	Shop Equipment	-					
345	Power Operated Equip.	398,481	50,127				448,608
346	Telecommunication Equipment	-					
347	Scada	-					
348	Other Tangible Plant	849,183	18,691				867,874
	Totals	\$ 48,288,707	\$ 5,361,019	\$ -	\$ 448,585	\$ -	\$ 53,201,141

**ACCUMULATED AMORTIZATION (ACCT. 110)**

Description	Total
Balance first of year.....	\$ N/A
Credit during year:	
Accruals Charged to Account 110.1....	\$
Accruals Charged to Account 110.2....	\$
Other Accruals (specify)	\$
	\$
Total Credits.....	\$
Debits during year:	
Book Cost of Plant Retired.....	\$
Other Debits (specify)	\$
	\$
Total Debits.....	\$
Balance end of year.....	\$

**UTILITY PLANT ACQUISITION ADJUSTMENT (ACCTS. 114 - 115)**

Report each acquisition adjustment and related accumulated amortization separately.  
For any acquisition adjustment approved by the Commission, include the Order Number.

ACCOUNT NAME	TOTAL
Acquisition Adjustments (114)	
Original District 9-14-55	\$ 263,366
District # 2 & 3 12-31-73	18,712
Mentor District 9-1-76	10,741
City of Cold Spring	228,253
City of Silver Grove	24,853
Newport Water Works	4,970,211
Total Plant Acquisition Adjustments.....	\$ 5,516,136
Accumulated Amortization (115)	
Original District 9-14-55	\$ 263,366
District # 2 & 3 12-31-73	18,712
Mentor District 9-1-76	10,741
City of Cold Spring	228,253
City of Silver Grove	24,853
Newport Water Works	701,620
Total Accumulated Amortization.....	\$ 1,247,545
Net Acquisition Adjustments.....	\$ 4,268,591

**Investments and Special Funds (Acct. 123-127)**

Report hereunder all investments and special funds carried in Account 123-127.

Description of Security or Special Fund (a)	Face or Par Value (b)	Year-End Book Cost c
Investment In Associated Companies (Acct. 123):	\$	\$
_____	_____	_____
_____	_____	_____
_____	_____	_____
Total Investment in Asso. Companies	_____	\$ _____
Utility Investments (Acct. 124):		
IRR Account	\$	\$ 3,074,102
Debt Service Account		6,547,631
Debt Service Reserve Account		12,289,650
<b>Total Utility Investments</b>		\$ 21,911,383
Other Investments (Acct. 125):		
Boone County/Florence KY Settlement	\$	\$ 3,783,211
_____	_____	_____
_____	_____	_____
Total Other Investments:	\$	\$ 3,783,211
Special Funds (Acct. 126 & 127):		
Prepayment Reserve	_____	_____
_____	_____	_____
_____	_____	_____
Total Special Funds	_____	\$ _____

ACCOUNTS AND NOTES RECEIVABLE - NET (ACCOUNTS 141 - 144)

Report hereunder all accounts and notes receivable included in Accounts 141, 142, and 144. Amounts included in Accounts 142 and 144 should be listed individually.

Description	Total
<b>ACCOUNTS &amp; NOTES RECEIVABLE:</b>	
Customer Accounts Receivable (Acct. 141) .....	\$ 3,681,014
Other Accounts Receivable (Acct. 142)	
Assessments .....	\$ 37,767
Other .....	13,832
	51,600
Notes Receivable (Acct. 144)	
	\$
<b>Total Accounts and Notes Receivable.....</b>	<b>\$ 3,732,614</b>
<b>Accumulated Provision for Uncollectable Accounts (Acct. 143)</b>	
Balance first of year .....	\$ -
Add: Provision for uncollectables for	
current year.....	\$
Collections fo accounts previously	
written off.....	
Utility accounts.....	
Others.....	
<b>Total Additions.....</b>	<b>\$</b>
Deduct accounts written off during year:	
Utility Accounts.....	\$
Other.....	
<b>Total accounts written off.....</b>	<b>\$</b>
Balance end of year.....	\$ -
<b>Total Accounts and Notes Receivable</b>	<b>\$ 3,732,614</b>

**Materials and Supplies (151 - 153)**

Account Name	Total
Plant Materials and Supplies (Account 151)	\$ 1,150,975
Merchandise (Account 152)	
Other Materials and Supplies (Account 153)	
Total Materials & Supplies	\$ 1,150,975

**Prepayments (Acct. 162)**

Description	Total
Prepaid Insurance	\$ 134,674
Prepaid Rents	
Prepaid Interest	
Prepaid Taxes	
Other Prepayments (Specify)	
Expenses/Services	\$ 110,375
Water Tower Painting	2,095,890
Total Prepayments	\$ 2,340,939

**Miscellaneous Deferred Debits (Acct. 186)**

Description	Total
Miscellaneous Deferred Debits (Acct. 186):	
Deferred Rate Case Expense 2003-2004	211,582.69
Deferred Rate Case Expense 2004-2006	26,874.69
Other Deferred Debits	6,685,725
<b>Total Miscellaneous Deferred Debits</b>	<b>\$ 6,924,182.10</b>

**Unamortized Debt Discount & Expense & Premium on Debt (Accts. 181 & 251)**

Report the net discount & expense or premium separately for each security issue.

Description	Amount Written Off During Year	Year-End Balance
Unamortized Debt Discount & Expense (Acct. 181)		
Bond Issue Cost 1997	\$ 4,916	\$ 82,748
Bond Discount 1997	6,735	113,373
Bond Discount 1998	7,570	173,479
Bond Issue Costs 1998	3,147	72,137
Cost of Issue 2001 Bond	3,699	77,084
Discount 2001 Bond	13,038	271,636
Cost of Issue 2002 A	13,731	289,495
Bond Discount 2002 A	27,209	573,657
Cost of Issue 2002 B	9,300	111,214
Cost of Issue 2003 A	1,620	40,790
Bond Discount 2003 A	1,087	28,366
Cost of Issue 2003 B	11,760	262,670
Bond Discount 2003 B	8,520	190,993
Cost of Issue 2003 C	14,940	217,833
Discount 2003 C	7,404	104,297
Cost of issue 2004A BAN	11,004	2,743
Discount 2004A BAN	7,824	1,954
Cost of issue 2004A Bonds	3,252	77,456
Discount 2004A Bond	7,920	188,662
Cost of issue 2005A BAN	14,648	29,294
Discount 2005 BAN	23,256	46,506
<b>Total Unamortized Debt Discount &amp; Expense</b>	<b>\$ 202,580</b>	<b>\$ 2,956,387</b>
Unamortized Premium on Debt (Acct. 251):		
Premium on 2002 B Bond	\$ 63,877	\$ 58,949
<b>Total Unamortized Premium on Debt</b>	<b>\$ 63,877</b>	<b>\$ 58,949</b>

**Miscellaneous Deferred Debits (Acct. 186)**

Description	Total
Miscellaneous Deferred Debits (Acct. 186):	
Deferred Rate Case Expense 2002-2003	\$ 72,543
Deferred Rate Case Expense 2003-2004	103,450
Deferred Rate Case Expense 2004-2006	211,583
Other Deferred Debits	6,536,606
<b>Total Miscellaneous Deferred Debits</b>	<b>\$ 6,924,182</b>

**Unamortized Debt Discount & Expense & Premium on Debt (Accts. 181 & 251)**

Report the net discount & expense or premium separately for each security issue.

Description	Amount Written Off During Year	Year-End Balance
Unamortized Debt Discount & Expense (Acct. 181)		
Bond Issue Cost 1997	\$ 4,916	\$ 82,748
Bond Discount 1997	6,735	113,373
Bond Discount 1998	7,570	173,479
Bond Issue Costs 1998	3,147	72,137
Cost of Issue 2001 Bond	3,699	77,084
Discount 2001 Bond	13,038	271,636
Cost of Issue 2002 A	13,731	289,495
Bond Discount 2002 A	27,209	573,657
Cost of Issue 2002 B	9,300	111,214
Cost of Issue 2003 A	1,620	40,790
Bond Discount 2003 A	1,087	28,366
Cost of Issue 2003 B	11,760	262,670
Bond Discount 2003 B	8,520	190,993
Cost of Issue 2003 C	14,940	217,833
Discount 2003 C	7,404	104,297
Cost of issue 2004A BAN	11,004	2,743
Discount 2004A BAN	7,824	1,954
Cost of issue 2004A Bonds	3,252	77,456
Discount 2004A Bond	7,920	188,662
Cost of issue 2005A BAN	14,648	29,294
Discount 2005 BAN	23,256	46,506
<b>Total Unamortized Debt Discount &amp; Expense</b>	<b>\$ 202,580</b>	<b>\$ 2,956,387</b>
Unamortized Premium on Debt (Acct. 251):		
Premium on 2002 B Bond	\$ 63,877	\$ 58,949
<b>Total Unamortized Premium on Debt</b>	<b>\$ 63,877</b>	<b>\$ 58,949</b>

EXTRAORDINARY PROPERTY LOSSES (ACCT. 182)

Report each item separately.

Description	Total
Extraordinary Property Losses (Acct. 182) :	
N/A	\$ _____
_____	\$ _____
_____	\$ _____
Total Extraordinary Property Losses .....	\$ _____

ADVANCES FOR CONSTRUCTION (ACCT. 252)

DESCRIPTION	TOTAL
N/A	
Balance first of year.....	\$ _____
Add credits during year.....	\$ _____
Deduct charges during year.....	\$ _____
Balance end of year.....	\$ _____



## Northern Kentucky Water Service District

Attachment 22A

Bond Issue: 11,225,000, Dated September 1, 1997

Bond Number	Maturity Date	Interest Rate	Principle Amount	Amounts Paid	Outstanding
Registered	1998	4.700%	210,000.00	210,000.00	
Registered	1999	4.700%	580,000.00	580,000.00	
Registered	2000	4.700%	610,000.00	610,000.00	
Registered	2001	4.700%	640,000.00	640,000.00	
Registered	2002	4.700%	670,000.00	670,000.00	
Registered	2003	4.700%	700,000.00	700,000.00	
Registered	2004	4.700%	735,000.00	735,000.00	
Registered	2005	4.700%	770,000.00	770,000.00	
Registered	2006	4.700%	810,000.00		810,000.00
Registered	2007	4.700%	850,000.00		850,000.00
Registered	2008	4.750%	890,000.00		890,000.00
Registered	2009	4.750%	930,000.00		930,000.00
Registered	2010	4.750%	975,000.00		975,000.00
Registered	2011	4.750%	1,025,000.00		1,025,000.00
Registered	2012	4.750%	60,000.00		60,000.00
Registered	2013	4.750%	60,000.00		60,000.00
Registered	2014	4.750%	65,000.00		65,000.00
Registered	2015	4.750%	70,000.00		70,000.00
Registered	2016	4.750%	70,000.00		70,000.00
Registered	2017	4.750%	75,000.00		75,000.00
Registered	2018	4.750%	80,000.00		80,000.00
Registered	2019	4.750%	80,000.00		80,000.00
Registered	2020	4.750%	85,000.00		85,000.00
Registered	2021	4.750%	90,000.00		90,000.00
Registered	2022	4.750%	95,000.00		95,000.00
<b>TOTALS</b>			11,225,000.00	4,915,000.00	6,310,000.00

Northern Kentucky Water Service District

Attachment 22-B

Bond Issue: 11,355,000, Dated December 1, 1998

Bond Number	Maturity Date	Interest Rate	Principle Amount	Amounts Paid	Outstanding
Registered	02/01/1999	4.700%	250,000.00	250,000.00	
Registered	02/01/2000	4.700%	200,000.00	200,000.00	
Registered	02/01/2001	4.700%	200,000.00	200,000.00	
Registered	02/01/2002	4.700%	210,000.00	210,000.00	
Registered	02/01/2003	4.700%	220,000.00	220,000.00	
Registered	02/01/2004	4.700%	230,000.00	230,000.00	
Registered	02/01/2005	4.700%	240,000.00	240,000.00	
Registered	02/01/2006	4.700%	255,000.00		255,000.00
Registered	02/01/2007	4.700%	265,000.00		265,000.00
Registered	02/01/2008	4.750%	280,000.00		280,000.00
Registered	02/01/2009	4.750%	280,000.00		280,000.00
Registered	02/01/2010	4.750%	295,000.00		295,000.00
Registered	02/01/2011	4.750%	310,000.00		310,000.00
Registered	02/01/2012	4.750%	325,000.00		325,000.00
Registered	02/01/2013	4.800%	340,000.00		340,000.00
Registered	02/01/2014	4.850%	360,000.00		360,000.00
Registered	02/01/2015	4.875%	375,000.00		375,000.00
Registered	02/01/2016	4.875%	395,000.00		395,000.00
Registered	02/01/2017	4.875%	415,000.00		415,000.00
Registered	02/01/2018	4.875%	435,000.00		435,000.00
Registered	02/01/2019	4.875%	455,000.00		455,000.00
Registered	02/01/2020	4.875%	480,000.00		480,000.00
Registered	02/01/2021	4.875%	505,000.00		505,000.00
Registered	02/01/2022	4.875%	530,000.00		530,000.00
Registered	02/01/2023	4.875%	555,000.00		555,000.00
Registered	02/01/2024	4.875%	585,000.00		585,000.00
Registered	02/01/2025	4.875%	610,000.00		610,000.00
Registered	02/01/2026	4.875%	645,000.00		645,000.00
Registered	02/01/2027	4.875%	675,000.00		675,000.00
Registered	02/01/2028	4.875%	435,000.00		435,000.00
<b>TOTALS</b>			11,355,000.00	1,550,000.00	9,805,000.00

Northern Kentucky Water Service District					Attachment 22-C
Year	Maturity Date	Interest Rate	Principle Amount	Principle Paid	Outstanding
			0.00	0.00	
			0.00	0.00	
			21,000.00	21,000.00	
			22,000.00	22,000.00	
			24,000.00	24,000.00	
			24,000.00	24,000.00	
			26,000.00		26,000.00
			27,000.00		27,000.00
			28,000.00		28,000.00
			30,000.00		30,000.00
			31,000.00		31,000.00
			33,000.00		33,000.00
			34,000.00		34,000.00
			36,000.00		36,000.00
			38,000.00		38,000.00
			40,000.00		40,000.00
			42,000.00		42,000.00
			44,000.00		44,000.00
			46,000.00		46,000.00
			49,000.00		49,000.00
			51,000.00		51,000.00
			54,000.00		54,000.00
			56,000.00		56,000.00
			59,000.00		59,000.00
			62,000.00		62,000.00
			65,000.00		65,000.00
			68,000.00		68,000.00
			72,000.00		72,000.00
			75,000.00		75,000.00
			79,000.00		79,000.00
			83,000.00		83,000.00
			87,000.00		87,000.00
			92,000.00		92,000.00
			96,000.00		96,000.00
			102,000.00		102,000.00
			107,000.00		107,000.00
			112,000.00		112,000.00
			118,000.00		118,000.00
			124,000.00		124,000.00
			130,000.00		130,000.00
			130,000.00		130,000.00
<b>TOTALS</b>	0.00	0.00	2,287,000.00	91,000.00	2,196,000.00

Northern Kentucky Water Service District

Attachment 22-D

Bond Issue \$16,325,000.00 Dated 10-23-2001

Bond Number	Maturity Date	Interest Rate	Principle Amount	Amounts Paid	Outstanding
Registered	2/1/2002	2.700%	285,000.00	285,000.00	
Registered	2/1/2003	3.000%	235,000.00	235,000.00	
Registered	2/1/2004	3.250%	240,000.00	240,000.00	
Registered	2/1/2005	3.450%	230,000.00	230,000.00	
Registered	2/1/2006	3.600%	215,000.00		215,000.00
Registered	2/1/2007	3.750%	195,000.00		195,000.00
Registered	2/1/2008	3.900%	170,000.00		170,000.00
Registered	2/1/2009	4.000%	155,000.00		155,000.00
Registered	2/1/2010	4.100%	75,000.00		75,000.00
Registered	2/1/2011	4.200%	80,000.00		80,000.00
Registered	2/1/2012	4.350%	80,000.00		80,000.00
Registered	2/1/2013	4.450%	735,000.00		735,000.00
Registered	2/1/2014	4.550%	770,000.00		770,000.00
Registered	2/1/2015	4.670%	810,000.00		810,000.00
Registered	2/1/2016	4.750%	845,000.00		845,000.00
Registered	2/1/2017	4.820%	890,000.00		890,000.00
Registered	2/1/2018	4.850%	930,000.00		930,000.00
Registered	2/1/2019	4.900%	980,000.00		980,000.00
Registered	2/1/2020	4.950%	1,030,000.00		1,030,000.00
Registered	2/1/2021	5.000%	1,080,000.00		1,080,000.00
Registered	2/1/2022	5.000%	1,135,000.00		1,135,000.00
Registered	2/1/2023	5.000%	1,195,000.00		1,195,000.00
Registered	2/1/2024	5.100%	1,255,000.00		1,255,000.00
Registered	2/1/2025	5.100%	1,320,000.00		1,320,000.00
Registered	2/1/2026	5.100%	1,390,000.00		1,390,000.00
<b>TOTALS</b>			16,325,000.00	990,000.00	15,335,000.00

## Northern Kentucky Water Service District

Attachment 22-E

Bond Issue \$45,485,000.00 Dated 2/1/2002

Bond Number	Maturity Date	Interest Rate	Principle Amount	Amounts Paid	Outstanding
Registered	2/1/2003				
Registered	2/1/2003	4.50%	350,000.00	350,000.00	
Registered	2/1/2004	4.50%	345,000.00	345,000.00	
Registered	2/1/2005	4.50%	360,000.00	360,000.00	
Registered	2/1/2006	4.50%	370,000.00		370,000.00
Registered	2/1/2007	4.50%	380,000.00		380,000.00
Registered	2/1/2008	4.50%	410,000.00		410,000.00
Registered	2/1/2009	4.50%	365,000.00		365,000.00
Registered	2/1/2010	4.50%	465,000.00		465,000.00
Registered	2/1/2111	4.50%	485,000.00		485,000.00
Registered	2/1/2012	4.50%	1,530,000.00		1,530,000.00
Registered	2/1/2013	4.50%	950,000.00		950,000.00
Registered	2/1/2114	4.50%	990,000.00		990,000.00
Registered	2/1/2115	4.65%	1,035,000.00		1,035,000.00
Registered	2/1/2116	4.75%	1,100,000.00		1,100,000.00
Registered	2/1/2117	4.75%	1,625,000.00		1,625,000.00
Registered	2/1/2118	4.75%	2,520,000.00		2,520,000.00
Registered	2/1/2119	4.75%	2,640,000.00		2,640,000.00
Registered	2/1/2020	5.00%	3,080,000.00		3,080,000.00
Registered	2/1/2021	5.00%	3,240,000.00		3,240,000.00
Registered	2/1/2022	5.00%	3,405,000.00		3,405,000.00
Registered	2/1/2023	5.00%	3,580,000.00		3,580,000.00
Registered	2/1/2024	5.00%	3,765,000.00		3,765,000.00
Registered	2/1/2025	5.00%	3,960,000.00		3,960,000.00
Registered	2/1/2026	5.00%	4,160,000.00		4,160,000.00
Registered	2/1/2027	5.00%	4,375,000.00		4,375,000.00
<b>TOTALS</b>			45,485,000.00	1,055,000.00	44,430,000.00

## Northern Kentucky Water Service District

Bond Issue \$10,575,000.00 Dated 12/5/2002

Bond Number	Maturity Date	Interest Rate	Principle Amount	Amounts Paid	Outstanding
Registered	12/5/2002				
Registered	2/1/2003	3.00%	535,000.00	535,000.00	
Registered	2/1/2004	3.00%	455,000.00	455,000.00	
Registered	2/1/2005	3.00%	490,000.00	490,000.00	
Registered	2/1/2006	3.00%	530,000.00		530,000.00
Registered	2/1/2007	3.50%	580,000.00		580,000.00
Registered	2/1/2008	3.50%	625,000.00		625,000.00
Registered	2/1/2009	3.50%	745,000.00		745,000.00
Registered	2/1/2010	3.75%	775,000.00		775,000.00
Registered	2/1/2111	4.00%	805,000.00		805,000.00
Registered	2/1/2012	4.00%	835,000.00		835,000.00
Registered	2/1/2013	4.00%	870,000.00		870,000.00
Registered	2/1/2114	4.00%	900,000.00		900,000.00
Registered	2/1/2115	4.00%	930,000.00		930,000.00
Registered	2/1/2116	4.00%	965,000.00		965,000.00
Registered	2/1/2117	4.00%	535,000.00		535,000.00
<b>TOTALS</b>			10,575,000.00	1,480,000.00	9,095,000.00

Northern Kentucky Water Service District  
 2003 Series A  
 Bond Issue \$1,615,000.00 Dated 3/13/03

Attachment 22-G

Bond Number	Maturity Date	Interest Rate	Principle Amount	Amounts Paid	Outstanding
Registered	2/1/2004	1.20%	35,000.00	35,000.00	
Registered	2/1/2005	1.38%	35,000.00	35,000.00	
Registered	2/1/2006	1.75%	35,000.00		35,000.00
Registered	2/1/2007	2.20%	35,000.00		35,000.00
Registered	2/1/2008	2.60%	35,000.00		35,000.00
Registered	2/1/2009	3.00%	40,000.00		40,000.00
Registered	2/1/2010	3.30%	40,000.00		40,000.00
Registered	2/1/2011	3.55%	40,000.00		40,000.00
Registered	2/1/2012	3.70%	40,000.00		40,000.00
Registered	2/1/2113	3.85%	45,000.00		45,000.00
Registered	2/1/2014	3.95%	45,000.00		45,000.00
Registered	2/1/2015	4.05%	45,000.00		45,000.00
Registered	2/1/2116	4.15%	50,000.00		50,000.00
Registered	2/1/2117	4.25%	50,000.00		50,000.00
Registered	2/1/2118	4.50%	55,000.00		55,000.00
Registered	2/1/2119	4.50%	55,000.00		55,000.00
Registered	2/1/2020	4.50%	60,000.00		60,000.00
Registered	2/1/2121	4.50%	60,000.00		60,000.00
Registered	2/1/2022	4.50%	65,000.00		65,000.00
Registered	2/1/2023	4.55%	65,000.00		65,000.00
Registered	2/1/2024	4.55%	70,000.00		70,000.00
Registered	2/1/2025	4.55%	75,000.00		75,000.00
Registered	2/1/2026	4.55%	75,000.00		75,000.00
Registered	2/1/2027	4.55%	80,000.00		80,000.00
Registered	2/1/2028	4.60%	85,000.00		85,000.00
Registered	2/1/2029	4.60%	85,000.00		85,000.00
Registered	2/1/2030	4.60%	90,000.00		90,000.00
Registered	2/1/2031	4.60%	95,000.00		95,000.00
Registered	2/1/2032	4.60%	30,000.00		30,000.00
<b>TOTALS</b>			1,615,000.00	70,000.00	1,545,000.00

## Northern Kentucky Water Service District

2003 Series B

Bond Issue \$30,270,000.00 Dated 8/1/2003

Attachment 22-H

Bond Number	Maturity Date	Interest Rate	Principle Amount	Amounts Paid	Outstanding
Registered	2/1/2004	0.02	825,000.00	825,000.00	
Registered	2/1/2005	2.00%	845,000.00	845,000.00	
Registered	2/1/2006	2.00%	860,000.00		860,000.00
Registered	2/1/2007	2.00%	880,000.00		880,000.00
Registered	2/1/2008	2.00%	895,000.00		895,000.00
Registered	2/1/2004	2.25%	915,000.00		915,000.00
Registered	2/1/2010	2.75%	940,000.00		940,000.00
Registered	2/1/2011	3.00%	965,000.00		965,000.00
Registered	2/1/2012	3.13%	995,000.00		995,000.00
Registered	2/1/2013	3.13%	1,030,000.00		1,030,000.00
Registered	2/1/2014	3.13%	1,060,000.00		1,060,000.00
Registered	2/1/2015	3.25%	1,095,000.00		1,095,000.00
Registered	2/1/2016	3.50%	1,135,000.00		1,135,000.00
Registered	2/1/2017	4.00%	1,175,000.00		1,175,000.00
Registered	2/1/2018	4.00%	1,225,000.00		1,225,000.00
Registered	2/1/2019	4.00%	1,275,000.00		1,275,000.00
Registered	2/1/2020	4.13%	1,325,000.00		1,325,000.00
Registered	2/1/2021	4.13%	1,380,000.00		1,380,000.00
Registered	2/1/2022	1.43%	1,440,000.00		1,440,000.00
Registered	2/1/2023	4.13%	1,500,000.00		1,500,000.00
Registered	2/1/2024	4.13%	1,565,000.00		1,565,000.00
Registered	2/1/2025	4.13%	1,630,000.00		1,630,000.00
Registered	2/1/2026	4.13%	1,700,000.00		1,700,000.00
Registered	2/1/2027	4.13%	1,770,000.00		1,770,000.00
Registered	2/1/2028	4.13%	1,845,000.00		1,845,000.00
<b>TOTALS</b>			30,270,000.00	1,670,000.00	28,600,000.00

## Northern Kentucky Water Service District

Attachment 22-1

2003 Series C

Bond Issue \$23,790,000.00 Dated 12/18/2003

Bond Number	Maturity Date	Interest Rate	Principle Amount	Amounts Paid	Outstanding
Registered	2/1/2004	2.00%	1,430,000.00	1,430,000.00	
Registered	2/1/2005	2.00%	1,160,000.00	1,160,000.00	
Registered	2/1/2006	2.00%	1,180,000.00		1,180,000.00
Registered	2/1/2007	2.25%	1,215,000.00		1,215,000.00
Registered	2/1/2008	2.50%	1,235,000.00		1,235,000.00
Registered	2/1/2009	2.75%	1,270,000.00		1,270,000.00
Registered	2/1/2010	3.00%	1,305,000.00		1,305,000.00
Registered	2/1/2011	3.25%	1,350,000.00		1,350,000.00
Registered	2/1/2012	3.50%	1,395,000.00		1,395,000.00
Registered	2/1/2013	3.50%	1,445,000.00		1,445,000.00
Registered	2/1/2014	4.00%	1,505,000.00		1,505,000.00
Registered	2/1/2015	4.00%	1,565,000.00		1,565,000.00
Registered	2/1/2016	4.00%	1,625,000.00		1,625,000.00
Registered	2/1/2017	4.00%	1,690,000.00		1,690,000.00
Registered	2/1/2018	4.00%	1,595,000.00		1,595,000.00
Registered	2/1/2019	4.13%	1,665,000.00		1,665,000.00
Registered	2/1/2020	4.25%	1,160,000.00		1,160,000.00
<b>TOTALS</b>			23,790,000.00	2,590,000.00	21,200,000.00

## Northern Kentucky Water Service District

Attachment 22-J

Bond Issue

Dated 2/1/2002

Bond Number	Maturity Date	Interest Rate	Principle Amount	Amounts Paid	Outstanding
Registered	2/1/2005		270,000.00	270,000.00	
Registered	2/1/2006		275,000.00		275,000.00
Registered	2/1/2007		285,000.00		285,000.00
Registered	2/1/2008		290,000.00		290,000.00
Registered	2/1/2009		295,000.00		295,000.00
Registered	2/1/2010		305,000.00		305,000.00
Registered	2/1/2111		315,000.00		315,000.00
Registered	2/1/2012		325,000.00		325,000.00
Registered	2/1/2013		335,000.00		335,000.00
Registered	2/1/2114		345,000.00		345,000.00
Registered	2/1/2115		360,000.00		360,000.00
Registered	2/1/2116		375,000.00		375,000.00
Registered	2/1/2117		390,000.00		390,000.00
Registered	2/1/2118		405,000.00		405,000.00
Registered	2/1/2119		425,000.00		425,000.00
Registered	2/1/2020		460,000.00		460,000.00
Registered	2/1/2021		485,000.00		485,000.00
Registered	2/1/2022		505,000.00		505,000.00
Registered	2/1/2023		530,000.00		530,000.00
Registered	2/1/2024		555,000.00		555,000.00
Registered	2/1/2025		580,000.00		580,000.00
Registered	2/1/2026		605,000.00		605,000.00
Registered	2/1/2027		635,000.00		635,000.00
Registered	2/1/2028		665,000.00		665,000.00
<b>TOTALS</b>			10,015,000.00	270,000.00	9,745,000.00

Account 221, BONDS

Line No.	Par Value of Actual Issue 1	Cash Realized on Actual Issue 2	Par Value of Amount Held by or for Respondent 3	Actually Outstanding at Close of year 4	Interest During Year	
					Accrued 5	Actually Paid 6
1	11,225,000	11,131,694		6,310,000	301,911	316,990
2	11,355,000	11,141,619		9,805,000	476,086	480,836
3	2,287,000	2,287,000		2,196,000	110,200	110,400
4	16,325,000	15,835,250		15,335,000	729,746	733,100
5	48,485,000	44,121,624		44,430,000	2,169,790	2,176,540
6	10,575,000	10,525,204		9,095,000	350,581	356,706
7	1,615,000	1,583,553		1,545,000	64,878	65,078
8	30,270,000	30,068,115		28,600,000	1,032,108	139,150
9	23,790,000	23,532,357		21,200,000	738,277	747,944
10	10,455,000	10,195,116		10,185,000	403,081	303,323
Total	166,382,000	160,421,532	36,332,688	148,701,000	6,376,659	5,430,067

Schedule of Bond Maturities

Line No.	Bond Numbers 7	Maturity Date 8	Interest Rate 9	Principal Amount 10	Amount Paid 11	Remaining Bonds Outstanding 12
1						
2	See Attachments 22-A Through 22-I					
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

Notes Payable (Acct. 232 & 234)

a	Nominal Date of Issue b	Date of Maturity c	INTEREST		Principal Amount per Balance Sheet f
			Rate d	Amount of payment e	
Account 232 - Note Payable					
Kenton Co. Fiscal Court					\$ 100,000
BAN 2004A					61,285.00
BAN 2005A					876,920.00
Total Account 232					\$ 21,685,000
Account 234 - Notes Payable To Associated Companies					
					\$
					\$
					\$
					\$
					\$
Total Account 234					\$

Accounts Payable to Associated Companies (Acct. 233)

Show Payable to Each Associated Company Separately	Amount
	\$
N/A	
<b>Total</b>	\$

**TAXES ACCRUED (ACCOUNT 236)**

ACCT. NO. (a)	DESCRIPTION (b)	TOTAL ©
	Balance first of year.....	\$ -
	Accruals Charged:	
408.1	Utility regulatory assessment fees.....	
408.11	Property taxes.....	544,011
408.12	Payroll taxes.....	
408.13	Other taxes and licenses.....	
408.2	Taxes other than income, other income and deductions	
	Total taxes accrued.....	\$ 544,011
	Taxes paid during year:	
408.1	Utility regulatory assessment fees.....	
408.11	Property taxes.....	544,011
408.12	Payroll taxes.....	
408.13	Other taxes and licenses.....	
408.2	Taxes other than income, other income and deductions	
	Total taxes paid.....	\$ 544,011
	Balance end of year.....	\$ -

**ACCRUED INTEREST (ACCOUNT 237)**

DESC. DEBT (a)	BALANCE BEGINNING OF YEAR (b)	INTEREST ACCRUED DURING YEAR (c)	INTEREST PAID DURING YEAR (d)	BALANCE END OF YEAR (e)
Acct. No. 237.1 - Accrued Interest on Long-term Debt				
Series 1997	139,619	301,911	316,990	124,540
Series 1998	202,724	476,086	480,836	197,973
2000 RUS Loan	18,500	110,200	110,400	18,300
Series 2001	307,135	729,746	733,100	303,781
Series 2002 A	910,268	2,169,789	2,176,540	903,517
Series 2002 B	151,689	350,582	356,706	145,565
Series 2003 A	27,216	64,878	65,078	27,016
Series 2003 B	436,499	1,032,109	1,039,150	429,458
Series 2003 C	316,476	738,278	747,944	306,810
Series 2004 A	68,005	402,735	303,323	167,417
Total Acct No. 237.1	\$ 2,578,131	\$ 6,376,314	\$ 6,330,068	\$ 2,624,376
Acct. No. 237.2 - Accrued Interest on Other Liabilities:				
2004 BAN # 1	\$ 15,321	\$ 61,285	\$ 61,285	\$ 15,321
2005 BAN # 2		374,965	277,566	97,399
Total Acct No. 237.2	\$ 15,321	\$ 436,250	\$ 338,851	\$ 112,720
Total Acct No 237	\$ 2,593,452	\$ 6,812,565	\$ 6,668,919	\$ 2,737,096

**TAXES ACCRUED (ACCOUNT 236)**

ACCT. NO. (a)	DESCRIPTION (b)	TOTAL ©
	Balance first of year.....	\$ -
	Accruals Charged:	
408.1	Utility regulatory assessment fees.....	
408.11	Property taxes.....	544,011
408.12	Payroll taxes.....	
408.13	Other taxes and licenses.....	
408.2	Taxes other than income, other income and deductions	
	Total taxes accrued.....	\$ 544,011
	Taxes paid during year:	
408.1	Utility regulatory assessment fees.....	
408.11	Property taxes.....	544,011
408.12	Payroll taxes.....	
408.13	Other taxes and licenses.....	
408.2	Taxes other than income, other income and deductions	
	Total taxes paid.....	\$ 544,011
	Balance end of year.....	\$ -

**ACCRUED INTEREST (ACCOUNT 237)**

DESC. DEBT (a)	BALANCE BEGINNING OF YEAR (b)	INTEREST ACCRUED DURING YEAR (c)	INTEREST PAID DURING YEAR (d)	BALANCE END OF YEAR (e)
Acct. No. 237.1 - Accrued Interest on Long-term Debt				
Series 1997	139,619	301,911	316,990	124,540
Series 1998	202,724	476,086	480,836	197,973
2000 RUS Loan	18,500	110,200	110,400	18,300
Series 2001	307,135	729,746	733,100	303,781
Series 2002 A	910,268	2,169,789	2,176,540	903,517
Series 2002 B	151,689	350,582	356,706	145,565
Series 2003 A	27,216	64,878	65,078	27,016
Series 2003 B	436,499	1,032,109	1,039,150	429,458
Series 2003 C	316,476	738,278	747,944	306,810
Series 2004 A	68,005	402,735	303,323	167,417
Total Acct No. 237.1	\$ 2,578,131	\$ 6,376,313	\$ 6,330,068	\$ 2,624,376
Acct. No. 237.2 - Accrued Interest on Other Liabilities:				
2004 BAN # 1	\$ 30,643	\$ 45,964	\$ 61,285	\$ 15,321
2005 BAN # 2		374,965	277,566	97,399
Total Acct No. 237.2	\$ 30,643	\$ 420,929	\$ 338,851	\$ 112,720
Total Acct No 237	\$ 2,608,774	\$ 6,797,242	\$ 6,668,919	\$ 2,737,097

**Miscellaneous Current & Accrued Liabilities (Account 242)**

Description (a)	Balance End of Year (b)
Accrued Payroll Taxes	\$ 3,265
Accrued Payroll	141,235
Accrued Sales Taxes	58,086
Accrued Pension	118,462
Accrued Vacation/Sick	742,606
Subdistrict Surcharges Payable	565,669
Total Miscellaneous Current & Accrued Liabilities.....	\$ 1,629,323

241-0007-000

**Regulatory Commission Expense (Accounts 666 and 667)**

DESCRIPTION OF CASE (DOCKET #) (a)	TOTAL INCURRED DURING YEAR (b)	AMOUNT TRANSFERRED TO ACCOUNT # 186.1 (c)	EXPENSED DURING YEAR	
			ACCT. (d)	AMOUNT (e)
Rate Case 2005-0148 (Case still pending as of 12/31/05)	211,583	211,583		
Rate Case 2002-0105			667	\$ 145,116
Rate Case 2003-0234			667	\$ 62,076

Miscellaneous Current & Accrued Liabilities (Account 242)

Description (a)	Balance End of Year (b)
Accrued Payroll Taxes	\$ 3,265
Accrued Payroll	141,235
Accrued Sales Taxes	58,086
Accrued Pension	118,462
Accrued Vacation/Sick	742,606
Subdistrict Surcharges Payable	565,669
Total Miscellaneous Current & Accrued Liabilities.....	\$ 1,629,323

241-0007-000

Regulatory Commission Expense (Accounts 666 and 667)

DESCRIPTION OF CASE (DOCKET #) (a)	TOTAL INCURRED DURING YEAR (b)	AMOUNT TRANSFERRED TO ACCOUNT # 186.1 (c)	EXPENSED DURING YEAR	
			ACCT. (d)	AMOUNT (e)
Rate Case 2005-0148 (Case still pending as of 12/31/05)	195,519	211,583		
Rate Case 2002-0105			667	\$ 145,116
Rate Case 2003-0234			667	\$ 62,076

**WATER OPERATING REVENUE**

Acct. No Acct.	b	Beginning Year No. Customers c	Year End No. Customers d	Amounts e
	<b>Operating Revenues:</b>			
460	Unmetered Water Revenue			
461	Metered Water Revenue			
461.1	Sales to Residential Customers	57,852	72,563	\$ 20,045,989
461.2	Sales to Commercial Customers	3,861	4,509	5,445,797
461.3	Sale to Industrial Customers	106	116	2,472,461
461.4	Sales to Public Authorities	379	491	1,937,221
461.5	Sales to Multiple Family Dwellings	1,087	1,551	2,404,094
461.6	Sales through Bulk Loading Stations	1	-	4,538
	<b>Total Metered Sales</b>	<b>63,286</b>	<b>79,230</b>	<b>32,310,100</b>
462	<b>Fire Protection Revenue:</b>			
462.1	Public Fire Protection			
462.2	Private Fire Protection	367	450	73,995
	<b>Total Fire Protection Revenue</b>	<b>367</b>	<b>450</b>	<b>73,995</b>
464	Other Sales to Public Authorities			
465	Sales to Irrigation Customers			
466	Sales for Resale	7	3	845,183
467	Miscellaneous Sales	1	2	
	<b>Total Sales of Water</b>	<b>63,661</b>	<b>79,685</b>	<b>33,229,278</b>
	<b>Other Water Revenues:</b>			
470	Forfeited Discounts			\$ 752,736
471	Miscellaneous Service Revenues			
472	Rents from Water Property			506,326
473	Interdepartmental Rents			
474	Other Water Revenues			358,282
475	Provision for Rate Refunds			
	<b>Total Other Water Revenues:</b>			<b>1,617,344</b>
	<b>Total Water Operating Revenues</b>			<b>\$ 34,846,622</b>

Water Utility Expense Accounts

Acct. No.	Account Name	Current Year	Water Expense Account Matrix							
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
			Source of Supply & Expenses Operation	Source of Supply & Expenses Mainten.	Water Treatment Expenses/ Operation	Water Treatment Expenses/ Maint.	Trans. & Distribut Expenses Operation	Trans. & Dist. Expenses Maint.	Customer Accounts Expense	Adminis- trative Gen Expenses
a	b	c	d	e	f	g	h	i	j	k
601	Salaries and Wages - Employees	\$ 6,811,773	-	46	1,449,102	493,118	618,775	1,969,869	1,634,355	646,507
603	Salaries and Wages - Officers, Directors & Majority Stockholders	656,510	-	-	100,256		105,227	-	89,586	361,442
604	Employee Pensions and Benefits	2,413,137	-	-	507,288	93,400	425,806	458,966	579,157	348,520
610	Purchased Water	-	-	xxx	xxx	xxx	xxx	xxx	xxx	xxx
615	Purchased Power	2,121,220	609,258	xxx	355,921	xxx	1,047,697	xxx	-	108,344
616	Fuel for Power Production	-	-	-	-	-	-	-	-	-
618	Chemicals	1,035,885	-	-	1,035,885	-	-	-	xxx	xxx
620	Materials & Supplies	1,680,127	-	29,684	157,892	155,011	98,372	797,313	218,988	222,867
631	Contractual Services - Eng.	95,651	-	-	-	-	78,527	17,124	-	-
632	Contractual Services - Acct.	16,875	-	-	-	-	-	-	-	16,875
633	Contractual Services - Legal	114,219	-	-	4,579	-	19,707	-	3,341	86,592
634	Contractual Services - Management Fees	3,211	-	-	-	-	-	-	-	3,211
635	Contractual Services - Other	3,541,011	1,776	136,443	506,785	186,092	157,126	1,718,312	117,541	716,936
641	Rental of Bldg./Real Property	10,689	-	-	-	-	-	-	-	10,689
642	Rental of Equipment	-	-	-	-	-	-	-	-	-
650	Transportation Expenses	414,604	-	174	35,809	392	36,412	246,986	89,377	5,454
656	Insurance - Vehicle	86,502	-	-	16,459	-	42,456	-	23,807	3,780
657	Insurance - General Liability	272,040	-	-	87,048	-	144,180	-	27,204	13,608
658	Insurance - Worker's Comp	223,343	-	-	57,808	-	77,548	-	57,947	30,040
659	Insurance - Other	139,539	-	-	35,090	-	-	-	-	104,449
660	Advertising Expense	10,743	xxx	xxx	xxx	xxx	xxx	xxx	xxx	10,743
666	Regulatory Commission Exp/ Amortization of Rate Case Exp.	-	xxx	xxx	xxx	xxx	xxx	xxx	xxx	-
667	Regulatory Commission Exp/Other	258,404	-	-	-	-	-	-	258,404	-
670	Bad Debt Expense	524,536	xxx	xxx	xxx	xxx	xxx	xxx	524,536	xxx
675	Miscellaneous Expenses	49,257	-	-	5,387	187	6,886	8,333	9,402	19,062
	Total Water Utility Expenses	\$ 20,479,276	611,034	166,347	4,355,309	928,200	2,858,719	5,216,903	3,633,645	2,709,119

Water Utility Expense Accounts

Acct. No. a	Account Name b	Current Year c	Water Expense Account Matrix							
			0.1	0.2	0.3	0.4	.5.	0.6	0.7	0.8
			Source of Supply & Expenses Operation d	Source of Supply & Expenses Mainten. e	Water Treatment Expenses/ Operation f	Water Treatment Expenses/ Maint. g	Trans. & Distribut Expenses Operation h	Trans. & Dist. Expenses Maint. i	Customer Accounts Expense j	Adminis- trative Gen Expenses k
601	Salaries and Wages - Employees	\$ 6,811,773	-	46	1,449,102	493,118	618,775	1,969,869	1,634,355	646,507
603	Salaries and Wages - Officers, Directors & Majority Stockholders	656,510	-	-	100,256		105,227	-	89,586	361,442
604	Employee Pensions and Benefits	2,413,136	-	-	507,288	93,400	425,806	458,966	579,157	348,519
610	Purchased Water	-	-	xxx	xxx	xxx	xxx	xxx	xxx	xxx
615	Purchased Power	2,121,220	609,258	xxx	355,921	xxx	1,047,697	xxx	-	108,344
616	Fuel for Power Production	-	-	-	-	-	-	-	-	-
618	Chemicals	1,035,885	-	-	1,035,885	-	-	-	xxx	xxx
620	Materials & Supplies	1,680,127	-	29,684	157,892	155,011	98,372	797,313	218,988	222,867
631	Contractual Services - Eng.	95,651	-	-	-	-	78,527	17,124	-	-
632	Contractual Services - Acct.	16,875	-	-	-	-	-	-	-	16,875
633	Contractual Services - Legal	114,219	-	-	4,579	-	19,707	-	3,341	86,592
634	Contractual Services - Management Fees	3,211	-	-	-	-	-	-	-	3,211
635	Contractual Services - Other	3,541,008	1,776	136,443	506,785	186,092	157,126	1,718,312	117,541	716,933
641	Rental of Bldg./Real Property	10,689	-	-	-	-	-	-	-	10,689
642	Rental of Equipment	-	-	-	-	-	-	-	-	-
650	Transportation Expenses	414,430	-	-	35,809	392	36,412	246,986	89,377	5,454
656	Insurance - Vehicle	86,502	-	-	16,459	-	42,456	-	23,807	3,780
657	Insurance - General Liability	272,040	-	-	87,048	-	144,180	-	27,204	13,608
658	Insurance - Worker's Comp	223,343	-	-	57,808	-	77,548	-	57,947	30,040
659	Insurance - Other	139,539	-	-	35,090	-	-	-	-	104,449
660	Advertising Expense	10,743	xxx	xxx	xxx	xxx	xxx	xxx	xxx	10,743
666	Regulatory Commission Exp/ Amortization of Rate Case Exp.	-	xxx	xxx	xxx	xxx	xxx	xxx	xxx	-
667	Regulatory Commission Exp/Other	258,404	-	-	-	-	-	-	258,404	-
670	Bad Debt Expense	524,536	xxx	xxx	xxx	xxx	xxx	xxx	524,536	xxx
675	Miscellaneous Expenses	49,257	-	-	5,387	187	6,886	8,333	9,402	19,062
	Total Water Utility Expenses	\$ 20,479,098	611,034	166,173	4,355,309	928,200	2,858,719	5,216,903	3,633,645	2,709,115

**Pumping and Purchased Water Statistics**

a	Water Purchased for Resale (Omit 000's)  b	Water Pumped From Plants (Omit 000's)  c'	Total Water Pumped and Purchased (Omit 000's)  d	Water Sold to Customers (Omit 000's)  e
January		817,046.0	817,046.0	578,988.5
February		717,280.0	717,280.0	522,693.4
March		798,635.0	798,635.0	797,018.2
April		813,137.2	813,137.2	536,147.7
May		899,865.0	899,865.0	519,882.4
June		1,042,279.0	1,042,279.0	887,043.5
July		1,057,621.0	1,057,621.0	675,504.6
August		1,107,166.0	1,107,166.0	639,786.1
September		908,699.0	908,699.0	1,211,747.3
October		870,173.2	870,173.2	763,043.8
November		788,829.0	788,829.0	706,168.1
December		812,867.9	812,867.9	965,766.0
<b>Total for year</b>		<b>10,633,598.3</b>	<b>10,633,598.3</b>	<b>8,803,789.6</b>
Maximum gallons pumped by all methods in any one day: 8/4/2005				44,476.0
Minimum gallons pumped by all methods in any one day (Omit 000's): 12/25/2005				21,915.0
If water is purchased for resale, indicate the following: Vendor: _____ Point of delivery: _____				
If water is sold to other water utilities for redistribution, list names of such utilities below:				
Pendleton County Water District				
City of Walton				
Bullock Pen Water District				

**Sales for Resale (466)**

Line	Company	Gallons(000's)	Avg. Rate (Cents)	Amount
1	Pendleton County Water Dist.	97,415.9	2.40	\$235,541.76
2	City of Walton	168,960.8	2.40	\$406,099.56
3	Bullock Pen Water District	84,449.0	2.40	\$203,541.96
4				
5				
6				
7				
8				
<b>Total</b>		<b>350,825.7</b>		<b>\$845,183.28</b>

**WATER STATISTICS**

Line	Item	Gallons (000's)
1	<b>WATER PRODUCED, PURCHASED, &amp; DISTRIBUTED</b>	
2	Water Produced	10,633,598
3	Water Purchased	
4	<b>TOTAL PRODUCED AND PURCHASED</b>	<b>10,633,598</b>
5		
6	<b>WATER SALES:</b>	
7	Residential	5,931,183
8	Commercial	1,659,182.2
9	Industrial	847,058.4
10	Irrigation	-
11	Resale	350,825.7
12	Other Sales	15,541
13	<b>TOTAL WATER SALES</b>	<b>8,803,789.6</b>
14		
15	<b>OTHER WATER USED (estimate portions not metered)</b>	
16	Utility/water treatment plant	175,351.9
17	Wastewater plant	0.0
18	System flushing	190,433.0
19	Water main breaks/leaks	97,238.0
20	Storage tank overflow	0.0
21	Fire Department	8,300.0
22	Other (construction, flushing, disinfection, ect.)	4,240.0
23	<b>TOTAL OTHER WATER USED</b>	<b>475,562.9</b>
24		
25	<b>UNACCOUNTED-FOR WATER LOSS:</b>	
26	Line 4 - (Line 13 + Line 23)	<b>1,354,245.8</b>
27		
28	<b>UNACCOUNTED-FOR WATER LOSS PERCENTAGE</b>	
29	Line 26 divided by Line 4	12.74%

WATER STATISTICS

Line	Item	Gallons (000's)
1	<b>WATER PRODUCED, PURCHASED, &amp; DISTRIBUTED</b>	
2	Water Produced	10,633,598
3	Water Purchased	
4	<b>TOTAL PRODUCED AND PURCHASED</b>	<b>10,633,598</b>
5		
6	<b>WATER SALES:</b>	
7	Residential	5,931,183
8	Commercial	1,659,182.2
9	Industrial	847,058.4
10	Irrigation	-
11	Resale	350,825.7
12	Other Sales	15,541
13	<b>TOTAL WATER SALES</b>	<b>8,803,789.6</b>
14		
15	<b>OTHER WATER USED (estimate portions not metered)</b>	
16	Utility/water treatment plant	175,351.9
17	Wastewater plant	0.0
18	System flushing	190,433.0
19	Water main breaks/leaks	97,238.0
20	Storage tank overflow	0.0
21	Fire Department	8,300.0
22	Other (construction, flushing, disinfection, ect.)	4,240.0
23	<b>TOTAL OTHER WATER USED</b>	<b>475,562.9</b>
24		
25	<b>UNACCOUNTED-FOR WATER LOSS:</b>	
26	Line 4 - (Line 13 + Line 23)	1,354,245.8
27		
28	<b>UNACCOUNTED-FOR WATER LOSS PERCENTAGE</b>	
29	Line 26 divided by Line 4	12.74%

PLANT STATISTICS

Give the following information:

- 1 Number of fire hydrants, by size.
- 2 Number of private fire hydrants, by size.
- 3 Whether water supply is river, impounded streams, well, springs, artificial lake or collector type well.
- 4 Whether supply is by gravity, pumping, or a combination .
- 5 Type, capacity, and elevation of reservoirs at overflow and ground level.
- 6 Miles of main by size and kind.
- 7 Types of filters: gravity or pressure, number of units, and total rated capacity in gallons per minute.
- 8 Type of chlorinators, number of units and capacity in pounds per 24 hours.
- 9 Station equipment. List each pump separately, giving type and capacity and H.P. of driving unit and character of driving unit (steam, electric, or internal combustion). State whether pump is high or low duty.
- 10 Quantity of fuel used: coal in pounds, gas in cu. ft., oil in gallons, and electric in KWH .
- 11 Give a description and total cost of any sizable additions or retirements to plant in service outside the normal system growth for the period covered by this report.
- 12 Capacity of clear well.
- 13 Peak month, in gallons of water sold.
- 14 Peak day, in gallons of water sold.

1) Kenton County 5541, Campbell County 2423.

2) 48.

3) Rivers: Ohio River and the Licking River.

4) Plants are pumped; Distribution is combination of pumped and gravity.

5) See attached 31A.

6) See attached 31B.

7) Fort Thomas Treatment Plant  
12 - Gravity, each 560 sq. ft.

Taylor Mill Treatment Plant  
8 - Gravity, each 560 sq. ft. @ 5 gallons per sq. ft. per minute

8) See attached 31C

9) See attached 31D

10) N/A

11) None

Storage Location	Address	City Location	Type Of Storage	Year In Service	Structure Height (Feet)	Base Elevation (Feet)	Top Elevation (Feet)	Overflow Elevation (Feet)	Normal Elevation (Feet)	Normal Elevation (Feet)	Normal Elevation (Feet)	Capacity (Gallons)
Aqua Drive	100 Aqua Drive	Cold Spring	Hydropillar		184		1017					2,000,000
Barrington Road	2 Barrington Road	Ft. Wright	Hydropillar	1969	141	916.5	1057.5	1046.7	1045.0	1040.0	74	1,000,000
Bromley	1674 Highwater Road	Bromley	Ground Storage	1966	103	670.0	773.0	764.0	763.0	750.0	75	3,000,000
Dayton Avenue	2816 Dayton St.	Dayton	Ground Storage		50		829.0					500,000
Devon	US 25	Florence	Hydropillar	1991	156	939.5	1082.0		1042.0		100	2,000,000
Dudley Pike	796 Dudley Pike	Edgewood	Ground Storage	1964	59	831.0	889.5	876.0	874.0	866.0	140	5,000,000
Dudley Pike	796 Dudley Pike	Edgewood	Ground Storage	1990	59	831.0	889.5	876.0	874.0	866.0	140	5,000,000
Ft. Thomas Plant	700 Alexandria Pike	Ft. Thomas	Clearwell	1936	31	734.0	765.3	764.5	762.0	760.0		3,000,000
Ft. Thomas Plant	700 Alexandria Pike	Ft. Thomas	Clearwell	1990	35	730.0	778.5	764.5	763.5	757.5	130	3,500,000
Harrison Ave.	2361 Harrison Ave.	Bellevue	Ground Storage		60		829.0					600,000
Ida Spence	Tower Place	Covington	Elevated Tank	1952	175	840.0	1015.0	1005.0	1003.0	1000.0	57	500,000
Independence	5685 Madison Pike	Independence	Hydropillar	1981	137	943.5	1080.0		1039.5		74	1,000,000
Industrial Park	Industrial Rd. & US 25	Florence	Hydropillar	1961	146	945.5	1091.5	1083.5	1081.0	1062.0	50	500,000
John's Hill Road	Knollwood Dr.	Highland Hts.	Elevated Tank		113		1017.0					500,000
Kenton Lands Rd.	25 Kenton Lands Road	Erlanger	Elevated Tank	1953	158	896.0	1054.0	1045.0	1043.0	1033.0	50	500,000
Lumley Tank	R47 Lumley Ave.	Fort Thomas	Elevated Tank	1937	187		1017.0					275,000
Main St. Tank	Main St. & US 27	Alexandria	Elevated Tank	1962	152		1017.0					300,000
Memorial Pkwy. Plant	2055 Memorial Pkwy.	Fort Thomas	Clearwell				741.0					3,000,000
Old St. 4 Tank	Old St. Road #4	Claryville	Elevated Tank	1976	143		1017.0					1,000,000
Rosford Tank	Marion Dr.	Fort Thomas	Elevated Tank	1962	191		1017.0					300,000
South Newport Tank	Kentucky Drive	Newport	Elevated Tank		155		965.0					1,000,000
Taylor Mill Plant	608 Grand Ave.	Taylor Mill	Clearwell		15	509.5	524.5	522.0	520.0	518.0		1,000,000
Taylor Mill Standpipe	5907 Taylor Mill Rd.	Taylor Mill	Standpipe		143			1010.0	130.0	110.0		329,000
Total storage owned by NKWSD: 35,804,000												

NORTHERN KY. WATER DISTRICT  
MILES OF ANALYSIS

Attachment 31B

Size	Type	Prior Years	2004 Additions	2004 Retirements	2004 YTD TOTAL	2004 Miles	2004 Percent	2005 Additions	2005 Retirements	2005 YTD TOTALS	2005 Miles	2005 Percent
	Cast Iron	45.00			45.00	0.01	0.001%			45.00	0.009	0.001%
	Cast Iron				-	-	0.000%			-	0.000	0.000%
	Cast Iron	397,128.68	1,240.00	875.00	397,493.88	75.28	6.930%	2,094.00	3,100.00	396,487.68	75.092	6.827%
	Cast Iron	1,853,356.38	95,753.36	9,529.00	1,939,580.74	367.34	33.816%	737.00	6,765.00	1,933,552.74	366.203	33.291%
	Cast Iron	938,829.93	168,204.24	609.00	1,106,425.17	209.55	19.290%	16,786.00	12,978.00	1,110,233.17	210.271	19.116%
1"	Cast Iron	89,794.10	46,057.44		135,851.54	25.73	2.368%		350.00	135,501.54	25.663	2.333%
1"	Cast Iron	583,797.32	12,557.16	5,109.00	591,245.48	111.98	10.308%	21,555.00	1,440.00	641,360.48	115.788	10.526%
1"	Cast Iron	280,160.80	8,410.28	55.00	288,516.08	54.64	5.030%	1,500.00		290,016.08	54.927	4.993%
1"	Cast Iron	3,345.00			3,345.00	0.63	0.058%	104.00	1,500.00	1,949.00	0.369	0.034%
1"	Cast Iron	128,008.79	1,540.00		129,548.79	24.54	2.259%			129,548.79	24.536	2.231%
1"	Cast Iron	93,062.00	4,460.00		97,522.00	18.47	1.700%			97,522.00	18.470	1.679%
1"	Cast Iron	28,563.00			28,563.00	5.41	0.498%			28,563.00	5.410	0.492%
3"	Cast Iron	22,434.21	2,365.00	2,538.00	22,261.21	4.22	0.388%			22,261.21	4.216	0.383%
2"	Cast Iron	17,845.00			17,845.00	3.38	0.311%			17,845.00	3.380	0.307%
							0.000%					0.000%
3"	Concrete	6,050.00			6,050.00	1.15	0.105%			6,050.00	1.145	0.104%
4"	Concrete	21,530.00			21,530.00	4.08	0.375%			21,530.00	4.077	0.371%
6"	Concrete	35,000.00			35,000.00	6.63	0.610%			35,000.00	6.629	0.603%
							0.000%					0.000%
"	Galvanized	375.00			375.00	0.07	0.007%			375.00	0.071	0.006%
							0.000%					0.000%
"	Transite	50,335.00			50,335.00	9.53	0.878%			50,335.00	9.533	0.867%
"	Transite	96,598.00		120.00	96,478.00	18.27	1.682%			96,478.00	18.272	1.661%
							0.000%					0.000%
1/2"	Steel	226.00			226.00	0.04	0.004%			226.00	0.043	0.004%
"	Steel	677.00			677.00	0.13	0.012%			677.00	0.128	0.012%
"	Steel	83.00			83.00	0.02	0.001%			83.00	0.016	0.001%
"	Steel	11.00			11.00	0.00	0.000%			11.00	0.002	0.000%
"	Steel	31.00			31.00	0.01	0.001%			31.00	0.006	0.001%
0"	Steel	15.00			15.00	0.00	0.000%			15.00	0.003	0.000%
2"	Steel	1,681.00			1,681.00	0.32	0.029%			1,681.00	0.318	0.029%
16"	Steel	582.00			582.00	0.11	0.010%			582.00	0.110	0.010%
14"	Steel	5,227.00		3,178.00	5,227.00	0.99	0.091%		1,500.00	5,272.00	0.998	0.091%
							0.000%					0.000%

Attachment 31B

Size	Type	Prior Years	2004 Additions	2004 Retirements	2004 YTD TOTAL	2004 Miles	2004 Percent	2005 Additions	2005 Retirements	2005 YTD TOTALS	2005 Miles	2005 Percent
"	Copper	52.00			52.00	0.01	0.001%			52.00	0.010	0.001%
"	Copper	3,787.00			3,787.00	0.72	0.066%			3,787.00	0.717	0.065%
"	Copper	4,150.00			4,150.00	0.79	0.072%			4,150.00	0.786	0.071%
"	Copper	12,648.30			12,648.30	2.40	0.221%			12,648.30	2.396	0.218%
"	Plastic	2,973.00			2,973.00	0.56	0.052%			2,973.00	0.563	0.051%
"	Plastic	2,292.00			2,292.00	0.43	0.040%			2,292.00	0.434	0.039%
"	Plastic	66,168.00	2,120.00		68,288.00	12.93	1.191%	2,551.00		70,839.00	13.416	1.220%
"	Plastic	114,986.00			114,986.00	21.78	2.005%			114,986.00	21.778	1.980%
"	Plastic	29,539.00			29,539.00	5.59	0.515%			29,539.00	5.595	0.509%
"	Plastic	123,346.60	7,320.00		130,666.60	24.75	2.278%	6,499.00		137,165.60	25.978	2.362%
"	Plastic	347,923.00	36,101.00		384,024.00	72.73	6.695%	37,848.00		421,872.00	79.900	7.264%
"	Plastic	5,839.00			5,839.00	1.11	0.102%	8,555.00		14,394.00	2.726	0.248%
	TOTAL	5,368,495.11	386,128.48	22,013.00	5,735,788.59	1,086.32	100.0%	98,229.00	27,633.00	5,804,379.59	1,099.99	100.0%

Northern Kentucky Water District  
 Chlorinators and Sodium Hypochlorite Feeders In System  
 Updated 4/26/2006

Location	# of Units	Form of Chlorine	Type	Capacity (ea.)
Bromley Pump Station	1	Sodium Hypochlorite	Jesco Pump	1.3 GPH
West Covington Pump Station	1	Sodium Hypochlorite	Jesco Pump	2.8 GPH
Bristow Road Pump Station	1	Sodium Hypochlorite	Watson Marlow	5 GPH
Dudley Pump Station	2	Sodium Hypochlorite	US Filter Wallace & Tiernan Encore 700	12 GPH
Fort Thomas Treatment Plant	1	Sodium Hypochlorite	Watson Marlow	77 GPH
	7		US Filter Wallace & Tiernan Encore 700	
Taylor Mill Treatment Plant	2	Sodium Hypochlorite	US Filter Wallace & Tiernan Encore 700	5 GPH
	3		US Filter Wallace & Tiernan Encore 700	22.5 GPH
Ohio River Pump Station	4	Sodium Hypochlorite	Milton Roy Max Roy B	195 GPH
Memorial Pky Treatment Plant	1	Sodium Hypochlorite	Watson Marlow	9.1 GPH
	2		Seepex	8 GPH

KENTUCKY PUBLIC SERVICE COMMISSION
REPORT OF GROSS OPERATING REVENUES DERIVED FROM INTRA-KENTUCKY
BUSINESS FOR THE YEAR ENDING DECEMBER 31, 20 06

NORTHERN KENTUCKY WATER DISTRICT
(Utility Reporting)

100 AQUA DRIVE - P.O. BOX 220 - COLD SPRING
(Address)

FEIN # (Federal Employer Identification Number)

6 | 1 | - | 1 | 3 | 1 | 1 | 6 | 9 | 5

(DO NOT INCLUDE TAXES COLLECTED)

- (1) Gross Revenues of Electric Utility...\$
(2) Gross Revenues of Gas Utility...\$
(3) Gross Revenues of Water Utility...\$ 33,229,279.00
(4) Gross Revenues of Sewer Utility...\$
(5) Other Operating Revenues...\$ 1,716,334.00
\*\*\* TOTAL GROSS REVENUES...\$ 34,945,623.00

OATH

State of... KENTUCKY...
County of... CAMPBELL...

JACK BRAGG, CPA, CMA being duly sworn, states that he/she is
(Officer)

VICE-PRESIDENT OF FINANCE of the NORTHERN KENTUCKY WATER DISTRICT that the above
(Official Title) (Utility Reporting)

report of gross revenues is in exact accordance with NORTHERN KENTUCKY WATER DISTRICT, and that such
(Utility Reporting)

books accurately show the gross revenues of: NORTHERN KENTUCKY WATER DISTRICT, derived from
(Utility Reporting)

Intra-Kentucky business for the calendar year ending December 31, 20 06

[Signature] VICE-PRESIDENT OF FINANCE
(Officer) (Title)

This the 30 day of March, 20 06

[Signature] (Notary Public) [Signature] (County) 4-8-08 (Commission Expires)

NOTE: ANY DIFFERENCE BETWEEN THE AMOUNT OF THE GROSS REVENUES SHOWN IN THE
ANNUAL REPORT AND THE AMOUNT APPEARING ON THIS STATEMENT MUST BE
RECONCILED ON THE REVERSE OF THIS REPORT.

# OATH

Commonwealth of Kentucky );  
County of Kenton ): SS:

Jack Bragg, Jr. makes oath and says  
that he is Vice President of Finance of  
Northern Kentucky Water District ;

that it is his duty to have supervision over the books of account of the respondent and to control the manner in which such books are kept; that he knows that such books have, during the period covered by the foregoing report, been kept in good faith in accordance with the accounting and other orders of the Public Service Commission of Kentucky, effective during the said period; that he has carefully examined the said report and to the best of his knowledge and belief the entries contained in the said report have, so far as they relate to matters of account, been accurately taken from the said books of account and are in exact accordance therewith; that he believes that all other statements of fact contained in the said report are true; and that the said report is a correct and complete statement of the business and affairs of the above-named respondent during the period of time from and including

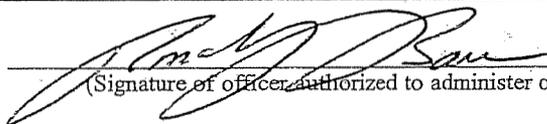
January 1, 2005, to and including December 31, 2005

  
\_\_\_\_\_  
Signature of official

Subscribed and sworn to before me, a NOTARY PUBLIC in and for the  
State and County above named, this 27 day of April, 2001.

(Apply Seal Here)

My commission expires: 1-14-09

  
\_\_\_\_\_  
(Signature of officer authorized to administer oath)



Ernie Fletcher  
Governor

LaJuana S. Wilcher, Secretary  
Environmental and Public  
Protection Cabinet

Christopher L. Lilly  
Commissioner  
Department of Public Protection

Commonwealth of Kentucky  
Public Service Commission  
211 Sower Blvd.  
P.O. Box 615  
Frankfort, Kentucky 40602-0615  
Telephone: (502) 564-3940  
Fax: (502) 564-3460  
psc.ky.gov

Mark David Goss  
Chairman

Teresa J. Hill  
Vice Chairman

Gregory Coker  
Commissioner

March 28, 2006

Hon. John N. Hughes  
Attorney At Law  
124 W. Todd Street  
Frankfort, KY 40601

RE: Northern Kentucky Water District

Dear Mr. Hughes:

Your request, on behalf of Northern Kentucky Water District, for an extension of time to May 1, 2006, for filing of the 2005 annual report of Northern Kentucky Water District is being granted, with the understanding that every effort will be made to complete and file the annual report at an earlier date.

An extension for filing the Report of Gross Operating Revenues Derived From Intra-Kentucky Business can not be granted. It is to be filed before March 31, 2006. Failure to comply with Commission Regulation 807 KAR 5:006, Section 3(1) and KRS 278.140, may result in the imposition of penalties as provided in KRS 278.990 and **WILL** result in the revocation of the extension for filing the Annual Report.

Sincerely,

Bill Feldman  
Assistant Director  
Filings Division

✓ cc: Northern Kentucky Water District

JOHN N. HUGHES  
ATTORNEY AT LAW  
PROFESSIONAL SERVICE CORPORATION  
124 WEST TODD STREET  
FRANKFORT, KENTUCKY 40601

TELEPHONE (502) 227-7270

JEHUGHES@pscorp.net

TELEFAX (502) 228-7059

March 27, 2006

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MAR 27 2006

PUBLIC SERVICE  
COMMISSION

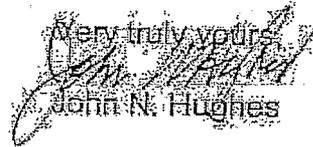
Beth O'Donnell  
Executive Director  
Public Service Commission  
211 Sower Blvd.  
Frankfort, KY 40601

Dear Beth:

Northern Kentucky Water District requests an extension of time up to and including May 1, 2006 to file its 2005 Annual Report. The District has not received the Independent Auditor's final report and is in the process of moving into its new office facility. Given the lack of final audited information and the disruption of the staff's daily routine due to the relocation, the District will be unable to file the report when due. For these reasons, the extension is being requested.

If there are any questions about this, please contact me.

Very truly yours,



John N. Hughes

Attorney for Northern Kentucky  
Water District



Case No. 2006-\_\_\_\_\_  
Exhibit \_\_\_\_\_ F \_\_\_\_\_

NORTHERN KENTUCKY  
WATER DISTRICT

*Project*

*Ohio River Pump Station No. 1 Standby Generators*

Campbell County  
184-437

SCHEDULE OF MORTGAGES, BONDS, NOTES, AND  
OTHER INDEBTEDNESS





Case No. 2006-\_\_\_\_  
Exhibit     G    

NORTHERN KENTUCKY  
WATER DISTRICT

*Project*

*Ohio River Pump Station No. 1 Standby Generators*

Campbell County  
184-437

CURRENT BALANCE SHEET AND INCOME  
STATEMENT

# Northern Kentucky Water District

Balance Sheet  
As of June 30, 2006

	2006	2005
<b>ASSETS</b>		
<b>CURRENT ASSETS</b>		
Cash and Cash Equivalents	\$4,363,250	\$3,692,383
Accrued Interest Receivable		
Accounts Receivable		
Customers	3,699,010	3,396,277
Unbilled Customers	4,900,000	4,900,000
Other	248,071	429,698
Assessments Receivable	37,767	37,251
Inventory Supplies for New Installation and Maintenance, at Cost	1,212,379	1,130,364
Prepaid Items	1,792,361	1,023,769
<b>TOTAL CURRENT ASSETS</b>	<b>16,252,838</b>	<b>14,609,742</b>
<b>RESTRICTED ASSETS</b>		
Boone/Florence Settlement Account	3,362,517	3,720,438
Bond Proceeds Fund	11,287,394	23,547,028
Debt Service Reserve Account	12,455,893	12,460,710
Debt Service Account	4,468,188	3,605,267
Improvement, Repair & Replacement	1,813,479	4,590,037
<b>TOTAL RESTRICTED ASSETS</b>	<b>33,387,471</b>	<b>47,923,480</b>
<b>NONCURRENT ASSETS</b>		
Miscellaneous Deferred Charges	9,289,437	10,168,377
Capital assets:		
Land, System, Buildings and Equipment	255,034,780	248,044,414
Construction in Progress	26,036,150	13,172,732
Total capital assets before accumulated depreciation	281,070,930	261,217,146
Less Accumulated Depreciation	(57,249,247)	(52,075,693)
Total capital assets before accumulated depreciation	223,821,683	209,141,453
<b>TOTAL NONCURRENT ASSETS</b>	<b>233,111,120</b>	<b>219,309,830</b>
<b>TOTAL ASSETS</b>	<b>282,751,429</b>	<b>281,843,052</b>

# Northern Kentucky Water District

Balance Sheet  
As of June 30, 2006

	2006	2005
<b>LIABILITIES AND RETAINED EARNINGS</b>		
<b>CURRENT LIABILITIES</b>		
Current Portion of Long Term Debt	\$4,967,000	\$4,806,000
Accounts Payable	1,647,658	1,534,569
Accrued Payroll & Liabilities	297,836	162,909
Other Accrued Liabilities	165,083	217,452
<b>TOTAL CURRENT LIABILITIES</b>	<b>7,077,577</b>	<b>6,720,930</b>
<b>CURRENT LIABILITIES PAYABLE FROM RESTRICTED ASSETS</b>		
Accounts Payable	730,121	354,575
Accrued Interest Payable	2,688,576	2,475,350
<b>TOTAL CURRENT LIABILITIES PAYABLE FROM RESTRICTED ASSETS</b>	<b>3,418,697</b>	<b>2,829,925</b>
<b>LONG-TERM DEBT</b>		
Long-Term Portion of Bonded Indebtedness	139,428,000	144,145,000
Bond Anticipation Notes Payable	21,585,000	21,585,000
Note Payable - Taylor Mill	2,125,000	2,375,000
Deferred Note Payable	100,000	100,000
<b>TOTAL LONG-TERM DEBT</b>	<b>163,238,000</b>	<b>168,205,000</b>
<b>TOTAL LIABILITIES</b>	<b>173,734,274</b>	<b>177,755,855</b>
Unrestricted Retained Earnings	80,166,164	75,236,207
<b>TOTAL NET ASSETS</b>	<b>109,017,156</b>	<b>104,087,199</b>
<b>TOTAL LIABILITIES AND NET ASSETS</b>	<b>282,751,430</b>	<b>281,843,054</b>

Northern Kentucky Water District  
Income Actual to Actual  
For the Six Months Ending June 30, 2006

Acct. #	Description	June 2006	June 2005	Variance	YTD June 2006	YTD June 2005	Variance
<b>Income</b>							
(461 TO ...	Water Sales	\$3,345,654	\$3,383,044	(1.11%)	\$14,996,229	\$15,014,818	(0.12%)
(470 TO 470)	Forfeited Discounts	53,458	67,603	(20.92%)	311,102	349,026	(10.87%)
(4720001...	Rents from Water Property	38,784	47,749	(18.78%)	217,875	295,138	(26.18%)
(471 TO ...	Other Water Revenues	23,800	23,470	1.41%	191,502	174,725	9.60%
	<b>Total Operating Revenues</b>	<b>\$3,461,696</b>	<b>\$3,521,866</b>	<b>(1.71%)</b>	<b>\$15,716,708</b>	<b>\$15,833,707</b>	<b>(0.74%)</b>
<b>Non-Operating Income (Expense)</b>							
41900010...	Interest Income	\$179,520	\$243,227	(26.19%)	\$1,058,645	\$736,756	43.69%
(474 TO ...	Miscellaneous	13,709	26,152	(47.58%)	108,269	82,177	31.75%
	<b>Total Non-Operating Income</b>	<b>193,229</b>	<b>269,379</b>	<b>(28.27%)</b>	<b>1,166,914</b>	<b>818,933</b>	<b>42.49%</b>
	<b>TOTAL INCOME</b>	<b>3,654,925</b>	<b>3,791,245</b>	<b>(3.60%)</b>	<b>16,883,622</b>	<b>16,652,640</b>	<b>1.39%</b>

ADDENDUM NO. 1

OHIO RIVER PUMP STATION NO. 1 STANDBY GENERATORS

June 19, 2006

All Bidders on the above titled Project are hereby advised of the following modifications to the Specifications and Drawings on the Project. These modifications will be a part of the resulting Contract.

*SPECIFICATIONS*

Item No. AD1-1: Invitation to Bid (Section 00020)

A revised Section 00020 – Invitation to Bid is attached stating that bids are due July 7, 2006, 2:00 p.m., local time and the pre-bid conference will be held June 27, 2006, 9:00 a.m.

END ADDENDUM NO. 1

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AUG 03 2006

PUBLIC SERVICE  
COMMISSION

REVISED

Section 00020

INVITATION TO BID

Date: June 9, 2006

**PROJECT: Ohio River Pump Station No. 1 Standby Generators**

SEALED BIDS WILL BE RECEIVED AT:

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

UNTIL: Date: July 7, 2006  
Time: 2:00 p.m., local time

At said place and time, and promptly thereafter, all Bids that have been duly received will be publicly opened and read aloud.

The proposed Work is generally described as follows: In order to maintain a maximum of two (2) raw water pumps during a power outage, it is necessary that standby generators be provided for on-site emergency power, along with automatic transfer switches and switchgear.

All Bids must be in accordance with the Bidding Documents on file, and available for examination at:

Northern Kentucky Water District  
2835 Crescent Springs Road  
Erlanger, Kentucky 41018  
(859) 578-9898

Or

Quest Engineers, Inc.  
2517 Sir Barton Way  
Lexington, Kentucky 40509  
(859) 223-3755

Or

Quest Engineers, Inc.  
1251 Kemper Meadow Drive, Suite 600  
Cincinnati, Ohio 45240  
(513) 851-9774

Copies of the Bidding Documents may be obtained from the office of Queen City Reprographics, 2863 Sharon Road, Cincinnati, OH 45241, (513-326-2300), at the address indicated herein. Charges for all documents obtained will be made on the following basis:

	<u>Charge</u>
Complete set of Bidding Documents	\$80.00
Copy of Geotechnical Report	\$25.00
Copy of 1991 Site Drawings	\$10.00
Mailing and Handling (U.S. Mail) (if requested)	\$7.50
Mailing and Handling (FED EX) (if requested)	\$15.00

Charges for Bidding Documents and mailing and handling, if applicable, will not be refunded.

Bids will be received on a combined base bid with alternatives basis as described in the Contract Documents.

Bid security, in the form of a Bid Bond 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 as security for the faithful performance and the payment of all bills and obligations arising from the performance of the Contract.

Contractor and all Subcontractors will be required to conform to the labor standards set forth in the Contract Documents. This project falls under the provisions of KRS 337.505 to 337.550 for prevailing wage rates.

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 qualified Bidder to such an extent as may be determined by Owner.

A pre-bid conference will be held June 27, 2006, 9:00 a.m., at the Ohio River Pump Station No. 1. The pump station is located at Mary Ingles Highway, Fort Thomas, Kentucky 41075.

Minority Bidders are encouraged to bid.

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

Ron Lovan, President/CEO  
Northern Kentucky Water District

End of Section

ADDENDUM NO. 2

OHIO RIVER PUMP STATION NO. 1 STANDBY GENERATORS

June 30, 2006

All Bidders on the above titled Project are hereby advised of the following modifications to the Specifications and Drawings on the Project. These modifications will be a part of the resulting Contract.

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*SPECIFICATIONS*

AUG 03 2006

Item No. AD2-1: Informational Data

PUBLIC SERVICE  
COMMISSION

The following are provided to the Bidders as information data and are a part of the Contract Documents unless shown or noted elsewhere in this Addendum:

Part A: Minutes to Pre-Bid Meeting - attached.

Part B: Pre-Bid Meeting Sign-In Sheet - attached.

Part C: Revised copy of "1991 Site Drawing" which shows the general location of existing underground structures and utilities - attached.

Item No. AD2-2: Bid Form (Section 00300)

A revised Section 00300 - Bid Form is attached which includes a bid allowance for additional subsurface information during construction prior to caisson drilling.

Item No. AD2-3: Supplements to Bid Form (Section 00400)

Insert the attached new section.

Item No. AD2-4: Special Conditions (Section 00810)

Insert the attached new section.

Item No. AD2-5: Summary of Work (Section 01010)

Add the following paragraph to Item 1.02:

"F. The concrete pad locations are based on minimizing potential subsurface issues. Each Bidder is to be aware that any alternate manufacturer that requires a larger footprint than what is shown (or an alternate location) may be considered unacceptable by the Owner/Engineer due to adverse

subsurface conditions. It will be each Bidder's responsibility to verify the subsurface requirements for an alternate pad size and provide additional structural re-design as required."

Item No. AD2-6: Alternatives (Section 01030)

On page 01030-1, replace Item 2.01 B.1. with the following:

"Size each generator such that two generators in parallel are capable of starting one or two 1250 HP pumps sequentially (with 150 kW continuous load), but only one generator would be required to run a single 1250 HP pump and 150 kW continuous load. Set-up the controls so that once a single pump is up and running, the second generator can be taken off-line should the operator choose to run only a single pump."

Item No. AD2-7: Caissons (Section 02370)

Replace this section with the attached.

END ADDENDUM NO. 2

## **Part A**

### **Minutes to Pre-Bid Meeting**

*Meeting Minutes*

Subject: Northern Kentucky Water District  
Ohio River Pump Station No. 1 Standby Generators

Date: June 27, 2006

Attendees: Refer to Part B - Sign-In Sheet

Purpose: This meeting was held to discuss the upcoming bid and answer any question contractors may have.

Discussion: The following items were discussed:

1. Contact Person:

A. Northern Kentucky Water District  
Amy Kramer, Engineering Manager  
2835 Crescent Springs Road  
P.O. Box 18640  
Erlanger, Kentucky 41018  
(859) 426-2734, (859) 578-7893 (fax)  
akramer@nkywater.org

B. Quest Engineers, Inc. - Technical Questions  
Larry Anderson, Project Manager  
2517 Sir Barton Way  
Lexington, Kentucky 40509  
(859) 223-3755, 223-3150 (fax)  
landerson@questeng.com

2. Bids are to be delivered to NKWD's new office at 2835 Crescent Springs Road in Erlanger, Kentucky.

3. Addendum No. 1 has been issued clarifying the bid date.

4. If necessary, Addendum No. 2 will be issued June 30, 2006.

5. Additional site visits must be arranged through Amy Kramer.

6. The construction period is 270 days for Substantial Completion and 300 days for Final Completion.

7. The pump station address is 200 Mary Ingles Highway, Fort Thomas, Kentucky 41075.
8. The base bid shall be a combination of a lump sum bid for all equipment, materials and labor as called for in the documents, plus unit prices for concrete caissons. The price shall include all labor, materials, overhead, profit, insurance and other costs as necessary.
9. Each bidder shall provide pricing for alternatives as called for in the bid form and as described in Section 01030.
10. The Contractor shall be responsible for all shipping costs and permits required for all equipment delivery to the Owner=s destination.
11. Pump Station must remain operational at all times during construction. The Contractor is to coordinate work with the Owner to maintain access to the existing pump station as necessary.
12. Each bidder is to be aware that trains pass the site at a minimum of six (6) times a day.
13. The concrete pad locations are based on minimizing potential subsurface issues. Larger pad sizes or alternate locations may be considered unacceptable by the Owner/Engineer.
14. If the equipment for each alternative requires a smaller concrete pad, each bidder may include this in their alternative pricing. The quantities for concrete caisson unit pricing shall remain as is.

End of Meeting Minutes

**Part B**

**Pre-Bid Meeting Sign-In Sheet**



## **Part C**

### **Revised Copy of 1991 Site Drawing**



Section 00300

BID FORM

PROJECT IDENTIFICATION: Ohio River Pump Station No. 1 Standby Generators

THIS BID IS SUBMITTED TO:

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

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 Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding 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 days after the Bid opening, or for such longer period of time to which Bidder may agree in writing upon request of Owner. Bidder understands that certain extensions to the time for acceptance by this Bid may require the consent of the surety for the Bid Bond.
  
3. In submitting this Bid, Bidder represents and covenants, as set forth in the Agreement, that:
  - a. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of all of which is hereby acknowledged:
 

No. _____	Dated _____
No. _____	Dated _____
No. _____	Dated _____
  
  - b. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
  
  - c. Bidder is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
  
  - d. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary explorations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder,

including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

- e. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
  - f. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
  - g. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.
  - h. Bidder has given Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Owner is acceptable to Bidder.
  - i. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
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. Combined Base Bid: In compliance with the Advertisement for Bids, Bidder hereby proposes to furnish all equipment, materials and labor for the work required for the Ohio River Pump Station No. 1 Standby Generators in strict accordance with the Contract Documents, within the time set forth herein, and at the following prices:

a. For all work other than the items listed for unit price, the lump sum of:

---

\_\_\_\_\_ (in words) Dollars \$ \_\_\_\_\_ (in numbers).

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

b. For the listed unit price item, a unit price of:

Item Description	Unit	Est. Qty.	Bid Unit Price	Bid Price
30-inch Diameter Reinforced Concrete Caissons in Soil (Specification Section 02370)	L.F.	940	\$ _____ (numbers) _____ _____ (words)	\$ _____
30-inch Diameter Reinforced Concrete Caissons in Rock (Specification Section 02370)	L.F.	110	\$ _____ (numbers) _____ _____ (words)	\$ _____
36-inch Diameter Reinforced Concrete Caissons in Soil (Specification Section 02370)	L.F.	265	\$ _____ (numbers) _____ _____ (words)	\$ _____
36-inch Diameter Reinforced Concrete Caissons in Rock (Specification Section 02370)	L.F.	30	\$ _____ (numbers) _____ _____ (words)	\$ _____

Amount for unit prices shall be shown in both words and numbers. In case of discrepancy, the amount shown as the Bid Unit Price, in words, will govern. Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions. Bidder acknowledges that estimated quantities of all items (other than those listed as Lump Sum) 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, determined as provided in the Contract Documents.

c. Combined Bid Total of a. and b.

\_\_\_\_\_ (in words) Dollars \$ \_\_\_\_\_ (in numbers).

The prices shall include all labor, materials, overhead, profit, insurance, and other costs necessary to cover the finished work of the several kinds called for.

**All specific Cash Allowances are included in the price set forth above and have been established in accordance with Section 00810 and the referenced technical specification sections.**

6. Bidder agrees that the Work will be substantially complete within two hundred seventy (270) 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 three hundred (300) calendar days after the date when the Contract Times commence to run.

7. Alternatives:

Alternative No. 1

Delete the paralleling switchgear and upsize each generator as described in Specification Section 01030 and as shown on the Drawings. Provide all labor and material necessary to complete the work.

Add the following amount to the Base Bid:

Lump Sum Bid of \$ \_\_\_\_\_ in numbers and \_\_\_\_\_  
\_\_\_\_\_ in words.

Or, deduct the following amount from the Base Bid:

Lump Sum Bid of \$ \_\_\_\_\_ in numbers and \_\_\_\_\_  
\_\_\_\_\_ in words.

Additive Alternative No. 2

Upsize each generator as described in Specification Section 01030. Provide all labor and material necessary to complete the work. Add the following amount to the Base Bid:

Lump Sum Bid of \$ \_\_\_\_\_ in numbers and \_\_\_\_\_  
\_\_\_\_\_ in words.

Deductive Alternative No. 3

Delete one (1) automatic transfer switch as described in Specification Section 01030 and as shown on the Drawings. Provide all labor and material necessary to complete the work. Deduct the following amount from the Base Bid:

Lump Sum of \$ \_\_\_\_\_ in numbers and \_\_\_\_\_  
\_\_\_\_\_ in words.

8. References

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

SUBMITTED on \_\_\_\_\_, 200\_\_.

**SIGNATURE OF BIDDER**

**If an Individual**

Name (typed or printed): \_\_\_\_\_

By \_\_\_\_\_ (SEAL)  
*(Individual's signature)*

doing business as \_\_\_\_\_

Business address \_\_\_\_\_

\_\_\_\_\_

Phone No.: \_\_\_\_\_ Fax No.: \_\_\_\_\_

**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.: \_\_\_\_\_

**If a Corporation**

Corporation Name: \_\_\_\_\_ (SEAL)

State of Incorporation: \_\_\_\_\_

Type (General, Professional, Service, Limited Liability): \_\_\_\_\_

By \_\_\_\_\_  
*(Signature - attach evidence of authority to sign)*

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_ (CORPORATE SEAL)

Attest \_\_\_\_\_

Business address \_\_\_\_\_

\_\_\_\_\_

Phone No. \_\_\_\_\_ Fax No.: \_\_\_\_\_

**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.: \_\_\_\_\_

Joint Venturer Name: \_\_\_\_\_ (SEAL)

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

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_

Business address: \_\_\_\_\_

\_\_\_\_\_

Phone No.: \_\_\_\_\_ Fax No.: \_\_\_\_\_

End of Section

SECTION 00400 - SUPPLEMENTS TO BID FORM

PART 1 - SUBCONTRACTORS

Proposed subcontractors are listed below for each branch of work included in the proposed Contract. (All subcontractors are subject to the approval of the OWNER. Failure to submit a completed list may be cause for rejection of the Bid.)

Branch of Work	Name and Address of Subcontractor
1. Concrete Work	
2. Concrete Caissons	
3. Electrical	

(Add supplemental pages if necessary)

PART 3 - LIST OF PROPOSED MANUFACTURERS

The following list of proposed manufacturers must be submitted within twenty (20) minutes following the opening of Bid. The OWNER reserves the right to reject any proposed manufacturer that is not listed in the Bid Documents; however, after the OWNER has accepted the BIDDER'S proposed manufacturers (including modifications), the BIDDER (Contractor) cannot change any manufacturer without processing a formal change order that is justifiable and acceptable to the OWNER. The "list" may be submitted at the same time the Bid is submitted but will not be considered a part of the Bid.

Material (Equipment)	Name and Address of Material Manufacturer
1. Standby Generators	
2. Automatic Transfer Switch and Paralleling Switchgear	

END OF SECTION 00400

## SECTION 00810 - SPECIAL CONDITIONS

### 1. GENERAL

- A. These specifications and the drawing accompanying them describe the work to be done and the materials to be furnished for the construction of standby generators for onsite emergency power along with automatic transfer switches and switchgear.
- B. The drawings and specifications are intended to be fully explanatory and supplementary. However, should anything be shown, indicated or specified in one and not the other, it shall be done the same as if shown, indicated or specified in both.
- C. It shall be the responsibility of all contractors and subcontractors to carefully examine all drawings, specifications and contract documents pertaining to all phases of the construction in order that the Contractor and subcontractor may foresee all requirements for coordination of their work. Submission of a bid shall be construed as evidence that such an examination has been made. Claims based on unforeseen requirements will not be considered.
- D. Should any error or inconsistency appear in drawings or specifications, the Contractor, before proceeding with the work, must make mention of the same to the Engineer for proper adjustment and in no case proceed with the work in uncertainty or with insufficient drawings.
- E. The Contractor and each subcontractor shall be responsible for verification of all measurements at the site before ordering any materials or doing any work. No extra charge or compensation shall be allowed due to differences between actual dimensions and dimensions indicated on the drawings. Any such discrepancy in dimensions which may be found shall be submitted to the Engineer for his consideration before the Contractor proceeds with the work in the affected areas.
- F. Contractors shall follow sizes in specifications or figures on drawings, in preference to scale measurements and shall follow detail drawings in preference to general drawings.
- G. Where it is obvious that a drawing illustrates only a part of a given work of a number of items, the remaining shall be deemed repetitious and so constructed.

### 2. ORDERING MATERIALS

- A. Immediately following award of contract for this work, the Contractor shall determine source of supply for all materials and length of time required for their delivery, including materials of subcontractors and orders shall be placed for such materials promptly.
- B. If, for any reason, any item specified will not be available when needed and the Contractor can show that he has made a reasonably persistent effort to obtain the item(s) in question, the Engineer shall be notified in writing within sixty (60) days after the contract is signed. Otherwise, the Contractor will not be excused for delays in securing the material specified and will be held accountable if completion of the work is thereby delayed.

3. DAMAGED FACILITIES

The Contractor shall repair and/or replace, at no expense to the Owner, any sections of existing roads, drives, streets, sidewalks, curbs, utilities, buildings, trees and landscape plantings and other structures damaged by reason of work performed under this contract or incidental thereto, whether by his own forces or by his subcontractors or by his material suppliers.

4. CASH ALLOWANCES

A. The Contractor shall have included in the Contract Sum all allowances named in the Contract Documents and shall cause the work so covered to be done as the Engineer may direct. If the actual price for purchasing the Allowed materials or obtaining the Allowed services is more or less than the cash allowance, the Contract price shall be adjusted accordingly. The adjustment in Contract price shall be made on the basis of the purchase price or incurred cost of service without additional charges for overhead, profit, insurance or any other incidental expenses. The cost of installation of the Allowed materials or coordination of the Allowed services shall be included in the applicable section of the Contract Specifications covering this work.

B. The following allowance has been established:

Allowance No. 1:

Section 02370 - Include cost of \$10,000 for work performed by Thelen Associates, Inc. for additional subsurface information as necessary.

END OF SECTION 00810

## SECTION 02370 - CAISSONS

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

- A. Work included: Extent of caissons is shown on drawings, including locations, diameters of shafts, estimated bottom elevations, top elevations, and details of construction.
- B. Related work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Division I of these Specifications.

#### 1.02 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of American Concrete Institute (ACI) "Standard Specification for the Construction of End Bearing Drilled Piers" (ACI 336.1), and as herein specified.
- B. Caisson Installer Qualifications: Not less than three successfully completed contracts with similar soil conditions, shaft sizes, depths and volumes of work contained in this project. Submit satisfactory proof of compliance to Owner/Engineer.
- C. Concrete Testing Services:
  - 1. Engage a testing laboratory acceptable to Owner (see Section 01400) to perform material evaluation tests and to design concrete mixes.
  - 2. Contractor will engage testing laboratory to perform sampling and testing during placement of concrete.
  - 3. Contractor will engage a testing laboratory to conduct tests of compression test specimens.
  - 4. Materials and installed work may require testing and retesting as directed by Contractor, at any time during progress of work. Allow free access to material stockpiles and facilities. Re-testing of rejected materials and installed work, shall be done at Subcontractor's expense.
- D. Geotechnical Services: Engage geotechnical engineering firm that performed site investigations to provide geotechnical engineering services for caisson installation.

#### 1.03 SUBMITTALS

- A. Certified Caisson Report for each caisson, recording actual elevation at bottom and top, elevation of rock (if any), final centerline location at top, variation of shaft from plumb, result of tests performed, actual allowable bearing capacity of bottom, levelness of bottom, seepage of water, still water level (if allowed to flood), elevation of bottom and top of any casing left in place, any unusual conditions, dates of starting excavation, completion of excavation, inspection,

testing, and placement of concrete (including any delays in concreting and location of construction joints in shafts).

- B. Shop Drawings - Reinforcement: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required at openings through concrete structures.
- C. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design test as specified.
- D. Material Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Engineer. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

#### 1.04 JOB CONDITIONS

Existing Utilities: Locate existing underground utilities by careful hand excavation before starting caisson excavation operations. If utilities are to remain in place, provide protection from damage during caisson operations. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult Contractor immediately for directions as to procedure. Cooperate with Owner, and public or private utility companies in keeping their respective service and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

### PART 2 - PRODUCTS

#### 2.01 CONCRETE MATERIALS

Concrete materials as specified in Section 03310.

#### 2.02 REINFORCING MATERIALS

Reinforcing materials as specified in Section 03210.

#### 2.03 PROPORTIONING AND DESIGN OF MIXES

- A. Proportioning and design of concrete mixes as specified in Section 03310 and as noted.
- B. Design mix to produce concrete for caissons with minimum 28-day compressive strength of 3000 PSI.
- C. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement of not less than 1" and not more than 3".

## PART 3 - EXECUTION

### 3.01 CAISSON EXCAVATION

- A. General: Excavate holes for caissons to required bearing strata or elevation as shown on drawings.
- B. Caisson design dimensions shown are minimums. The design of caissons is based on assumed strata bearing capacity. If bearing strata is not capable of maintaining bearing capacity assumed, foundation system will be revised as directed by Engineer. Revisions will be paid for in accordance with contract conditions relative to changes in work.
- C. If required, install casings as excavation proceeds so that earth walls are maintained without spilling into shaft.
- D. Construction Tolerances: Locate centerline of caissons within the following tolerances:
  - 1. Maximum permissible variation of location not more than 1/24th of shaft diameter or 3", whichever is less.
  - 2. Shafts out of plumb, not more than 1.5% of length nor exceeding 12.5% of shaft diameter or 15", whichever is less.
  - 3. Concrete cut-off elevation, plus 1" to minus 3".
  - 4. If above tolerances are exceeded, provide corrective construction to compensate for excessive eccentricity, Submit proposed corrective construction methods to Engineer for review before proceeding.
- E. Obstructions:
  - 1. If rock, boulders, or other unforeseen obstruction are encountered which cannot be removed by standard caisson excavation methods, and if such obstructions are not indicated by available subsurface data, removal of such obstructions will be paid for in accordance with terms of contract relative to changes in work.
  - 2. Remove such obstructions by hand labor using air-powered tools, or by other safe methods recognized in construction industry.
- F. Classification of Rock:
  - 1. Rock is defined as material which cannot be drilled with a conventional earth auger or other reaming tool, and requires use of special rock augers, core barrels, air tools, blasting, or other methods of hand excavation. Earth seams, rock fragments, and voids included in rock excavation area will be considered rock for full volume of shaft from initial contract with rock for pay purposes.
  - 2. The work of this section includes demolition and removal of rock, boulders, concrete, masonry, and other subsurface obstructions which are clearly indicated by contract documents, or by available subsurface exploration data, and such work will not be considered a change in work.

G. Dewatering:

1. Provide and maintain pumping equipment to keep excavations free of water before placing concrete. If excessive water is encountered and drilling operations must be halted, consult with Engineer before using alternate methods of construction.
2. Conduct water to general site run-off ditches and disposal areas with discharge lines. Provide ditching as required to conduct water to site drainage facilities.

H. Inspection:

1. Each caisson must be inspected and tested before placing concrete.
2. Provide facilities as required to assist inspection and testing of excavations, and cooperate with inspecting and testing personnel to expedite work.
3. Notify Engineer and testing facility at least 6 hours prior to time excavations will be ready for inspection and tests.

I. Depth of Bearing Strata:

1. If indicated depth of shaft excavation is reached without developing required strata bearing capacity, immediately suspend excavation operations and inform Engineer. Engineer will determine procedures to be followed in each instance.
2. Where changes in indicated depth or dimensions are required, or additional soil borings are required, proceed with such work when directed in writing by Engineer.

J. Overexcavation: No payment will be made for extra length, when caisson shafts are excavated to a greater depth than required or authorized by Engineer, due to overdrilling by Contractor. Complete caisson and fill extra depth with concrete, if other conditions are satisfactory. Over-excavated shafts will be measured and paid for to original design authorized depth.

K. Excavated Material: Deposit and spread excavated material on site at locations as directed by Owner or Engineer.

### 3.02 REINFORCING STEEL AND DOWELS

Fabricate and erect reinforcing cages in shafts as one continuous unit. Place reinforcement accurately and symmetrically about axis of hole and hold securely in position during concrete placement.

### 3.03 CONCRETE PLACEMENT

A. General: Fill caissons with concrete immediately after inspection and approval by testing laboratory. Use protection sheets (cut out to receive concrete) over excavation openings, extending at least 12" beyond edge.

- B. Place concrete continuously and in a smooth flow without segregating and mixed materials. Provide mechanical vibration for consolidation of at least top 25' of each shaft.
- C. Place concrete by means of bottom discharge bucket, flexible drop chute, elephant truck hopper, or tremie. Use chutes or tremies for placing concrete where a drop of more than 25' is required, or pump concrete into place.
- D. Place concrete in-the-dry unless placing underwater is acceptable to Engineer. If water occurs, and it is impracticable to dewater caisson excavation, and reasonable attempts to seal off water flow have failed, allow water level to attain its normal level and place concrete by tremie method. Control placement operations to ensure that tremie is not broken during continuous placing from bottom to top. Other methods of depositing concrete underwater may be used, if acceptable to Engineer.
- E. Maintain a sufficient head of concrete to prevent reduction in diameter of caisson shaft by earth pressure and to prevent extraneous material from mixing with fresh concrete. Coordinate withdrawal of temporary casings with concrete placement operations to maintain a head of concrete approximately 5' above casing bottom.
- F. Stop concrete placement at cut-off elevation shown, screed level, and apply a scoured, rough finish.
- G. Interrupted placing operations of over one hour duration will require a cold joint installation. Leave resulting shaft surface approximately level and insert steel dowels. At resumption of concrete placing, clean off surface laitance, roughen as required, and slush with a 1-to-1 cement grout or commercial bonding agent before remainder of concrete is placed.

### 3.04 FIELD QUALITY CONTROL

- A. Field quality control for concrete as specified in Section 03310.
- B. Inspection and Tests for Caissons: Geotechnical engineer shall perform and report specified tests, and additional tests which may be required. Conduct tests and provide reports as soon as possible to not delay concreting operations for acceptable excavations.
  - 1. Bottom elevations and bearing capacities and lengths of caissons as shown on drawings are estimated from available soil data. Actual elevations, caisson lengths, and bearing capacities will be determined by soil testing facility from conditions found in excavations. Final evaluations and acceptance of data will be determined by Engineer.
  - 2. Caissons Bearing on Earth: Make auger probe and visually inspect and classify soil.
  - 3. Caissons Bearing on Rock: The geotechnical engineer (see Section 01400) shall inspect each caisson bottom to determine whether voids, clay seams, or solution channels exist.

### 3.05 MEASUREMENT AND PAYMENT

- A. Basis of Bids: Bids shall be based on number of caissons, total length with each caisson penetrating five feet into bedrock and diameter of shaft as shown on drawings.
- B. Basis for Payment: Payment for caissons will be made on actual length of caissons in place and accepted. The actual length may vary to coincide with elevation where satisfactory bearing strata is encountered. Adjustments will be made on variation of total quantities, based on design dimensions for shafts.
- C. There will be no additional compensation for excavation, concrete fill, reinforcing, casings, or other costs due to unauthorized overexcavating. No payment will be made for rejected caissons.
- D. Prices quoted include full compensation for labor, materials, tools, equipment, and incidentals required for excavation, trimming, shoring, casings, dewatering, reinforcement, concrete, and other items for complete installation.

End of Section

GEOTECHNICAL EXPLORATION  
OHIO RIVER STANDBY GENERATORS  
OHIO RIVER PUMP STATION NO. 1  
FT. THOMAS, KENTUCKY

RECEIVED

AUG 03 2006

PUBLIC SERVICE  
COMMISSION

Prepared for: **Quest Engineers, Inc.**

Thelen Project No.: **050525E**



**THELEN ASSOCIATES, INC.**

Geotechnical • Testing Engineers

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February 23, 2006

Quest Engineers, Inc.  
2517 Sir Barton Way  
Lexington, Kentucky 40509

Attention: Mr. Larry Anderson

Re: Geotechnical Exploration  
Ohio River Standby Generators  
Ohio River Pump Station No. 1  
Ft. Thomas, Kentucky

Ladies and Gentlemen:

Presented in this report are the results of a geotechnical exploration made for the proposed standby generator pads to be located at the Ohio River Pump Station No. 1 on Route 8 in Ft. Thomas, Kentucky. Our services were authorized by Mr. Larry Anderson with Quest Engineers, Inc. via his signature on two separate contracts dated August 26, 2005 and January 16, 2006. We performed our services in accordance with the scope outlined in our Proposal-Agreement K25200, dated August 24, 2005 and our proposal for Additional Geotechnical Services, dated December 5, 2005.

## 1.0 SCOPE

The main purpose of this exploration was to determine the general subsurface profile at the site and to relate the engineering properties of the soils and bedrock, that is their classification, strength, and compressibility characteristics, to the proposed concrete pad foundations and to site development. The geotechnical work included a site reconnaissance, test borings, site meetings, records research, laboratory testing, engineering analysis, and preparation of this report.

## 2.0 PROJECT BACKGROUND AND CHARACTERISTICS

For the purposes of this report, Route 8 runs in a north/south direction and the Ohio River Pump Station No. 1 is located on the east side of the road to the north of the Route 8 and River Road intersection. It is our understanding that the Northern Kentucky Water District (NKWD) initially planned to construct an elevated concrete pad to support a new standby generator at the existing pump station. The new concrete pad was to be located to the northeast of the existing pump station in the existing concrete walled area. We reviewed the initial Electrical Site Plan, dated July 30, 2005 prepared by Quest Engineers, Inc. We also reviewed our files for work previously performed by us in the vicinity of the new pad (Thelen Project Numbers 90401E and 93697E). After review of such information, we performed two (2) test borings numbered 501 and 502 as shown on the Boring Plan, Drawing 050525E-1 in the Appendix to this report.

Based on the findings in these two (2) test borings and our records research, it was determined that an underground arched structure with I-beam supports was located below the southeastern part of the initially planned location of the new generator pad. At that time, we recommended that the generator pad be relocated in order to avoid difficult construction and stability issues created by archway void spaces and the steel I-beams of this underground structure.

After review and discussion of our findings, it was decided to construct two (2) separate concrete pads outside the area of the underground structure described above. We reviewed the new Site Grading Plan, Sheet C-2 of the Project Plans prepared by Quest Engineers, Inc., dated November 2005. The smaller of the two elevated pads will support the switchgear and transfer switches, and is to be located at the southwest corner of the existing walled area and will be approximately 20 feet by 34 feet in overall dimension with stairs located to the north of the pad. The larger of the pads will support the generators and fuel tanks and is to be constructed immediately west of the existing tank to the north of the concrete walled area. This pad will be approximately 32 feet by 34 feet in overall dimension with stairs located to the south of the pad. The tops of both pads will be at El. 512.50 feet (MSL), about 7.5 feet above the existing ground levels at

the selected locations. An additional test boring, numbered 503, was performed at the northeast corner of the larger proposed pad in order to determine the subsurface profile in that area. The locations of Test Boring 503 and the previously drilled Test Boring 117 (Thelen Project No. 090401E) are also shown on the Boring Plan, Drawing 050525E-1 in the Appendix to this report.

### **3.0 SUBSURFACE EXPLORATION**

Our field work was carried out on September 15 and September 16, 2005 and on January 30, 2006. As previously mentioned, the locations of the test borings are shown on the Boring Plan, Drawing 050525E-1, in the Appendix to this report. The test boring locations were selected by us based on the initial Electrical Site Plan, dated July 30, 2005 prepared by Quest Engineers, Inc. and the new Site Grading Plan, Sheet C-2 of the Project Plans prepared by Quest Engineers, Inc., dated November 2005. We staked the test boring locations and surveyed the ground surface elevations in the field relative to the finished floor level of the existing pump station at Mean Sea Level Elevation 512.5 (El. 512.5).

The test borings were made with a track-mounted drill rig advancing hollow stem augers. Standard split spoon sampling was accomplished ahead of the augers following the procedures outlined in ASTM D1586. Observations for groundwater were made in the borings during drilling, at completion of drilling, and after completion of drilling.

As each test boring was advanced, the Drilling Technician kept a log of the subsurface profile noting the soil and bedrock types and stratifications, groundwater, penetration test results, and other pertinent data. Representative portions of the split-spoon samples were placed in labeled glass jars.

### **4.0 LABORATORY REVIEW AND TESTING**

The samples from the test borings were examined and visually classified in the laboratory by the Project Geotechnical Engineer. Representative samples were

selected for moisture content determinations and Atterberg limits tests. The results of these tests are included in the Tabulation of Laboratory Tests in the Appendix.

Final test boring logs were prepared by the Project Geotechnical Engineer on the basis of the visual classification in the laboratory, the laboratory test results and the field logs kept by the Drilling Technician. Copies of the final test boring logs are included in the Appendix with a Soil Classification Sheet which describes the terms and symbols used on the boring logs.

The dashed lines on the test boring logs indicate an approximate change in soil or bedrock strata as estimated between samples. A solid line indicates a change in strata occurred within a sample where a more precise measurement could be made. The transitions between soil and bedrock types may be abrupt or gradual.

#### **5.0 ENGINEERING RECONNAISSANCE AND SITE CONDITIONS**

Currently, the area for the proposed northern (larger) elevated slab is partially asphalt paved and partially grass covered. The asphalt pavement is located along the western edge of the proposed slab location. The ground surface in the area of the asphalt pavement is relatively flat. A short concrete retaining wall is then located approximately 5 feet east of the western edge of the proposed structure. This concrete retaining wall runs along the northern border of the proposed slab structure. The remaining portion of this proposed slab area is grass covered and is higher in elevation than the asphalt pavement. The ground surface in the grass-covered area is relatively flat. The difference in elevation between the asphalt area and the highest part of the grass-covered area is about 4.5 feet. Another concrete retaining wall and then a deep concrete wet wall are located immediately east of the proposed slab area. The ground surface rapidly drops off downward to the east to the Ohio River between the wet well and the existing walled area to the south. This ground surface is a very uneven, steep fill slope.

The majority of the project area for the proposed southern (smaller) elevated slab is asphalt paved. The ground surface in the area of the asphalt pavement is relatively flat. A short concrete retaining wall is located approximately 3 feet west of the eastern edge of the proposed structure. The ground surface in the area east of the proposed elevated slab is the existing walled area, which is grass covered and relatively flat. The difference in elevation between the asphalt area and the grass-covered area is about 2 to 3 feet. The grass-covered area extends to the east to the eastern wall of the existing walled area, and then drops off to the Ohio River. The existing walls are large stone foundation walls that previously supported old pump buildings.

### **6.0 SUBSURFACE CONDITIONS**

The test borings at the site indicate that the ground surface is underlain by asphalt or topsoil followed by deep poorly consolidated fill soils, then by silty clay and clay colluvial soils and finally by the bedrock formation of interbedded shale and limestone. An exception is that Test Borings 502 and 117 did not encounter the asphalt pavement or topsoil layer. The asphalt pavement encountered in Test Boring 501 was about 9.5 inches thick and the topsoil encountered in Test Boring 503 was about 2.5 inches thick.

The fill encountered in the test borings was highly variable in soil type and consistency. The thicknesses of the fill were 16.2, 48.5, 31.0 and 18.0 feet in Test Borings 501, 502, 503 and 117, respectively. The fill included moist to wet, intermixed layers of very loose to dense sand and gravel and very soft to very stiff silty clays and shale. The fill ranged in color between brown, black, gray, olive brown and red or a mixture of any of these colors. In addition, the fill contained limestone floaters, topsoil, concrete, coal, cinders, ash, slag, crushed stone, brick and asphalt. The standard penetration resistances (N-values) for this fill were also highly variable with very loose/very soft to soft material having N-values ranging from less than 1 blow per foot (bpf) to 2 bpf. The medium stiff to very stiff material had N-values ranging primarily from 3 to 21 bpf. It should be noted that two (2) samples of the fill had N-values greater than 50 blows per 6 inches. It is our opinion that these high N-values are due to encountering limestone floaters or pieces of concrete, asphalt or brick larger than the size of the sampler opening. It should also be

noted that solid concrete was encountered in Test Boring 503 from a depth of 5.5 feet to 7.5 feet below the ground surface. Test Boring 502 encountered a void from approximately a depth of 4.0 feet to a depth of 9.9 feet below the ground surface. This void is present due to the ground surface dropping off toward the Ohio River underneath the existing arch structure. Several moisture content tests were performed on representative samples of the fill, which resulted in highly variable moisture contents ranging from 7.9 to 28.8 percent. Three (3) samples of the fill were classified as CL soils according to the Unified Soil Classification System (USCS) with liquid limits of 33, 42 and 50 percent and plasticity indices of 14, 21 and 27 percent, respectively.

The native colluvium was encountered beneath the fill soils in all of the test borings, except Test Boring 502, below depths ranging from about 17.0 to 31.2 feet. The thickness of the colluvium ranged from 9.8 to 13.0 feet. The colluvium consisted of mottled brown, brown to olive brown and/or occasional traces of gray, moist, stiff to hard, silty clay and clay. The silty clay and clay colluvium also had shale fragments and limestone floaters. The N-values for the colluvium ranged from 12 to 46 bpf. Four (4) moisture content tests were performed on samples of the colluvium, which yielded moisture contents of 17.8, 9.2, 19.2 and 21.8 percent. One (1) plastic sample of the colluvium classified as a CH soil according to the USCS with a liquid limit of 55 percent and a plasticity index of 31 percent.

A bedrock formation consisting of a system of interbedded shale and limestone layers was encountered below the undocumented fill and native colluvium in all of the test borings. Bedrock in the Northern Kentucky Area is typically characterized in three basic zones depending upon the degree of weathering. The uppermost zone is a highly weathered zone wherein the shale is brown and has almost weathered to a clay, yet the bedding planes can still be seen. This zone was only encountered in Test Boring 503 below a depth of 41.0. The thickness of this zone was 3.5 feet.

In the intermediate zone, the shale is typically olive brown with occasional gray, and tougher than the shale in the highly weathered zone. This zone was encountered in Test

Borings 501, 503 and 117 below depths of 29.5, 44.5 and 31.0 feet respectively. A moisture content test performed on a sample of the shale portion from this zone yielded a moisture content value of 15.0 percent. Test Borings 503 and 117 were terminated in this zone at depths of 50.7 and 40.6 feet, respectively. The thickness of this zone in Test Boring 501 was 8.5 feet.

The parent bedrock consists of interbedded unweathered gray shale and gray hard limestone. The upper boundary of this zone was encountered in Test Borings 501 and 502 below depths of 38.0 and 48.5 feet, respectively. A moisture content test performed on a sample of the shale portion from this zone yielded a moisture content value of 10.0 percent.

## **7.0 GROUNDWATER CONDITIONS**

Test Borings 501 and 502 were noted to be dry during drilling, at completion of drilling and 0.5 to 24.0 hours after the completion of drilling. Test Borings 503 and 117 encountered groundwater at depths of 5.5, 25.5, 37.5 and 47.5 feet during drilling. Test Boring 503 was backfilled immediately, therefore, long-term water readings could not be taken. Test Boring 117 was noted to have groundwater at a depth of 32.0 feet upon completion of drilling and at 1.0 hour after the completion of drilling. Based on our local experience, periodic groundwater seepage can occur as perched water within the fill, at the fill soil/native soil interface, at the native soil/bedrock interface, and along limestone layers in the bedrock.

## **8.0 CONCLUSIONS AND RECOMMENDATIONS**

### **8.1 General**

The conclusions and recommendations of this report have been derived by relating the general principles of the discipline of Geotechnical Engineering to the proposed construction outlined by Section 2.0 of this report. Because changes in surface, subsurface, climatic, and economic conditions can occur with time and location, we recommend for our mutual interest that the use of this report be restricted to this specific project.

Our understanding of the proposed design and construction is based on the documents and information provided to us at the time this report was prepared and which are referenced in Section 2.0 of this report. We recommend that our office be retained to review the final design documents, plans, and specifications to assess any impact changes, additions or revisions in these documents may have on the conclusions and recommendations of this Geotechnical Report. Any changes or modifications which are made in the field during the construction phase which alter site grading, structure locations, infrastructure or other related site work should also be reviewed by our office prior to their implementation.

If conditions are encountered in the field during construction which vary from the facts of this report, we recommend that our office be contacted immediately to review the changed conditions in the field and make appropriate recommendations.

The scope of our services did not include any environmental assessment or investigation for the presence or absence of wetlands or hazardous or toxic materials in the soil, bedrock, surface water, groundwater or air, on or below or around this site.

We have performed the test borings and laboratory tests for our evaluation of the site conditions and for the formulation of the conclusions and recommendations of this report. We assume no responsibility for the interpretation or extrapolation of the data by others.

The earthwork recommendations of this report presume that the earthwork will be monitored continuously by an Engineering Technician under the direction of a Registered Professional Geotechnical Engineer. We recommend that the Owner contract these services directly with Thelen Associates, Inc.

We recommend that a preconstruction meeting be held at the site with the Owner's representative, the Design Civil Engineer, the General Contractor, the Foundation

Contractor, the Geotechnical Engineer and any other interested parties to review the scope and schedule of the proposed foundation installation.

Based upon our engineering reconnaissance of the site, the test borings, a visual examination of the samples, the laboratory tests, our understanding of the proposed construction, and our experience as Consulting Soil and Foundation Engineers in the Northern Kentucky Area, we have reached the following conclusions and make the following recommendations.

In general, it is our opinion that the site is suitable for the proposed construction provided that the recommendations contained herein are implemented. Our recommendations for design and construction of the proposed elevated slabs and for the associated site development are contained in the following paragraphs.

### **8.2 Site Preparation and Earthwork**

We understand that the proposed generator and switchgear pads are to be structural concrete slabs supported on concrete foundation walls. Due to the poor quality of the deep existing fill soils and overall stability concerns, we recommend that no filling be performed in order to raise the site grades to the elevated slab levels. The existing concrete wet well structure and the existing stone foundation walls are currently providing retention stability to both proposed slab areas. Additional filling in these areas would increase the load on these existing structures and compromise the stability of the ground. It would also cause consolidation of the poor fill soils and downdrag loads on the foundations. As such, we recommend that elevated structural platform structures with no filling above existing grades inside or around the supporting foundation walls be constructed.

Any utility trench excavations should be backfilled with compacted and tested approved silty clays, clays, shale, sand and gravel but not cinders, ash, slag, coal, concrete, asphalt, wood or other debris. All clayey soil materials used as trench backfill should be moisture conditioned to within 2 percent below to 3 percent above optimum moisture

content for compaction, and then placed in shallow level layers, 4 to 6 inches thick, with each layer thoroughly compacted to densities not less than 95 percent, ASTM D698. Granular backfill should be compacted to at least 75 percent relative density as per ASTM D4253 and D4254. Under no conditions should any backfill be flushed in an attempt to obtain compaction.

### **8.3 Elevated Slab Foundations**

Based on our field exploration, the test boring findings and our experience, we have concluded that due to the highly variable poorly consolidated nature of the existing fill encountered at the site, shallow spread footings will not be suitable for support of the proposed elevated slabs. We recommend that a system of drilled shafts and grade beams be used for the support of the foundation wall and elevated slab structures. The grade beams, foundation walls and slabs should be reinforced as rigid boxes, and should be connected to the drilled shafts with steel reinforcement. No fill should be placed above existing grades inside or around these structures, as recommended earlier in this report. The drilled shafts should have full length reinforcing steel cages, should penetrate the existing fill, native colluvium and highly weathered bedrock, and should extend at least 5 feet into the interbedded olive brown weathered shale and limestone bedrock. The drilled shafts may be proportioned for a maximum allowable end bearing pressure of 10,000 psf, full dead and full live load, excluding the weight of the drilled shafts. The bottoms of the grade beams should be at least 30 inches below final grades for frost protection.

We recommend that the individual shafts be drilled straight and plumb, with relatively level bearing surfaces. The bottoms of the shafts should be adequately cleaned of all loosened or disturbed materials prior to placement of concrete. We recommend that the drilled shafts be at least 24 inches in diameter. If a limestone layer is exposed in the bottom of a drilled shaft excavation, we recommend that the shaft be deepened to penetrate the limestone layer and to expose the shale portion of the bedrock. Groundwater should be removed from the drilled shaft excavations so that no drilled shaft concrete is placed through more than 4 inches of accumulated water.

The test borings indicate that there are very loose to loose granular layers and very soft to soft clay layers in the fill, which are prone to caving into drilled shaft excavations. The borings also indicate that groundwater will be encountered within the existing fill, near the fill/native soil and native soil/bedrock interfaces, and within the bedrock. We anticipate that temporary casing will be required to control caving and the flow of groundwater during the drilled shaft construction. We therefore recommend that the contract documents include an item for casing the drilled shaft excavations.

The findings of the test borings indicate that some rubble fill will be encountered during installation of the drilled shafts. The rubble fill includes limestone floaters, topsoil, concrete, cinders, ash, slag, crushed stone, brick and asphalt. The Drilled Shaft Contractor should be aware of hard fractions included within the fill deposits, and the drilling difficulties that they present.

As discussed earlier in Section 6.0 of this report, it should be noted that solid concrete was encountered in Test Boring 503 from 5.5 feet to 7.5 feet below the ground surface. It is unknown whether this concrete is part of the rubble fill or a portion of the nearby existing wet well structure or retaining wall. We recommend that test pits be excavated in order to determine the extent and nature of this concrete. We do not recommend structural connection of the new drilled shaft foundations to the existing wet well structure or retaining wall. We recommend that the northern elevated slab be shifted small, minimum distances west and south as necessary to avoid the concrete of the existing wet well and retaining wall. We recommend that the structure remain as far to the north as possible while still avoiding the concrete encountered in Test Boring 503.

The current plans for the two elevated structures show new foundation walls immediately adjacent to the existing retaining walls at the site. The new east wall of the southern proposed structure is also immediately adjacent to the buried west stone wall of the old pump house structure. We recommend that test pits be excavated to expose the existing wall foundations so that the new walls and the new drilled shafts can be shifted westward small amounts to avoid the existing foundations. No new foundations

should be constructed east of the existing west foundation wall in the existing walled area.

We recommend that the installation of all drilled shafts be reviewed by the Project Geotechnical Engineer or his/her representative in order to determine that the shafts are installed in accordance with the recommendations in this report and the intent of the design.

The Contractor should be responsible for the stability and safety of all excavations and should exercise all necessary cautions to shore, slope or otherwise maintain stable excavations to protect workers. All excavations should be made and maintained in accordance with all federal, state and local regulations.

#### **8.5 Seismicity**

The Kentucky Building Code (KBC 2002) has been revised. Since January 1, 2002, all commercial project plans and specifications have been required to meet the provisions of KBC 2002.

A significant change in KBC 2002 is that it has adopted the earthquake having a 2 percent probability of exceedance (POE) in any 50-year period as the basis for seismic design. Previous codes had used the earthquake having a 10 percent POE in any 50-year period as the basis for seismic design. Another significant change is a KBC 2002 requirement that local site geology, including overburden soils above the bedrock, be factored into the determination of seismic parameters to be used in structural design.

In our opinion and based on our experience with the new code revision, the higher seismic standard will have an impact on structural design in the Northern Kentucky Area. The effects of regional seismicity (as mandated by KBC 2002) are being presented herein for use by the Structural Engineer.

We have assumed that the proposed elevated generator and switchgear pads will be designated in Seismic Use Group II or III. This information should be verified by the Project Structural Engineer. Based on our assessment of the site conditions, it is our opinion that the following seismic parameters will be applicable to the proposed construction.

Seismic Use Group (to be selected by the Project Structural Engineer)	II	III
$S_s$	0.179 g (USGS Data)	0.179 g (USGS Data)
$S_1$	0.090 g (KBC 2002))	0.090 g (KBC 2002)
Site Class	D	D
$F_a$	1.6	1.6
$F_v$	2.4	2.4
$S_{MS}$	0.286 g	0.286 g
$S_{M1}$	0.216 g	0.216 g
$S_{DS}$	0.191 g	0.191 g
$S_{D1}$	0.144 g	0.144 g
Seismic Design Category	B or C	C or D

Independent of which Seismic Use Group is chosen, the Project Structural Engineer should review the following amendment to the KBC 2002. An amendment to KBC 2002 passed by the Kentucky Department of Housing, Buildings, and Construction during the Spring of 2002 and published as an undated KBC 2003 Supplement states that the "seismic design category is permitted to be determined from Table 1616.3(1) when the approximate fundamental period of the structure,  $T_a$ , in each of the two orthogonal directions determined in accordance with Section 1617.4.2.1 is less than  $0.8 T_s$  determined in accordance with Section 1615.1.4 and Equation 16-35 is used to determine the seismic response coefficient,  $C_s$ ." The Project Structural Engineer will need to determine the Seismic Design Category based on these criteria.

The KBC 2002 indicates that when the Seismic Design Category is C or worse, an evaluation of the soil profile should be made with regard to slope instability, liquefaction and surface rupture. In addition, the KBC 2002 indicates that when the Seismic Design Category is D or worse, an evaluation of the soil profile should be made with regard to the items listed above, as well as with regard to seismic lateral pressures on basement

and retaining walls, differential settlement, lateral movement or reduction in foundation soil-bearing capacity. The following is a discussion on each of these items.

#### Slope Instability

The old concrete wet well structure and the large stone foundation walls for the old pump buildings are providing stable retention for the new structure areas, and have done so for decades under steep slope conditions, repeated Ohio River flood and rapid drawdown conditions, and during small earthquakes that have occurred during their lifetime. It is our judgment that these structures will continue to retain the proposed pad areas, so slope instability is not expected to be a concern. Further, the existing elevated generator and switchgear pad, to which the proposed structures are a backup, is retained by a large retaining wall that is founded in and anchored to the bedrock, and was designed for earthquake forces. This wall is expected to prevent slope instability at the existing generator/switchgear pad during a seismic event.

#### Liquefaction and Surface Rupture

We have reviewed the subsurface profile relative to liquefaction and surface rupture, and it is our opinion that neither of these will occur since the very loose to loose granular fill zones are not saturated except during flood events. It is unusual to consider the design earthquake and flooding simultaneously, so liquefaction and surface rupture are not expected to occur.

#### Lateral Pressures on Basement and Retaining Walls

We have recommended that the proposed construction not include basement or retaining walls, so there will be no seismic lateral earth pressures on such walls.

#### Differential Settlement, Lateral Movement and Reduction in Soil Bearing Capacity

Differential settlement of the existing fill may occur during a seismic event, but will not affect the structures since they will be founded on drilled shafts to bedrock. Lateral movement is not expected based on the discussions above. The bedrock is the bearing

stratum for these structures, and is not expected to suffer loss of bearing capacity during an earthquake.

### 9.0 CLOSURE

We are enclosing with this report a reprint of "Important Information About Your Geotechnical Engineering Report" published by ASFE, Professional Firms Practicing in the Geosciences, which our firm would like to introduce to you at this time.

We appreciate the opportunity to provide these consulting services to you. Should you have any questions regarding this report, please do not hesitate to contact us. We look forward to following through with you on this project by providing the necessary construction review and testing services.

Respectfully submitted,  
**THELEN ASSOCIATES, INC.**



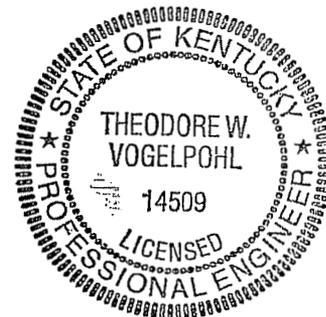
for Michelle E. Sperber, P.E.  
Staff Geotechnical Engineer



Theodore W. Vogelwohl, P.E.  
Chief Geotechnical Engineer

MES:mes  
050525E

Copies submitted: 2 – Client  
1 – Northern Kentucky Water District



**APPENDIX**

ASFE Report Information

Tabulation of Laboratory Tests

Boring Plan, Drawing 050525E-1

Test Boring Logs

Soil Classification Sheet

# Important Information About Your Geotechnical Engineering Report

*Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.*

*The following information is provided to help you manage your risks.*

## **Geotechnical 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 civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you — should apply the report for any purpose or project except the one originally contemplated.*

## **Read the Full Report**

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

## **A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors**

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- 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,

- elevation, configuration, location, orientation, or weight of the proposed structure,
- 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. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

## **Subsurface Conditions Can Change**

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

## **Most Geotechnical Findings Are Professional Opinions**

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

## **A Report's Recommendations Are *Not* Final**

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

### **A Geotechnical Engineering Report Is Subject to Misinterpretation**

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

### **Do Not Redraw the Engineer's Logs**

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

### **Give Contractors a Complete Report and Guidance**

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

### **Read Responsibility Provisions Closely**

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that

have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of 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 equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

### **Obtain Professional Assistance To Deal with Mold**

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention.* *Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

### **Rely on Your ASFE-Member Geotechnical Engineer for Additional Assistance**

Membership in ASFE/THE BEST PEOPLE ON EARTH exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.



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# THELEN ASSOCIATES, INC.

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www.thelenassoc.com

## LOG OF TEST BORING

CLIENT: Quest Engineers, Inc. BORING # 501

PROJECT: Geotechnical Exploration, Ohio River Standby Generator, Ohio River Pump Station JOB # 050525E

LOCATION OF BORING: As shown on Boring Plan, Drawing 050525E-1 /No. 1, Ft. Thomas, Ky.

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRATA DEPTH feet	DEPTH SCALE feet	SAMPLE				
				Cond	Blows/6"	No.	Type	Rec. Inches
503.2	SURFACE	0.0						
502.4	ASPHALT	0.8						
496.2	Mixed brown moist medium stiff FILL, silty clay, some fine sand and gravel with shale, brick and asphalt fragments (CL).	7.0	5	I	2/3/3	1	DS	18
				I	3/3/3	2	DS	7
				I	1/1/2	3	DS	10
488.7	Mixed brown and black moist very loose FILL, fine to coarse sand and gravel, trace silty clay with brick and asphalt fragments.	14.5	10	D	1/1/1	4	DS	18
				D	1/12"/1	5	DS	11
				I	1/1/1	6	DS	12
486.2	Mixed brown very moist very soft FILL, silty clay, trace fine sand with shale fragments.	17.0	15	I	1/1/1	7	DS	14
473.7	Brown to olive brown, trace gray moist very stiff CLAY with shale fragments and limestone floaters (colluvium) (CH).	29.5	20	I	4/10/9	8	DS	18
				I	3/5/7	9	DS	18
				I	4/7/8	10	DS	18
				I	5/7/7	11	DS	18
				I	21/21/43	12	DS	16
465.2	Interbedded brown to olive brown, trace gray moist soft weathered SHALE and gray hard LIMESTONE (bedrock).	38.0	35	I	21/50/6"	13	DS	11
463.0	Interbedded gray moist soft SHALE and gray hard LIMESTONE (bedrock).	40.2	40	I	50/2"	14	DS	1
	Split spoon refusal and bottom of test boring at 40.2 feet							

Datum MSL Hammer Wt. 140 lbs. Hole Diameter 7 in. Foreman JS

Surf. Elev. 503.2 ft. Hammer Drop 30 in. Rock Core Dia. \_\_\_\_\_ in. Engineer MES

Date Started 9/16/05 Pipe Size O.D. 2 in. Boring Method 3-1/4 HSA Date Completed 9/16/05

### 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

### GROUND WATER DEPTH

FIRST NOTED None ft.  
AT COMPLETION Dry ft.  
AFTER 0.5 hrs. Dry ft.  
BACKFILLED 0.5 hrs.

### 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: Quest Engineers, Inc. BORING # 502  
 PROJECT: Geotechnical Exploration, Ohio River Standby Generator, Ohio River Pump Station JOB # 050525E  
 LOCATION OF BORING: As shown on Boring Plan, Drawing 050525E-1 /No. 1, Ft. Thomas, Ky.

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRATA DEPTH feet	DEPTH SCALE feet	SAMPLE			
				Cond	Blows/6"	No.	Type
507.3	SURFACE	0.0					
505.3	Mixed brown, trace gray moist very stiff FILL, silty clay with shale fragments and limestone floaters, trace topsoil and hairlike roots.	2.0	I	5/12/9	1	DS	16
		4.0	I	50/4"	2	DS	4
503.3	Mixed brown moist medium stiff FILL, shale, trace silty clay with limestone floaters.			Note: Scale Change			
497.4	VOID	9.9					
495.3	Mixed brown moist very loose FILL, fine sand, trace topsoil and brick and concrete fragments.	12.0	D	4/1/1	3	DS	9
			I	1/1/1	4	DS	12
			I	1/1/1	5	DS	18
487.8	Mixed grayish brown moist medium stiff FILL, shale, trace silty clay with limestone floaters (CL).	19.5	I	6/4/2	6	DS	1
			I	1/35"	7	DS	15
482.5	Mixed grayish brown moist soft FILL, shale, trace silty clay with limestone floaters.	24.8	I	1/19"	8	DS	7
			I	1/2/5	9	DS	6
478.8	Mixed grayish brown to olive brown moist stiff FILL, shale, trace silty clay and fine sand with limestone floaters.	28.5					
		33.0	I	2/1/1	10	DS	9
474.3	Mixed grayish brown moist stiff FILL, shale.		I	1/18"	11	DS	7
469.3	Mixed gray very moist very soft FILL, silty clay with shale fragments (CL).	38.0					
458.8	Mixed brown and gray very moist very soft FILL, silty clay with shale fragments.		I	1/18"	12	DS	9
			I	2/18"	13	DS	1
455.8	Interbedded gray, trace brown moist soft SHALE and gray hard LIMESTONE (bedrock).	48.5					
	Bottom of test boring at 51.5 feet.	51.5	I	16/25/50	14	DS	16

Datum MSL Hammer Wt. 140 lbs. Hole Diameter 7 in. Foreman JS  
 Surf. Elev. 507.3 ft. Hammer Drop 30 in. Rock Core Dia. \_\_\_\_\_ in. Engineer MES  
 Date Started 9/15/05 Pipe Size O.D. 2 in. Boring Method 3-1/4 HSA Date Completed 9/15/05

**SAMPLE CONDITIONS**      **SAMPLE TYPE**      **GROUND WATER DEPTH**      **BORING METHOD**  
 D - DISINTEGRATED      DS - DRIVEN SPLIT SPOON      FIRST NOTED None ft.      HSA - HOLLOW STEM AUGERS  
 I - INTACT      PT - PRESSED SHELBY TUBE      AT COMPLETION Dry ft.      CFA - CONTINUOUS FLIGHT AUGERS  
 U - UNDISTURBED      CA - CONTINUOUS FLIGHT AUGER      AFTER 24.0 hrs. Dry ft.      DC - DRIVING CASING  
 L - LOST      RC - ROCK CORE      BACKFILLED 24.0 hrs.      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: Quest Engineers, Inc. BORING # 503 (1of2)  
 PROJECT: Geotechnical Exploration, Ohio River Standby Generator, Ohio River Pump Station JOB # 050525E  
 LOCATION OF BORING: As shown on Boring Plan, Drawing 050525E-1 /No. 1, Ft. Thomas, KY

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRATA DEPTH feet	DEPTH SCALE feet	SAMPLE				
				Cond	Blows/6"	No.	Type	Rec. Inches
507.3	SURFACE	0.2						
507.1	TOPSOIL			I	1/2/1	1A 1B	DS	12
502.8	Mixed brown and gray moist stiff FILL, silty clay and shale with limestone floaters and concrete debris.	4.5		I	3/3/3	2	DS	4
501.8	Mixed brown and red moist soft FILL, silty clay with bricks, trace shale and cinders.	5.5	5	I	2/50/5"	3	DS	6
499.8	CONCRETE	7.5		I	1/1/1	4	DS	4
495.3	Mixed brown, trace black moist soft to medium stiff FILL, silty clay, shale and cinders.	12.0	10	I	1/2/1	5	DS	6
487.8	Mixed brown and gray moist medium stiff FILL, silty clay and shale, trace cinders.	19.5	15	I	2/2/3	6	DS	10
482.8	Mixed brown and gray moist soft to medium stiff FILL, shale and silty clay, trace sand.	24.5	20	I	2/3/4	7	DA	18
480.3	Mixed brown, black and gray wet soft FILL, silty clay with layers of sand and cinders.	27.0	25	I	4/6/9	8	DS	8
477.8	Mixed brown, black and gray moist soft/loose FILL, interlayered clay and cinders.	29.5		I	3/2/9	9	DS	10
				I	3/3/4	10	DS	10
				I	2/2/4	11	DS	12
				I	1/2/2	12	DS	12

Datum MSL Hammer Wt. 140 lbs. Hole Diameter 7 in. Foreman JS/GB  
 Surf. Elev. 507.3 ft. Hammer Drop 30 in. Rock Core Dia. \_\_\_\_\_ in. Engineer TWV  
 Date Started 1/30/06 Pipe Size O.D. 2 in. Boring Method 3-1/4 HSA Date Completed 1/30/06

### 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

### GROUND WATER DEPTH

FIRST NOTED 5.5, 25.5, 47.5 ft.  
 AT COMPLETION Trace ft.  
 AFTER -- hrs. -- ft.  
 BACKFILLED Immed. hrs.

### 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



# THELEN ASSOCIATES, INC.

Geotechnical • Testing Engineers

☑ 1398 Cox Avenue / Erlanger, Kentucky 41018-1002 / 859-746-9400 / Fax 859-746-9408  
 ○ 2140 Waycross Road / Cincinnati, Ohio 45240-2719 / 513-825-4350 / Fax 513-825-4756  
 www.thelenassoc.com

## LOG OF TEST BORING

CLIENT: Quest Engineers, Inc. BORING # 503 (2of2)  
 PROJECT: Geotechnical Exploration, Ohio River Standby Generator, Ohio River Pump Station JOB # 050525E  
 LOCATION OF BORING: As shown on Boring Plan, Drawing 050525E-1 /No. 1, Ft. Thomas, KY

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRATA DEPTH feet	DEPTH SCALE feet	SAMPLE				
				Cond	Blows/6"	No.	Type	Rec. Inches
477.3	SURFACE	30.5	30.0					
476.8	Mixed brown and gray moist medium stiff FILL, silty clay and shale.	31.2 32.0		I	3/2/3	13A 13B 13C	DS	18
476.1	Black wet very loose FILL, fine sand, cinders and ash.	34.5		I	7/11/12	14	DS	13
475.3	Mottled brown and gray moist stiff SILTY CLAY.		35	I	7/11/13	15	DS	12
472.8	Brown, trace gray moist very stiff to hard SILTY CLAY with shale and limestone fragments (colluvium).			I	6/9/14	16	DS	13
466.3	Brown, trace gray moist stiff to very stiff SILTY CLAY with shale fragments (colluvium).	41.0	40	I	5/7/10	17A 17B	DS	18
462.8	Interbedded brown moist very soft highly weathered SHALE and gray hard LIMESTONE with clay seams (bedrock).	44.5		I	50/6"	18	DS	4
457.8	Interbedded brown to olive brown and gray moist to wet soft weathered SHALE and gray hard LIMESTONE (bedrock).	49.5	45	I	50/6"	19	DS	6
456.6	Intertbedded gray, trace brown moist soft weathered SHALE and gray hard LIMESTONE (bedrock).	50.7	50	I	32/50/2"	20 21	DS	6
	Bottom of test boring at 50.7 feet.		55					

Datum MSL Hammer Wt. 140 lbs. Hole Diameter 7 in. Foreman JS/GB  
 Surf. Elev. 507.3 ft. Hammer Drop 30 in. Rock Core Dia. \_\_\_\_\_ in. Engineer TWV  
 Date Started 1/30/06 Pipe Size O.D. 2 in. Boring Method 3-1/4 HSA Date Completed 1/30/06

### 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

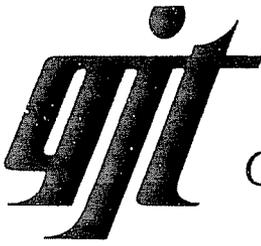
### GROUND WATER DEPTH

FIRST NOTED 5.5, 25.5, 47.5 ft.  
 AT COMPLETION Trace ft.  
 AFTER \_\_\_\_\_ hrs. \_\_\_\_\_ ft.  
 BACKFILLED Immed. hrs.

### 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



CIVIL ENGINEERS

# G. J. Thelen & Associates, Inc.

- 516 Enterprise Drive/Covington, Kentucky 41017-1595/606-341-1322/Fax 606-341-0832
- 10265 Spartan Drive/Cincinnati, Ohio 45215/513-771-5005/Fax 513-771-6669
- 3337 Milverton Court/Cincinnati, Ohio 45248-2865/513-574-7137

## LOG OF TEST BORING

CLIENT Kenton County Water District BORING # 117  
 PROJECT Geotechnical Exploration, Proposed 42-Inch Water Intake Line, Ft. JOB # 90401E  
 LOCATION OF BORING Baseline Station 0+61, 6' Left / Thomas, Kentucky

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRA. DEPTH	DEPTH SCALE	SAMPLE				
				Cond	Blows/6"	No.	Type	Rec.
503.7	<b>SURFACE</b>	-0.0						
		2.0		D	9/8/20	1	DS	18"
	Black moist medium dense FILL, cinders, ash and slag, trace gravel.	4.5		I	5/18/20	2	DS	12"
501.7		7.0	5	D	4/5/6	3	DS	12"
	Mixed brown and black moist dense FILL, sand, gravel, clay, crushed stone.	9.5		D	4/3/5	4	DS	12"
499.2		12.0	10	D	7/7/5	5	DS	4"
496.7	Black moist medium dense FILL, coal, ash and cinders.	14.5		I	2/3/2	6	DS	12"
494.2	Mixed brown and black moist medium stiff FILL, clay with coal and ash.	18.0	15	I	4/6/14	7	DS	14"
491.7	Mixed brown moist medium stiff FILL, clay and shale.		20	D	30/19/27	8	DS	6"
489.2	Mixed olive green, gray and brown moist soft FILL, clay, cinders and ash.		25	I	6/5/7	9	DS	14"
485.7	Mixed bluish green, gray and brown moist stiff FILL, silty clay.	31.0	30	I	50/4"	10	DS	4"
				I	26/30/50	11	DS	12"
472.7	Brown, trace gray moist stiff SILTY CLAY with shale fragments and limestone floaters (colluvium).		35	I	50/30/50 /4"	12	DS	18"
				D	150/1" /4"	13	DS	6"
463.1	Olive brown and gray moist soft weathered SHALE and thinly bedded LIMESTONE (bedrock).	40.6	40	D	50/6"	14	DS	6"
	Bottom of test boring at 40.6 feet.		45					
	Note: Shelby tube samples were obtained in an offset hole from 8.0 to 10.0 feet (PT-16) and from 12.0 to 14.0 feet (PT-17). Recoveries were 12 inches and 23 inches, respectively.		50					
			55					

Datum USGS Hammer Wt. 140 Lbs. Hole Diameter 8" Foreman DEH  
 Surf. Elev. 503.7 Ft. Hammer Drop 30 in. Rock Core Dia. \_\_\_\_\_ Engineer TWV  
 Date Started 2/20/91 Pipe Size O.D.2 in. Boring Method HSA Date Completed 2/21/91

<b>SAMPLE CONDITIONS</b>	<b>SAMPLER TYPE</b>	<b>GROUND WATER DEPTH</b>	<b>BORING METHOD</b>
D - DISINTEGRATED	DS - DRIVEN SPLIT SPOON	FIRST NOTED <u>37.5</u> FT.	HSA - Hollow Stem Augers
I - INTACT	PT - PRESSED SHELBY TUBE	AT COMPLETION <u>32.0</u> FT.	CFA - Continuous Flight Augers
U - UNDISTURBED	CA - CONTINUOUS FLIGHT AUGER	AFTER <u>1.0</u> HRS. <u>32.0</u> FT.	DC - Driving Casing
L - LOST	RC - ROCK CORE	BACKFILLED <u>1.0</u> HRS.	MD - Mud Drilling

\*STANDARD PENETRATION TEST - DRIVING 2" OD SAMPLER 1' WITH 140 #, HAMMER FALLING 30"; COUNT MADE AT 6" INTERVALS



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## SOIL CLASSIFICATION SHEET

### NON COHESIVE SOILS

(Silt, Sand, Gravel and Combinations)

#### Density

Very Loose	- 5 blows/ft. or less
Loose	- 6 to 10 blows/ft.
Medium Dense	- 11 to 30 blows/ft.
Dense	- 31 to 50 blows/ft.
Very Dense	- 51 blows/ft. or more

#### Relative Properties

Descriptive Term	Percent
Trace	1 – 10
Little	11 – 20
Some	21 – 35
And	36 – 50

#### Particle Size Identification

Boulders	- 8 inch diameter or more
Cobbles	- 3 to 8 inch diameter
Gravel	- Coarse - 3/4 to 3 inches - Fine - 3/16 to 3/4 inches
Sand	- Coarse - 2mm to 5mm (dia. of pencil lead) - Medium - 0.45mm to 2mm (dia. of broom straw) - Fine - 0.075mm to 0.45mm (dia. of human hair)
Silt	- 0.005mm to 0.075mm (Cannot see particles)

### COHESIVE SOILS

(Clay, Silt and Combinations)

#### Consistency

	<u>Field Identification</u>
Very Soft	Easily penetrated several inches by fist
Soft	Easily penetrated several inches by thumb
Medium Stiff	Can be penetrated several inches by thumb with moderate effort
Stiff	Readily indented by thumb but penetrated only with great effort
Very Stiff	Readily indented by thumbnail
Hard	Indented with difficulty by thumbnail

#### Unconfined Compressive Strength (tons/sq. ft.)

Less than 0.25
0.25 – 0.5
0.5 – 1.0
1.0 – 2.0
2.0 – 4.0
Over 4.0

Classification on logs are made by visual inspection.

Standard Penetration Test – Driving a 2.0" O.D., 1 3/8" I.D., sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30 inches. It is customary to drive the spoon 6 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the tests are recorded for each 6 inches of penetration on the drill log (Example – 6/8/9). The standard penetration test results can be obtained by adding the last two figures (i.e. 8+9=17 blows/ft.). Refusal is defined as greater than 50 blows for 6 inches or less penetration.

Strata Changes – In the column "Soil Descriptions" on the drill log, the horizontal lines represent strata changes. A solid line (————) represents an actually observed change; a dashed line (-----) represents an estimated change.

Groundwater observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc., may cause changes in the water levels indicated on the logs.

Case No. 2006-372

RECEIVED

AUG 03 2006

PUBLIC SERVICE  
COMMISSION

# **SPECIFICATIONS**

**FOR**

**NORTHERN KENTUCKY WATER DISTRICT**

## **Ohio River Pump Station No. 1** **Standby Generators** **Campbell County, Kentucky**

**June 2006**

**RON LOVAN, PRESIDENT/CEO**

### **COMMISSIONERS:**

**JOE KOESTER - CHAIRPERSON**  
**ANDREW COLLINS - SECRETARY**  
**FRED MACKE, JR. - TREASURER**  
**PAT SOMMERKAMP - COMMISSIONER**  
**FRANK JACKSON - COMMISSIONER**  
**DOUG WAGNER - COMMISSIONER**

**CHARLES PANGBURN - ATTORNEY**

### **COMPILED BY:**

**Quest Engineers, Inc.**  
**2517 Sir Barton Way**  
**Lexington, Kentucky 40509**

### **OWNER:**

**Northern Kentucky Water District**  
**2835 Crescent Springs Road**  
**Erlanger, Kentucky 41018**

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OHIO RIVER PUMP STATION NO. 1 STANDBY GENERATORS  
CAMPBELL COUNTY, KENTUCKY

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# **Bidding Requirements**

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Section 00020

INVITATION TO BID

Date: June 9, 2006

**PROJECT: Ohio River Pump Station No. 1 Standby Generators**

SEALED BIDS WILL BE RECEIVED AT:

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

UNTIL: Date: July 13, 2006  
Time: 2:00 p.m., local time

At said place and time, and promptly thereafter, all Bids that have been duly received will be publicly opened and read aloud.

The proposed Work is generally described as follows: In order to maintain a maximum of two (2) raw water pumps during a power outage, it is necessary that standby generators be provided for on-site emergency power, along with automatic transfer switches and switchgear.

All Bids must be in accordance with the Bidding Documents on file, and available for examination at:

Northern Kentucky Water District  
2835 Crescent Springs Road  
Erlanger, Kentucky 41018  
(859) 578-9898

Or

Quest Engineers, Inc.  
2517 Sir Barton Way  
Lexington, Kentucky 40509  
(859) 223-3755

Or

Quest Engineers, Inc.  
1251 Kemper Meadow Drive, Suite 600  
Cincinnati, Ohio 45240  
(513) 851-9774

Copies of the Bidding Documents may be obtained from the office of Queen City Reprographics, 2863 Sharon Road, Cincinnati, OH 45241, (513-326-2300), at the address indicated herein. Charges for all documents obtained will be made on the following basis:

	<u>Charge</u>
Complete set of Bidding Documents	\$80.00
Copy of Geotechnical Report	\$25.00
Copy of 1991 Site Drawings	\$10.00
Mailing and Handling (U.S. Mail) (if requested)	\$7.50
Mailing and Handling (FED EX) (if requested)	\$15.00

Charges for Bidding Documents and mailing and handling, if applicable, will not be refunded.

Bids will be received on a combined base bid with alternatives basis as described in the Contract Documents.

Bid security, in the form of a Bid Bond 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 as security for the faithful performance and the payment of all bills and obligations arising from the performance of the Contract.

Contractor and all Subcontractors will be required to conform to the labor standards set forth in the Contract Documents. This project falls under the provisions of KRS 337.505 to 337.550 for prevailing wage rates.

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 qualified Bidder to such an extent as may be determined by Owner.

A pre-bid conference will be held July 11, 2006, 9:00 a.m., at the Ohio River Pump Station No. 1. The pump station is located at Mary Ingles Highway, Fort Thomas, Kentucky 41075.

Minority Bidders are encouraged to bid.

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

Ron Lovan, President/CEO  
Northern Kentucky Water District

End of Section

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

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

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

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

- a. thoroughly examine and study the Bidding 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 Bidding 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 Bidding Documents;

- f. promptly give Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Owner is acceptable to Bidder; and
- g. determine that the Bidding 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 Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner or others, and Owner and Engineer disclaim responsibility for the accuracy or completeness thereof, unless it is expressly provided otherwise in the Supplementary Conditions.

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

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

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

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

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

7. BID SECURITY. Each Bid must be accompanied by Bid security made payable to Owner in an amount of 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.

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. Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within seven days after the Bid opening.

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. SUBCONTRACTORS, SUPPLIERS, AND OTHERS. Each Bidder shall submit with its Bid the name of all such Subcontractors, Suppliers, and other individuals and organizations proposed for those portions of the Work for which such identification is required. If, after due investigation, Owner or Engineer has reasonable objection to any proposed Subcontractor, Supplier, or other individual or entity, Owner or Engineer may, before the Notice of Award is given, request the apparent Successful Bidder to submit an acceptable substitute without an increase in the Bid. If the apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use an acceptable Subcontractor, Supplier, or other individual or entity. Declining to make requested substitutions will not constitute grounds for sacrificing the bid security of any Bidder. Any Subcontractors, Suppliers, or other individual or entity to whom the Owner or Engineer does

not make written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance as provided in the General Conditions. Preliminary acceptance of equipment listed by manufacturer's name shall not in any way constitute a waiver of the specifications covering such equipment; final acceptance will be based on full conformity with the Contract Documents. Any Bid conditioned on furnishing equipment or materials which are not responsive to the Contract Documents will be rejected.

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

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

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

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

A Bid by a limited liability company shall be executed in the name of the firm by a member 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.

13. BASIS OF BID; EVALUATION OF BIDS. The lump sum price shall be based on the Work as indicated in the Contract Documents.

The Contract will be awarded based on the lowest responsive Base Bid, or combination of the Base Bid with any alternative submitted by a qualified Bidder, that produces an amount that is within the Owner's budget.

14. SUBMITTAL OF BID. A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the advertisement or invitation to Bid and shall be enclosed in an opaque sealed envelope plainly marked with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of

Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "Bid Enclosed".

Bids shall be addressed to Owner at:

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

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

15. MODIFICATION AND WITHDRAWAL OF BIDS. A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. If within 24 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, and the Bid security will be returned.

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

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

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 the apparent Successful Bidder to such an extent as may be determined by Owner.

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

In evaluating Bids, Owner will consider the following:

1. Whether or not the Bid complies with the prescribed requirements, and provides such alternates, unit prices and other data as may be requested in the Bid form or prior to the Notice of Award.
2. The qualifications of the Bidder and the qualifications of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted. Owner may also consider operating costs, maintenance requirements, performance data, and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data are required to be submitted prior to the Notice of Award.
3. If the Bidder maintains a permanent place of business.
4. If the Bidder has adequate plant and equipment to perform the Work properly and expeditiously.
5. Bidder's financial status to meet all obligations and incidentals to the Work.
6. Whether the Bidder has appropriate technical experience.
7. Bidder's performance record.
8. The amount of the Bid and best Bid

Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders to perform the Work in accordance with the Contract Documents.

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 fifteen (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 fifteen (15) days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

End of Section

## **Bid Forms**

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Section 00300

BID FORM

PROJECT IDENTIFICATION: Ohio River Pump Station No. 1 Standby Generators

THIS BID IS SUBMITTED TO:

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

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 Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding 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 days after the Bid opening, or for such longer period of time to which Bidder may agree in writing upon request of Owner. Bidder understands that certain extensions to the time for acceptance by this Bid may require the consent of the surety for the Bid Bond.
  
3. In submitting this Bid, Bidder represents and covenants, as set forth in the Agreement, that:
  - a. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of all of which is hereby acknowledged:  
  
No. \_\_\_\_\_ Dated \_\_\_\_\_  
  
No. \_\_\_\_\_ Dated \_\_\_\_\_  
  
No. \_\_\_\_\_ Dated \_\_\_\_\_
  
  - b. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
  
  - c. Bidder is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
  
  - d. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary explorations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder,

including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

- e. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
  - f. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
  - g. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.
  - h. Bidder has given Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Owner is acceptable to Bidder.
  - i. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
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. Combined Base Bid: In compliance with the Advertisement for Bids, Bidder hereby proposes to furnish all equipment, materials and labor for the work required for the Ohio River Pump Station No. 1 Standby Generators in strict accordance with the Contract Documents, within the time set forth herein, and at the following prices:
- a. For all work other than the items listed for unit price, the lump sum of:

\_\_\_\_\_

\_\_\_\_\_ (in words) Dollars \$ \_\_\_\_\_ (in numbers).

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

b. For the listed unit price item, a unit price of:

Item Description	Unit	Estimated Quantity	Bid Unit Price	Bid Price
30-inch Diameter Reinforced Concrete Caissons in Soil (Specification Section 02370)	L.F.	940	\$	\$
30-inch Diameter Reinforced Concrete Caissons in Rock (Specification Section 02370)	L.F.	110	\$	\$
36-inch Diameter Reinforced Concrete Caissons in Soil (Specification Section 02370)	L.F.	265	\$	\$
36-inch Diameter Reinforced Concrete Caissons in Rock (Specification Section 02370)	L.F.	30	\$	\$

Amount for unit prices shall be shown in both words and numbers. In case of discrepancy, the amount shown as the Bid Unit Price, in words, will govern. Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions. Bidder acknowledges that estimated quantities of all items (other than those listed as Lump Sum) 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, determined as provided in the Contract Documents.

c. Combined Bid Total of a. and b.

\_\_\_\_\_ (in words) Dollars \$ \_\_\_\_\_ (in numbers).

The prices shall include all labor, materials, overhead, profit, insurance, and other costs necessary to cover the finished work of the several kinds called for.

6. Bidder agrees that the Work will be substantially complete within two hundred seventy (270) 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 three hundred (300) calendar days after the date when the Contract Times commence to run.

7. Alternatives:

Alternative No. 1

Delete the paralleling switchgear and upsize each generator as described in Specification Section 01030 and as shown on the Drawings. Provide all labor and material necessary to complete the work.

Add the following amount to the Base Bid:

Lump Sum Bid of \$ \_\_\_\_\_ in numbers and \_\_\_\_\_  
 \_\_\_\_\_ in words.

Or, deduct the following amount from the Base Bid:

Lump Sum Bid of \$ \_\_\_\_\_ in numbers and \_\_\_\_\_  
\_\_\_\_\_ in words.

Additive Alternative No. 2

Upsize each generator as described in Specification Section 01030. Provide all labor and material necessary to complete the work. Add the following amount to the Base Bid:

Lump Sum Bid of \$ \_\_\_\_\_ in numbers and \_\_\_\_\_  
\_\_\_\_\_ in words.

Deductive Alternative No. 3

Delete one (1) automatic transfer switch as described in Specification Section 01030 and as shown on the Drawings. Provide all labor and material necessary to complete the work. Deduct the following amount from the Base Bid:

Lump Sum of \$ \_\_\_\_\_ in numbers and \_\_\_\_\_  
\_\_\_\_\_ in words.

8. References

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

SUBMITTED on \_\_\_\_\_, 200\_\_.

**SIGNATURE OF BIDDER**

**If an Individual**

Name (typed or printed): \_\_\_\_\_

By \_\_\_\_\_ (SEAL)  
*(Individual's signature)*

doing business as \_\_\_\_\_

Business address \_\_\_\_\_

Phone No.: \_\_\_\_\_ Fax No.: \_\_\_\_\_

**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.: \_\_\_\_\_

**If a Corporation**

Corporation Name: \_\_\_\_\_ (SEAL)

State of Incorporation: \_\_\_\_\_

Type (General, Professional, Service, Limited Liability): \_\_\_\_\_

By \_\_\_\_\_  
*(Signature - attach evidence of authority to sign)*

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_

(CORPORATE SEAL)

Attest \_\_\_\_\_

Business address \_\_\_\_\_

\_\_\_\_\_

Phone No. \_\_\_\_\_ Fax No.: \_\_\_\_\_

**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.: \_\_\_\_\_

Joint Venturer Name: \_\_\_\_\_ (SEAL)

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

Name (typed or printed): \_\_\_\_\_

Title: \_\_\_\_\_

Business address: \_\_\_\_\_

\_\_\_\_\_

Phone No.: \_\_\_\_\_ Fax No.: \_\_\_\_\_

End of Section

**BID BOND**

**BIDDER** (Name and Address):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**SURETY** (Name and Address of Principal Place of Business):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**OWNER** (Name and Address):

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

**BID**

BID DUE DATE: \_\_\_\_\_  
PROJECT (Brief Description Including Location):  
In order to maintain a maximum of two (2) raw water pumps during a power outage from Cinergy, it is necessary that standby generators be provided for on-site emergency power, along with automatic transfer switches and switchgear, at the Ohio River Pump Station No. 1.

**BOND**

BOND NUMBER: \_\_\_\_\_  
DATE (Not later than Bid due date): \_\_\_\_\_  
PENAL SUM: \_\_\_\_\_ (Words) \_\_\_\_\_ (Figures)

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

BIDDER

SURETY

\_\_\_\_\_  
(Seal)  
Bidder's Name and Corporate Seal

\_\_\_\_\_  
(Seal)  
Surety's Name and Corporate Seal

By: \_\_\_\_\_  
Signature and Title

By: \_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

Attest: \_\_\_\_\_  
Signature and Title

Attest: \_\_\_\_\_  
Signature and Title

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

## PENAL SUM FORM

1. Bidder and Surety jointly and severally bind themselves their heirs, executors, administrator successors, and assigns to pay to OWNER upon default of Bidder the penal sum set forth in the face of this Bond.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents.
3. This obligation shall be null and void if
  - 3.1 OWNER accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents or
  - 3.2 All Bids are rejected by OWNER or
  - 3.3 OWNER fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and if applicable consented to by Surety when required by paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from OWNER which notice will be given with reasonable promptness identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of and any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by OWNER and Bidder, provided that the total time for issuing Notice of Award, including extensions, shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of 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.

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EJCDC NO 1910-28-C (1996 Edition)

## **Owner's Forms**

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Section 00460

NON-COLLUSION AFFIDAVIT

STATE OF: \_\_\_\_\_ )

COUNTY OF: \_\_\_\_\_ ) SS

\_\_\_\_\_, being first duly sworn, deposes

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

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

\_\_\_\_\_  
AFFIANT

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

State and County, this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_.

\_\_\_\_\_  
NOTARY PUBLIC

End of Section

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## **Contract Forms**

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

Section 00500

AGREEMENT

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:

In order to maintain a maximum of two (2) raw water pumps during a power outage, it is necessary that standby generators be provided for on-site emergency power, along with automatic transfer switches and switchgear.

Article 2. ENGINEER.

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

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

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

3.1. Contract Times. The Work will be substantially completed within two hundred seventy (270) 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 of the General Conditions within three hundred (300) 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) \$350.00 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, and except as set forth in paragraph 4.01 of the General Conditions, 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 a total amount of:

\_\_\_\_\_ (\$ \_\_\_\_\_)  
(words) (figures)

#### 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 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 sheets numbered C-1 through C-4, S-1 through S-3, E-1 through E-6 and M-1 through M-2 inclusive, with each sheet bearing the following general title:
  - Northern Kentucky Water District
  - Ohio River Pump Station No. 1 Standby Generators
- 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 twelve (12) months after the issuance of Final Payment for all machinery, piping, materials, equipment and fittings furnished under the Contract Documents and twenty-four (24) months for all roadway pavement work, which shall include all pavement, shoulder and ditch restoration and repairs. The extension to the correction period referenced in paragraph 13.07.C of the General Conditions shall be twelve (12) months for all machinery, piping, materials, equipment and fittings and twenty-four (24) months for 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 within the previous five years. Contractor further represents and warrants that it 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. 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

\_\_\_\_\_

By: \_\_\_\_\_

Address for giving notices

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

CONTRACTOR: \_\_\_\_\_

By: \_\_\_\_\_

(Corporate Seal)

Address for giving notices

\_\_\_\_\_

Joint Venturer

CONTRACTOR: \_\_\_\_\_

By: \_\_\_\_\_

(Corporate Seal)

Address for giving notices

\_\_\_\_\_

\_\_\_\_\_

End of Section

SECTION 00610 - 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): Northern Kentucky Water District, 2835 Crescent Springs Road, P.O. Box 18640, Erlanger, Kentucky 41018

CONTRACT Date: Amount: Description (Name and Location): Ohio River Pump Station No. 1 Standby Generators

BOND Date (Not earlier than Contract Date): Amount: Modifications to this Bond Form: Sub-paragraph 3.3.2 is deleted. Sub-paragraph 4.3 is deleted; the balance of the paragraph remains in effect. Modify Paragraph 6 to delete all references to Sub-paragraph 4.3.

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) SURETY Company: (Corp. Seal)

Signature: Name and Title: 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) SURETY Company: (Corp. Seal)

Signature: Name and Title: Signature: Name and Title:

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 fight of action shall accrue on this Bond to any person or entity other than the OWNER or its heirs, executors, administrators, or successors.

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

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

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

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

12. Definitions.

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

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

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

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

END OF SECTION 00610

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

CONTRACT  
Date:  
Amount:  
Description (Name and Location): Ohio River Pump Station No. 1 Standby Generators

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 SURETY  
Company: (Corp. Seal) Company: (Corp. Seal)

Signature: \_\_\_\_\_ Signature: \_\_\_\_\_  
Name and Title: Name and Title:  
(Attach Power of Attorney)

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

CONTRACTOR AS PRINCIPAL SURETY  
Company: (Corp. Seal) Company: (Corp. Seal)

Signature: \_\_\_\_\_ Signature: \_\_\_\_\_  
Name and Title: Name and Title:

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 address 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 address 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:
  - 4.2.1. 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
  - 4.2.2. 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
  - 4.2.3. Not having been paid with 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.

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 address 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 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 the performance of the Work of the CONTRACTOR and the CONTRACTOR's Subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

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

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

## END OF SECTION 00620

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

CERTIFICATE OF INSURANCE						Issue Date
PRODUCER		THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER THIS CERTIFICATE DOES NOT AMEND EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW				
		COMPANIES AFFORDING COVERAGE				
Code	Sub-Code	COMPANY LETTER A				
INSURED		COMPANY LETTER B				
		COMPANY LETTER C				
		COMPANY LETTER D				
		COMPANY LETTER E				
COVERAGES						
THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS EXCLUSIONS AND CONDITIONS OF SUCH POLICIES						
CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE	POLICY EXPIRATION DATE	ALL LIMITS IN THOUSANDS	
	GENERAL LIABILITY				GENERAL AGGREGATE	\$1 000
	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY	(Completed Operations & Products Liability remains in force for 2 years after final payment)			PRODUCTS-COMP/OPS	\$1 000
	<input checked="" type="checkbox"/> OCCURRENCE				AGGREGATE	\$1 000
	<input checked="" type="checkbox"/> BLANKET CONTRACTUAL				PERSONAL & ADVERTISING INJURY	\$1 000
					EACH OCCURRENCE	\$1 000
	AUTOMOBILE LIABILITY				COMBINED SINGLE LIMIT	\$1 000
	<input checked="" type="checkbox"/> ANY AUTO				EACH OCCURRENCE	
	<input checked="" type="checkbox"/> HIRED AUTOS				Bodily Injury & Property Damage	
	<input checked="" type="checkbox"/> NON OWNED AUTOS					
	EXCESS LIABILITY				EACH OCCURRENCE	\$4 000
	<input checked="" type="checkbox"/> UMBRELLA FORM	(Follows Form of the Primary)			AGGREGATE	\$4 000
	WORKERS COMPENSATION AND EMPLOYERS LIABILITY				STATUTORY	
		(Includes US Longshoremen and Harbor Workers Act and Maritime Coverage Where Applicable and All States Endorsement)			EACH ACCIDENT	\$1 000
					DISEASE POLICY LIMIT	\$1 000
					DISEASE EACH EMPLOYEE	\$1 000
	OTHER				EACH OCCURRENCE	
					AGGREGATE	
DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS						
<p>1 Certificate Holder(s) &amp; their Officers Directors Partners Employees &amp; 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)</p> <p>2 Blanket Coverage for XCU Hazards (General Liability &amp; Excess Liability)</p> <p>3 Waiver of Subrogation Against Certificate Holder(s) Their Officers Directors Partners Employees &amp; Agents (all policies)</p> <p>4 Contractual Coverage covers liability assumed in the Indemnification Clause of the Contract between Certificate Holder and Insured (General Liability &amp; Excess Liability)</p> <p>5 General and Products/Completed Operations aggregates apply for each Certificate Holder contract(s) or amendments (General Liability &amp; Excess Liability)</p> <p>6 Contractual Liability Limitation Endorsement CG2139 or its equivalent is not included in either General or Excess Liability policies</p> <p>7 Severability of Interest or Cross Liability clause or endorsement included (General Liability &amp; Excess Liability)</p>						
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			

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<b>CERTIFICATE OF PROPERTY INSURANCE</b>		ISSUE DATE _____ (mm/dd/yy)	
THIS IS EVIDENCE THAT INSURANCE AS IDENTIFIED BELOW HAS BEEN ISSUED IS IN FORCE AND CONVEYS ALL THE RIGHTS AND PRIVILEGES AFFORDED UNDER THE POLICY			
PRODUCER  Code                      Sub-Code		COMPANY	
INSURED		POLICY NUMBER	
		EFFECTIVE DATE (mm/dd/yy)	EXPIRATION DATE (mm/dd/yy)
<b>PROPERTY INFORMATION</b>			
LOCATION/DESCRIPTION			
<b>COVERAGE INFORMATION</b>			
<b>COVERAGES/PERILS/FORMS</b>		<b>AMOUNT OF INSURANCE</b>	<b>DEDUCTIBLE</b>
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 _	
<b>REMARKS (including Special Conditions)</b>			
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			
<b>CANCELLATION</b>			
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			
<b>CERTIFICATE HOLDERS</b>			
Name and Address		Nature of Interest	
1		X Additional Named Insured	
2			
		SIGNATURE OF AUTHORIZED AGENT OF THE COMPANY	

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## **Conditions of Contract**

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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 Law.

# STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

**ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE**

and



**AMERICAN CONSULTING  
ENGINEERS COUNCIL**

Issued and Published Jointly By



**National Society of  
Professional Engineers**  
*Professional Engineers in Private Practice*



**AMERICAN SOCIETY OF  
CIVIL ENGINEERS**

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*a practice division of the*  
**NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS**

**AMERICAN CONSULTING ENGINEERS' COUNCIL**

**AMERICAN SOCIETY OF CIVIL ENGINEERS**

This document has been approved and endorsed by

The Associated General



Contractors of America

Construction Specifications Institute



These General Conditions have been prepared for use with the Owner Contractor Agreements (No. 1910-8-A 1 or 1910-8 A 2) (1996 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 EJCDC User's Guide (No. 1910 50). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. 1910 17) (1996 Edition).

EJCDC No. 1910 8 (1996 Edition)

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American Consulting Engineers Council  
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American Society of Civil Engineers  
345 East 47th Street New York NY 10017

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## GENERAL CONDITIONS

### ARTICLE 1 DEFINITIONS AND TERMINOLOGY

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#### 1 01 *Defined Terms*

A Wherever used in the Contract Documents and printed with initial or all capital letters the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof

1 *Addenda*--Written or graphic instruments issued prior to the opening of Bids which clarify correct or change the Bidding Requirements or the 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 *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids)

7 *Bidding Requirements*--The Advertisement or Invitation to Bid Instructions to Bidders Bid security form if any and the Bid form with any supplements

8 *Bonds* Performance and payment bonds and other instruments of security

9 *Change Order* A document recommended by ENGINEER which is signed by CONTRACTOR and OWNER and authorizes an addition deletion or revision in the Work or an adjustment in the Contract Price or the

Contract Times issued on or after the Effective Date of the Agreement

10 *Claim* A demand or assertion by OWNER or CONTRACTOR seeking an adjustment of Contract Price or Contract Times or both or other relief with respect to the terms of the Contract A demand for money or services by a third party is not a Claim

11 *Contract* The entire and integrated written agreement between the OWNER and CONTRACTOR concerning the Work The Contract supersedes prior negotiations representations or agreements whether written or oral

12 *Contract Documents* The Contract Documents establish the rights and obligations of the parties and include the Agreement Addenda (which pertain to the Contract Documents) CONTRACTOR s Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement the Notice to Proceed the Bonds these General Conditions the Supplementary Conditions the Specifications and the Drawings as the same are more specifically identified in the Agreement together with all Written Amendments Change Orders Work Change Directives Field Orders and ENGINEER s written interpretations and clarifications issued on or after the Effective Date of the Agreement Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents Only printed or hard copies of the items listed in this paragraph are Contract Documents Files in electronic media format of text data graphics and the like that may be furnished by OWNER to CONTRACTOR 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 Substantial Completion and (ii) 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.A 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 *ENGINEER'S Consultant*--An individual or entity having a contract with ENGINEER to furnish services as ENGINEER'S independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

21 *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.

22 *General Requirements* Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

23 *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 in connection with the Work.

24 *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.

25 *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.

26 *Liens* Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

27 *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.

28 *Notice of Award* The written notice by OWNER to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, OWNER will sign and deliver the Agreement.

29 *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.

30 *OWNER*--The individual entity, public body, or authority with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be performed.

31 *Partial Utilization* Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

32 *PCBs* Polychlorinated biphenyls.

33 *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.

34 *Project* The total construction of which the Work to be performed under the Contract Documents may be the whole or a part as may be indicated elsewhere in the Contract Documents.

35 *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.

36 *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.

37 *Resident Project Representative* The authorized representative of ENGINEER who may be assigned to the Site or any part thereof.

38 *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

39 *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

40 *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

41 *Specifications*--That part of the Contract Documents consisting of written technical descriptions of materials equipment systems standards and workmanship as applied to the Work and certain administrative details applicable thereto

42 *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

43 *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

44 *Supplementary Conditions* That part of the Contract Documents which amends or supplements these General Conditions

45 *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 any Subcontractor

46 *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

47 *Unit Price Work* Work to be paid for on the basis of unit prices

48 *Work*--The entire completed 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

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

50 *Written Amendment*--A written statement modifying the Contract Documents signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly construction related aspects of the Contract Documents

## 102 Terminology

### A Intent of Certain Terms or Adjectives

1 Whenever in the Contract Documents the terms "as allowed" "as approved" or terms of like effect or import are used or 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 action or determination will be solely to evaluate in general the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed 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 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 10 or any other provision of the Contract Documents

**B Day**

1 The word "day" shall constitute a calendar day of 24 hours measured from midnight to the next midnight

**C Defective**

1 The word "defective" when modifying the word "Work" refers to Work that is unsatisfactory faulty or deficient in that it does not conform to the Contract Documents or does not meet the requirements of any inspection reference standard test or approval referred to in the Contract Documents or has been damaged prior to ENGINEER's recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14 04 or 14 05)

**D Furnish Install Perform Provide**

1 The word "furnish" when used in connection with services materials or equipment shall mean to supply and deliver said services materials or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition

2 The word "install" when used in connection with services materials or equipment shall mean to put into use or place in final position said services materials or equipment complete and ready for intended use

3 The words "perform" or "provide" when used in connection with services materials or equipment shall mean to furnish and install said services materials or equipment complete and ready for intended use

4 When "furnish" "install" "perform" or "provide" is not used in connection with services materials or equipment in a context clearly requiring an obligation of CONTRACTOR "provide" is implied

**E** Unless stated otherwise in the Contract Documents words or phrases which 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**

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**2 01 Delivery of Bonds**

**A** When CONTRACTOR delivers the executed Agreements to OWNER CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish

**2 02 Copies of Documents**

**A** OWNER shall furnish to CONTRACTOR up to ten copies of the Contract Documents. Additional copies will be furnished upon request at the cost of reproduction

**2 03 Commencement of Contract Times Notice to Proceed**

**A** The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or if a Notice to Proceed is given on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier

**2 04 Starting the Work**

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

**2 05 Before Starting Construction**

**A** CONTRACTOR's Review of Contract Documents 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 may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby however CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict error ambiguity or discrepancy in the Contract Documents unless CONTRACTOR knew or reasonably should have known thereof

**B** Preliminary Schedules Within ten days after the Effective Date of the Agreement (unless otherwise specified

in the General Requirements) CONTRACTOR shall submit to ENGINEER for its 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 Shop Drawing and Sample submittals which will list each required submittal and the times for submitting reviewing and processing such submittal 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

C *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 06 *Preconstruction Conference*

A Within 20 days after the Contract Times start to run but before any Work at the Site is started a conference attended by 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 B procedures for handling Shop Drawings and other submittals processing Applications for Payment and maintaining required records

#### 2 07 *Initial Acceptance of Schedules*

A Unless otherwise provided in the Contract Documents at least ten days before submission of the first Application for Payment a conference attended by CONTRACTOR ENGINEER and others as appropriate will be held to review for acceptability to ENGINEER as provided below the schedules submitted in accordance with paragraph 2 05 B CONTRACTOR shall have an additional ten 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 any specified Milestones and the Contract Times Such acceptance will not impose on ENGINEER responsibility for the progress schedule for sequencing scheduling or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR s full responsibility therefor

2 CONTRACTOR s schedule of Shop Drawing and Sample 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

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#### 3 01 *Intent*

A The Contract Documents are complementary what is called for by one is as binding as if called for 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 may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended 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)

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 in respect of 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 within the time and 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 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 OWNER ENGINEER and ENGINEER's Consultants 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

#### 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 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 of 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 of any of any such adjustment in Contract Price or Contract Times OWNER or CONTRACTOR may make a Claim therefor as provided in paragraph 10 05

#### 4 05 *Reference Points*

A OWNER shall provide engineering surveys to establish reference points for construction which in ENGINEER's judgment are necessary to enable CONTRACTOR to proceed with the Work CONTRACTOR shall be responsible for laying out the Work shall protect and preserve the established reference points and property

monuments and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

#### 4.06 Hazardous Environmental Condition at Site

**A Reports and Drawings** Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site if any that have been utilized by the ENGINEER in the preparation of the Contract Documents.

**B Limited Reliance by CONTRACTOR on Technical Data Authorized** CONTRACTOR may rely upon the general 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, ENGINEER or any of ENGINEER's Consultants 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) 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.

**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 to CONTRACTOR written notice (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 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 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, ENGINEER, ENGINEER's Consultants and the officers, directors, partners, employees, agents, other 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 (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 E 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 ENGINEER ENGINEER'S Consultants and the officers directors partners employees agents other 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 F 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 07 4 03 and 4 04 are not intended to apply to a Hazardous Environmental Condition uncovered or revealed at the Site

## ARTICLE 5 BONDS AND INSURANCE

### 5 01 Performance Payment and Other Bonds

A CONTRACTOR shall furnish performance and payment Bonds each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR'S obligations under the Contract Documents These Bonds shall remain in effect at least until one year after the date when final payment becomes due 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 current 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 must be accompanied by a certified copy of such agent's authority to act

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 within 20 days thereafter substitute 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 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 OWNER shall deliver to CONTRACTOR with copies to each additional insured 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

### 5 04 CONTRACTOR'S Liability Insurance

A CONTRACTOR shall purchase and maintain such liability and other 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 (i) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR or (ii) 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 so required by this paragraph 5 04 to be purchased and maintained shall

1 with respect to insurance required by paragraphs 5 04 A 3 through 5 04 A 6 inclusive include as additional insureds (subject to any customary exclusion in respect of professional liability) OWNER ENGINEER ENGINEER s Consultants 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 partners employees agents and other 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 completed operations insurance

4 include contractual liability insurance covering CONTRACTOR s indemnity obligations under paragraphs 6 07 6 11 and 6 20

5 contain a provision or endorsement that the coverage afforded will not be canceled materially changed or renewal refused until at least thirty 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)

6 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

7 with respect to completed operations insurance and any insurance coverage written on a claims made basis remain in effect for at least two years after final payment (and 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 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 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 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 additional insured to whom a certificate of insurance has been issued

B OWNER shall purchase and maintain such boiler and machinery 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 ENGINEER ENGINEER s Consultants and any other individuals or entities identified in the Supplementary Conditions each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured

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 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 additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 5 07

D OWNER shall not be responsible for purchasing and maintaining any property insurance specified in this paragraph 5 06 to protect the interests of CONTRACTOR Subcontractors or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions The risk of loss within such identified deductible amount will be borne by CONTRACTOR Subcontractors or others suffering any such loss and if any of them wishes property insurance coverage within the limits of such amounts each may purchase and maintain it at the purchaser s own expense

E If CONTRACTOR requests in writing that other special insurance be included in the property insurance policies provided under paragraph 5 06 OWNER shall if possible include such insurance and the cost thereof will be charged to CONTRACTOR by appropriate Change Order or Written Amendment 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 ENGINEER ENGINEER s Consultants and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers directors partners employees agents and other 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 additional insureds thereunder OWNER and CONTRACTOR waive all rights against each other and their respective officers directors partners employees agents and other 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 ENGINEER ENGINEER s Consultants and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers directors partners employees agents and other 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 ENGINEER ENGINEER s Consultants and the officers directors partners employees agents and other 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 peril 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 ENGINEER or ENGINEER s Consultants and the officers directors partners employees agents and other consultants and subcontractors of each and any of them

#### 5 08 Receipt and Application of Insurance Proceeds

A Any insured loss under the policies of insurance required by paragraph 5 06 will be adjusted with OWNER and made payable to OWNER as fiduciary for the insureds 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 or Written Amendment

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 05 C OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request If either party does not purchase or maintain all of the Bonds and insurance required

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

#### 5 10 Partial Utilization Acknowledgment of Property Insurer

A If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in paragraph 14 05 no such use or occupancy shall commence before the insurers providing the property insurance pursuant to paragraph 5 06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby The insurers providing the property insurance shall consent by endorsement on the policy or policies but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy

### ARTICLE 6 CONTRACTOR S RESPONSIBILITIES

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#### 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 but 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 CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents

B At all times during the progress of the Work CONTRACTOR shall assign a competent resident superintendent thereto who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances The superintendent will be CONTRACTOR s representative at the Site and shall have authority to act on behalf of CONTRACTOR All communications given to or received from the superintendent shall be binding on CONTRACTOR

## 6 02 Labor Working Hours

A CONTRACTOR shall provide competent suitably qualified personnel to survey lay out and construct the Work 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 and CONTRACTOR will not permit overtime work or the performance of Work on 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 General Requirements 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 warranties and guarantees specifically called for 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. All materials and equipment shall be stored applied installed connected erected protected used cleaned and conditioned in accordance with instructions of the applicable Supplier except as otherwise may be provided in the Contract Documents.

## 6 04 Progress Schedule

A CONTRACTOR shall adhere to the progress schedule established in accordance with paragraph 2 07 as it may be adjusted from time to time as provided below.

1 CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2 07) proposed adjustments in the progress schedule that will not result in changing the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with

any provisions of the General Requirements applicable thereto.

2 Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of Article 12. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

## 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 (i) it is at least equal in quality durability appearance strength and design characteristics (ii) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole and

b CONTRACTOR certifies that (i) there is no increase in cost to the OWNER and (ii) it will conform substantially even with deviations to the detailed requirements of the item named in the Contract Documents.

### 2 Substitute Items

a If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "or-equal" item under

paragraph 6 05 A 1 it will be considered a proposed substitute item

b CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that 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 procedure for review by ENGINEER will be as set forth in paragraph 6 05 A 2 d as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances

d CONTRACTOR shall first 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 shall certify that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design be similar in substance to that specified and be suited to the same use as that specified The application will state the extent if any to which the use of the proposed substitute item will prejudice CONTRACTOR s achievement of Substantial Completion on time whether or not 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 work on the Project) to adapt the design to the proposed substitute item and whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty All variations of the proposed substitute item from that specified will be identified in the application and available engineering sales maintenance repair and replacement services will be indicated The application will also 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 all of which will be considered by ENGINEER in evaluating the proposed substitute item ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute item

B *Substitute Construction Methods or Procedures* If a specific means method technique sequence or procedure of construction is shown or indicated in and 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 procedure for review by ENGINEER will be similar to that provided in subparagraph 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 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 either a Change Order for a substitute or 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 time required by ENGINEER and ENGINEER s Consultants in evaluating substitute proposed or submitted by CONTRACTOR pursuant to paragraphs 6 05 A 2 and 6 05 B and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby Whether or not ENGINEER approves a substitute item so proposed or submitted by CONTRACTOR CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER s Consultants for evaluating each such 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 or Written Amendment signed. No acceptance by OWNER of any such Subcontractor Supplier or other individual or entity whether initially or as a replacement shall constitute a waiver of any right of OWNER or ENGINEER to reject defective Work.

C CONTRACTOR shall be fully responsible to OWNER and ENGINEER for all acts and omissions of the Subcontractors Suppliers and other individuals or entities performing or furnishing any of the Work just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents 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 shall it create any obligation on the part of OWNER or ENGINEER to pay or to see to the payment of any moneys due any such Subcontractor Supplier or other 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 an additional insured 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 ENGINEER's Consultants and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers directors partners employees agents and other consultants and subcontractors of each and any of them) for all losses and damages caused by arising out of relating to or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier CONTRACTOR will obtain the same.

#### 6.07 Patent Fees and Royalties

A CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention design process product or device which is the subject of patent rights or copyrights held by others. If a particular invention design process product or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of OWNER or ENGINEER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others the existence of such rights shall be disclosed by OWNER in the Contract Documents. To the fullest extent permitted by Laws and Regulations CONTRACTOR shall indemnify and hold harmless OWNER ENGINEER ENGINEER's Consultants and the officers directors partners employees or agents and other consultants 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 CONTRACTOR shall pay all charges of utility owners for connections to the Work and OWNER shall pay all charges of such utility owners for capital costs related thereto such as plant investment fees

#### 6 09 *Laws and Regulations*

A CONTRACTOR shall give all notices and 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 primary 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 may be the subject of an adjustment in Contract Price or Contract Times If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent if any of any such adjustment a Claim may be made therefor as provided in paragraph 10 05

#### 6 10 *Taxes*

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

#### 6 11 *Use of Site and Other Areas*

##### A *Limitation on Use of Site and Other Areas*

1 CONTRACTOR shall confine construction equipment the storage of materials and equipment and the operations of workers to the Site and other areas permitted by Laws and Regulations and shall not

unreasonably encumber the Site and other areas with construction equipment or other materials or equipment CONTRACTOR shall assume full responsibility for any damage to any such land or area or to the owner or occupant thereof or of any adjacent land or areas resulting from the performance of the Work

2 Should any claim be made by any such owner or occupant because of the performance of the Work CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law

3 To the fullest extent permitted by Laws and Regulations CONTRACTOR shall indemnify and hold harmless OWNER ENGINEER ENGINEER s Consultant and the officers directors partners employees agents and other consultants 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 make it ready for utilization by OWNER At the completion of the Work CONTRACTOR shall remove from the Site all tools appliances construction equipment and machinery and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents

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

#### 6 12 *Record Documents*

A CONTRACTOR shall maintain in a safe place at the Site one record copy of all Drawings Specifications Addenda Written Amendments 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. 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. 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 ENGINEER's Consultant or anyone employed by any of them or anyone for whose acts any of them may be liable and not attributable directly or indirectly in whole or in part to the fault or negligence of CONTRACTOR or any Subcontractor Supplier or other individual or entity directly or indirectly employed by any of them). 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 to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. All submittals will be identified as ENGINEER may require and in the number of copies specified in the General Requirements. The data shown on the Shop Drawings will be complete with respect to quantities dimensions specified performance and design criteria materials and similar data to 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 E.

B CONTRACTOR shall also submit Samples to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample

submittals Each Sample will be identified clearly as to material Supplier pertinent data such as catalog numbers and the use for which intended and otherwise as ENGINEER may require to enable ENGINEER to review the submittal for the limited purposes required by paragraph 6 17 E The numbers of each Sample to be submitted will be as specified in the Specifications

C Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER as required by paragraph 2 07 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

#### D Submittal Procedures

1 Before submitting each Shop Drawing or Sample CONTRACTOR shall have determined and verified

a all field measurements quantities dimensions specified performance criteria installation requirements materials catalog numbers and similar information with respect thereto

b all materials with respect to intended use fabrication shipping handling storage assembly and installation pertaining to the performance of the Work

c all information relative to means methods techniques sequences and procedures of construction and safety precautions and programs incident thereto and

d CONTRACTOR shall also have 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

2 Each submittal shall bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR s obligations under the Contract Documents with respect to CONTRACTOR s review and approval of that submittal

3 At the time of each submittal CONTRACTOR shall give ENGINEER specific written notice of such variations if any that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents such notice to be in a written communication separate from the submittal and in addition shall cause a specific notation to be made on each Shop

Drawing and Sample submitted to ENGINEER for review and approval of each such variation

#### E ENGINEER s Review

1 ENGINEER will timely review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER ENGINEER s review and approval will be only to determine if the items covered by the submittals will after installation or incorporation in the Work conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents

2 ENGINEER s review and approval will not extend to means methods techniques sequences or procedures of construction (except where a particular means method technique sequence or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions

3 ENGINEER s review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called ENGINEER s attention to each such variation at the time of each submittal as required by paragraph 6 17 D 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 approval nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of paragraph 6 17 D 1

#### F 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 ENGINEER and ENGINEER , Consultants that all Work will be in accordance with the Contract Documents and will not be defective 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 Sub contractors Suppliers or any other individual or entity for whom CONTRACTOR is responsible or

2 normal wear and tear under normal usage

B CONTRACTOR s obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of CONTRACTOR s obligation to perform the Work in accordance with the Contract Documents

1 observations by ENGINEER

2 recommendation by ENGINEER or payment by OWNER of any progress or final payment

3 the issuance of a certificate of Substantial Completion by ENGINEER or any payment related thereto by OWNER

4 use or occupancy of the Work or any part thereof by OWNER

5 any acceptance by OWNER or any failure to do so

6 any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by ENGINEER

7 any inspection test or approval by others or

8 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 ENGINEER ENGINEER s Consultants and the officers directors partners employees agents and other 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

1 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 and

2 is caused in whole or in part 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 regardless of whether or not caused in part by any negligence or omission of an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such individual or entity

B In any and all claims against OWNER or ENGINEER or any of their respective consultants agents officers directors partners or employees 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 Consultants or to the officers directors partners employees agents and other consultants and subcontractors of each and any of them 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

## ARTICLE 7 OTHER WORK

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### 7 01 *Related Work at Site*

A OWNER may perform other work related to the Project at the Site by OWNER s employees or let 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 and each utility owner (and OWNER if OWNER is performing the other work with OWNER s employees) proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly coordinate the Work with theirs Unless otherwise provided in the Contract Documents 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 their work and will only cut or alter their work with the written consent of ENGINEER and the others whose work will be affected The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors

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

## ARTICLE 8 OWNER S RESPONSIBILITIES

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### 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 Promptly When Due*

A OWNER shall make payments to CONTRACTOR promptly 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 in respect of 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 in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by ENGINEER in preparing the Contract Documents

8 06 *Insurance*

A OWNER s responsibilities if any in 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 in respect to certain inspections tests and approvals is set forth in paragraph 13 03 B

8 09 *Limitations on OWNER s Responsibilities*

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

8 10 *Undisclosed Hazardous Environmental Condition*

A OWNER s responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in paragraph 4 06

8 11 *Evidence of Financial Arrangements*

A If and to the extent OWNER has agreed to furnish CONTRACTOR reasonable evidence that financial arrangements have been made to satisfy OWNER s obligations under the Contract Documents OWNER s responsibility in respect thereof will be as set forth in the Supplementary Conditions

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 and will not be changed without written consent of OWNER and ENGINEER

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 10 and particularly but without limitation during or as a result of ENGINEER s visits or observations of CONTRACTOR s Work ENGINEER will not supervise direct control or have authority over or be responsible for CONTRACTOR s means methods techniques sequences or procedures of construction or the safety precautions and programs incident thereto or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work

9 03 *Project Representative*

A If OWNER and ENGINEER agree ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more extensive observation of the Work The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9 10 and in the Supplementary Conditions 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 Clarifications and Interpretations

A ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents as ENGINEER may determine necessary which shall be consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent of any adjustment in the Contract Price or Contract Times or both that should be allowed as a result of a written clarification or interpretation a Claim may be made therefor as provided in paragraph 10 05

#### 9 05 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 and CONTRACTOR are unable to agree on entitlement to or on the amount or extent of any adjustment in the Contract Price or Contract Times or both as a result of a Field Order a Claim may be made therefor as provided in paragraph 10 05

#### 9 06 Rejecting Defective Work

A ENGINEER will have authority to disapprove or 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 07 Shop Drawings Change Orders and Payments

A In connection with ENGINEER's authority as to Shop Drawings and Samples see paragraph 6 17

B In connection with ENGINEER's authority as to Change Orders see Articles 10 11 and 12

C In connection with ENGINEER's authority as to Applications for Payment see Article 14

#### 9 08 Determinations for Unit Price Work

A ENGINEER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. ENGINEER will review with CONTRACTOR the ENGINEER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). ENGINEER's written decision thereon will be final and binding (except as modified by ENGINEER to reflect changed factual conditions or more accurate data) upon OWNER and CONTRACTOR subject to the provisions of paragraph 10 05

#### 9 09 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. Claims disputes and other matters relating to the acceptability of the Work the quantities and classifications of Unit Price Work the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work and Claims seeking changes in the Contract Price or Contract Times will be referred initially to ENGINEER in writing in accordance with the provisions of paragraph 10 05 with a request for a formal decision

B When functioning as interpreter and judge under this paragraph 9 09 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. The rendering of a decision by ENGINEER pursuant to this paragraph 9 09 with respect to any such Claim dispute or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14 07) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such Claim dispute or other matter

#### 9 10 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 contents complies with the requirements of and in the case of certificates of inspections tests and approvals that the results certified indicate compliance with the Contract Documents

E The limitations upon authority and responsibility set forth in this paragraph 9 10 shall also apply to ENGINEER s Consultants Resident Project Representative and assistants

## ARTICLE 10 CHANGES IN THE WORK CLAIMS

### 10 01 *Authorized Changes in the Work*

A Without invalidating the Agreement and without notice to any surety OWNER may at any time or from time to time order additions deletions or revisions in the Work by a Written Amendment 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 B

### 10 03 *Execution of Change Orders*

A OWNER and CONTRACTOR shall execute appropriate Change Orders recommended by ENGINEER (or Written Amendments) covering

1 changes in the Work which are (i) ordered by OWNER pursuant to paragraph 10 01 A (ii) required because of acceptance of defective Work under paragraph 13 08 A or OWNER s correction of defective Work under paragraph 13 09 or (iii) agreed to by the parties

2 changes in the Contract Price or Contract Times which are agreed to by the parties including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive and

3 changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 10 05 provided that in lieu of executing any such Change Order an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations but during any such appeal CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 6 18 A

### 10 04 *Notification to Surety*

A If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including but not limited to Contract Price or Contract Times) is required by the provisions of any Bond to be given to a surety the giving of any such notice will be CONTRACTOR s responsibility The amount of each applicable Bond will be adjusted to reflect the effect of any such change

A *Notice* Written notice stating the general nature of each Claim dispute or other matter 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. Notice of the amount or extent of the Claim dispute or other matter 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 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 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).

B *ENGINEER's Decision* ENGINEER will render a formal decision in writing within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party if any. ENGINEER's written decision on such Claim dispute or other matter will be final and binding upon OWNER and CONTRACTOR unless

1 an appeal from ENGINEER's decision is taken within the time limits and in accordance with the dispute resolution procedures set forth in Article 16 or

2 if no such dispute resolution procedures have been set forth in Article 16 a written notice of intention to appeal from ENGINEER's written decision is delivered by OWNER or CONTRACTOR to the other and to ENGINEER within 30 days after the date of such decision and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction within 60 days after the date of such decision or within 60 days after Substantial Completion whichever is later (unless otherwise agreed in writing by OWNER and CONTRACTOR) to exercise such rights or remedies as the appealing party may have with respect to such Claim dispute or other matter in accordance with applicable Laws and Regulations.

C If ENGINEER 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 the claimant or the last submittal of the opposing party if any.

D No Claim for an adjustment in Contract Price or Contract Times (or Milestones) will be valid if not submitted in accordance with this paragraph 10 05.

## ARTICLE 11 COST OF THE WORK CASH ALLOWANCES UNIT PRICE WORK

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### 11 01 *Cost of the Work*

A *Costs Included* The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. 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 include only the following items and shall not include any of the costs itemized in paragraph 11 01 B.

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 at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include but not be limited to salaries and wages plus the cost of fringe benefits which shall include social security contributions unemployment excise and payroll taxes workers compensation health and retirement benefits bonuses sick leave vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours on Saturday Sunday or legal holidays shall be included in the above to the extent authorized by OWNER.

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

3 Payments made by CONTRACTOR to Subcontractors for Work performed by Subcontractors. If required by OWNER CONTRACTOR shall obtain competitive bids from subcontractors acceptable to OWNER and CONTRACTOR and shall deliver such bids to OWNER who will then determine with the advice of ENGINEER which bids if any will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee the Subcontractor's Cost of the Work and fee shall be determined in the same manner as CONTRACTOR's Cost of the Work and fee as provided in this paragraph 11 01.

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

5 Supplemental costs including the following

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

b Cost including transportation and maintenance of all materials surplus 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 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 expressage and similar petty cash items in connection with the Work.

i When the Cost of the Work is used to determine the value of a Change Order or of a Claim the cost of premiums for additional Bonds and insurance required because of the changes in the Work or caused by the event giving rise to the Claim.

j When all the Work is performed on the basis of cost plus the costs of premiums for all Bonds and insurance CONTRACTOR is required by the Contract Documents to purchase and maintain.

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

1 Payroll costs and other compensation of CONTRACTOR's officers executives principals (of partnerships and sole proprietorships) general managers engineers architects estimators attorneys auditors accountants purchasing and contracting agents expeditors timekeepers clerks and other personnel employed by CONTRACTOR whether at the Site or in CONTRACTOR's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11 01 A 1 or specifically covered by paragraph 11 01 A 4 all of which are to be

considered administrative costs covered by the CONTRACTOR's fee

2 Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the Site

3 Any part of CONTRACTOR's capital expenses including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent payments

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

5 Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraphs 11 01 A and 11 01 B

**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 Cash 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 as may be acceptable to OWNER and ENGINEER CONTRACTOR agrees that

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

2 CONTRACTOR's costs for unloading and handling on the Site labor installation costs overhead profit and other expenses contemplated for the allow

ances have been included in the Contract Price and not in the allowances and no demand for additional payment on account of any of the foregoing will be valid

B 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 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 08

B 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

C 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 any other item of Work and

3 if 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 or by a Written Amendment. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the ENGINEER and the other party to the Contract in accordance with the provisions of paragraph 10 05.

B The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1 where the Work involved is covered by unit prices contained in the Contract Documents by application of such unit prices to the quantities of the items involved (subject to the provisions of paragraph 11 03) or

2 where the Work involved is not covered by unit prices contained in the Contract Documents by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 12 01 C 2) or

3 where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under paragraph 12 01 B 2 on the basis of the Cost of the Work (determined as provided in paragraph 11 01) plus a CONTRACTOR'S fee for overhead and profit (determined as provided in paragraph 12 01 C).

C *CONTRACTOR'S Fee* The CONTRACTOR'S fee for overhead and profit shall be determined as follows:

1 a mutually acceptable fixed fee or

2 if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a for costs incurred under paragraphs 11 01 A 1 and 11 01 A 2 the CONTRACTOR'S fee shall be 15 percent

b for costs incurred under paragraph 11 01 A 3 the CONTRACTOR'S fee shall be five percent

c where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no

fixed fee is agreed upon the intent of paragraph 12 01 C 2 a is that the Subcontractor who actually performs the Work at whatever tier will be paid a fee of 15 percent of the costs incurred by such Subcontractor under paragraphs 11 01 A 1 and 11 01 A 2 and that any higher tier Subcontractor and CONTRACTOR will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor.

d no fee shall be payable on the basis of costs itemized under paragraphs 11 01 A 4, 11 01 A 5 and 11 01 B.

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

f when both additions and credits are involved in any one change the adjustment in CONTRACTOR'S fee shall be computed on the basis of the net change in accordance with paragraphs 12 01 C 2 a through 12 01 C 2 e inclusive.

12 02 *Change of Contract Times*

A The Contract Times (or Milestones) may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Times (or Milestones) 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 (or Milestones) covered by a Change Order or of any Claim for an adjustment in the Contract Times (or Milestones) will be determined in accordance with the provisions of this Article 12.

12 03 *Delays Beyond CONTRACTOR'S Control*

A Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR the Contract Times (or Milestones) 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

12 04 *Delays Within CONTRACTOR s Control*

A The Contract Times (or Milestones) will not be extended due to 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

12 05 *Delays Beyond OWNER s and CONTRACTOR s Control*

A Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR s sole and exclusive remedy for such delay

12 06 *Delay Damages*

A In no event shall OWNER or ENGINEER 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 arising out of or resulting from

1 delays caused by or within the control of CONTRACTOR or

2 delays beyond the control of both OWNER and CONTRACTOR including but not limited to fires floods epidemics abnormal weather conditions acts of God or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7

B Nothing in this paragraph 12 06 bars a change in Contract Price pursuant to this Article 12 to compensate CONTRACTOR due to delay interference or disruption directly attributable to actions or inactions of OWNER or anyone for whom OWNER is responsible

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 All defective Work may be rejected corrected or accepted as provided in this Article 13

13 02 *Access to Work*

A OWNER ENGINEER ENGINEER s Consultants 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 inspecting and testing CONTRACTOR shall provide them proper and safe conditions for such access and advise them of CONTRACTOR s Site 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 said paragraph 13 04 B and

3 as otherwise specifically provided in the Contract Documents

C If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected tested or approved by an employee or other representative of such public body CONTRACTOR shall assume full responsibility for arranging and obtaining such inspections tests or approvals pay all costs in connection therewith and furnish ENGINEER the required certificates of inspection or approval

D CONTRACTOR shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections tests or approvals required for OWNER s and ENGINEER s acceptance of materials or equipment to be incorporated in the Work or acceptance of materials mix designs or equipment submitted for approval prior to CONTRACTOR s purchase thereof for incorporation in the Work Such inspections tests or approvals shall be performed by organizations acceptable to OWNER and ENGINEER

E If any Work (or the work of others) that is to be inspected tested or approved is covered by CONTRACTOR without written concurrence of ENGINEER it must if requested by ENGINEER be uncovered 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 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 the parties are unable to agree as to the amount thereof OWNER may make a Claim therefor as provided in paragraph 10 05 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

#### 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 CONTRACTOR shall correct all defective Work whether or not fabricated installed or completed or if the Work has been rejected by ENGINEER remove it from the Project and replace it with Work that is not defective CONTRACTOR shall pay all Claims costs losses and damages (including but not limited to all fees and charges of engineers architects attorneys and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others)

#### 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 Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents any Work is found to be defective 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 (i) repair such defective land or areas or (ii) correct such defective Work or if the defective Work has been rejected by OWNER remove it from the Project and replace it with Work that is not defective and (iii) 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 If CONTRACTOR does not promptly comply with the terms of such instructions or in an emergency where delay would cause serious risk of loss or damage OWNER may have the defective Work corrected or repaired or may have the rejected Work removed and replaced and 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

B 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 or by Written Amendment

C 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

D CONTRACTOR s obligations under this paragraph 13 07 are in addition to any other obligation or warranty The provisions of this paragraph 13 07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose

#### 13 08 *Acceptance of Defective Work*

A If instead of requiring correction or removal and replacement of defective Work OWNER (and prior to ENGINEER s recommendation of final payment ENGINEER) prefers to accept it OWNER may do so CONTRACTOR shall pay all Claims costs losses and damages (including but not limited to all fees and charges of engineers architects attorneys and other professionals and all court or arbitration or other dispute resolution costs) attributable to OWNER s evaluation of and determination to accept such defective Work (such costs to be approved by ENGINEER as to reasonableness) and 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 and remedy any such deficiency

B In exercising the rights and remedies under this paragraph OWNER shall proceed expeditiously In

connection with such corrective and remedial action OWNER may exclude CONTRACTOR from all or part of the Site take possession of all or part of the Work and suspend CONTRACTOR s services related thereto take possession of CONTRACTOR s tools appliances construction equipment and machinery at the Site and incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere CONTRACTOR shall allow OWNER OWNER s representatives agents and employees OWNER s other contractors and ENGINEER and ENGINEER s Consultants access to the Site to enable OWNER to exercise the rights and remedies under this paragraph

C All Claims costs losses and damages (including but not limited to all fees and charges of engineers architects attorneys and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by OWNER in exercising the rights and remedies under this paragraph 13 09 will be charged against CONTRACTOR and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and OWNER shall be entitled to an appropriate decrease in the Contract Price If the parties are unable to agree as to the amount of the adjustment OWNER may make a Claim therefor as provided in paragraph 10 05 Such claims costs losses and damages will include but not be limited to all costs of repair or replacement of work of others destroyed or damaged by correction removal or replacement of CONTRACTOR s defective Work

D CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones) 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 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 on the Site of the executed Work as an experienced and qualified design professional and on ENGINEER's review of the Application for Payment and the accompanying data and schedules that to the best of ENGINEER's knowledge information and belief

a the Work has progressed to the point indicated

b the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion 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 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 (i) 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 (ii) 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 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 to supervise direct or control the Work or for the means methods techniques sequences or procedures of construction or the safety precautions and programs incident thereto or for CONTRACTOR's failure to comply with Laws and Regulations applicable to CONTRACTOR's performance of the Work. Additionally said review or recommendation will not impose responsibility on ENGINEER to make any examination to ascertain how or for what purposes CONTRACTOR has used the moneys paid on account of the Contract Price or 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 referred to in paragraph 14 02 B 2. ENGINEER may also refuse to recommend any such payment or because of subsequently discovered evidence or the results of subsequent inspections or tests.

revise or revoke any such payment recommendation previously made to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because

a the Work is defective or completed Work has been damaged requiring correction or replacement

b the Contract Price has been reduced by 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 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 must 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 corrects to OWNER's satisfaction the reasons for such action

3 If it is subsequently determined 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

### 14 03 *CONTRACTOR's Warranty of Title*

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

### 14 04 *Substantial Completion*

A When CONTRACTOR considers the entire Work ready for its intended use CONTRACTOR shall notify OWNER and ENGINEER in writing that the entire Work is substantially complete (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion Promptly thereafter 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 If ENGINEER considers the Work substantially complete ENGINEER will prepare and 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 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 responsibility

ties 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

B OWNER shall have the right to exclude CONTRACTOR from the Site after the date of Substantial Completion but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list

#### 14 05 Partial Utilization

A Use by OWNER at OWNER's option of 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 may be accomplished prior to Substantial Completion of all the Work subject to the following conditions

1 OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete If CONTRACTOR agrees that such part of the Work is substantially complete CONTRACTOR will certify to OWNER and ENGINEER that such part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work 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 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

2 No 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 (i) all documentation called for in the Contract Documents including but not limited to the evidence of insurance required by subparagraph 5 04 B 7 (ii) consent of the surety if any to final payment and (iii) 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 or OWNER's property might in any way be responsible 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 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 will become due and when due 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 and recommendation of ENGINEER and without terminating the Agreement make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not fully completed or corrected is less than the retainage stipulated in the Agreement and if Bonds have been furnished as required in paragraph 5 01 the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment except that it shall not constitute a waiver of Claims.

**14 09 Waiver of Claims**

A The making and acceptance of final payment will constitute

1 a waiver of all Claims by OWNER against CONTRACTOR except Claims arising from unsettled Liens from defective Work appearing after final inspection pursuant to paragraph 14 06 from failure to comply with the Contract Documents or the terms of any special guarantees specified therein or from CONTRACTOR's continuing obligations under the Contract Documents and

2 a waiver of all Claims by CONTRACTOR against OWNER other than those previously made in writing which are 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 allowed 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 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 the surety if any) seven days written notice terminate

the services of CONTRACTOR exclude CONTRACTOR from the Site and take possession of the Work and of all CONTRACTOR s tools appliances construction equipment and machinery at the Site and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion) incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere and finish the Work as OWNER may deem expedient In such case CONTRACTOR shall not be entitled to receive any further payment until the Work is finished If the unpaid balance of the Contract Price exceeds 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

C 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

#### 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 elect to terminate the Contract In such case CONTRACTOR shall be paid (without duplication of any items)

1 for 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 for 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 for all claims costs losses and damages (including but not limited to all fees and charges of

engineers architects attorneys and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors Suppliers and others and

4 for 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 the Work is suspended for more than 90 consecutive days by OWNER or under an order of court or other public authority or ENGINEER 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 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 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 Dispute resolution methods and procedures if any shall be as set forth in the Supplementary Conditions If no method and procedure has been set forth and subject to the provisions of paragraphs 9 09 and 10 05 OWNER and CONTRACTOR may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute

ARTICLE 17 MISCELLANEOUS

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

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 and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty obligation right and remedy to which they apply

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 Agreement

17 05 *Controlling Law*

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

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Section 00800

SUPPLEMENTARY CONDITIONS

SCOPE. These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (No. 1910-8, 1996 Edition) and other provisions of the Contract Documents as indicated herein. All provisions which are not so amended or supplemented remain in full force and effect.

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

SC-1. DEFINITIONS AND TERMINOLOGY. Add the following new definitions to paragraph 1.01:

51. Bidder - The one who submits a Bid directly to Owner, as distinct from a sub-bidder who submits a bid directly to a Bidder.
52. 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.

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:

Five (5) 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 District 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 last sentence of paragraph 2.03.A.

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

SC-4.02. Subsurface and Physical Conditions. Delete Paragraph 4.02.A in its entirety and insert the following new paragraph in its place:

A. *Reports and Drawings:*

1. In the preparation of Drawings and Specifications, Engineer relied upon the following reports of exploration and tests of subsurface conditions at the Site:
  - a. Report dated February 23, 2006, prepared by Thelen Associates, Inc., 1398 Cox Avenue, Erlanger, Kentucky 41018, entitled: "Geotechnical Exploration, Ohio River Standby Generators, Ohio River Pump Station No. 1, Ft. Thomas, Kentucky, consisting of 16 pages, plus an appendix of 9 sheets. The "technical data" contained in such report upon which the Contractor may rely is the elevations indicated by solid lines on the test boring logs, within twelve inches of the location of the boring.
2. In the preparation of Drawings and Specifications, Engineer relied upon the following drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilities) which are at or contiguous to the Site:
  - a. Drawings dated 1991, consisting of 1 sheet without numbering. All of the information on the drawing constitutes information which was included in the design decisions made for the project. However, none of the information shown thereon may be relied upon as "technical data", since no signed indication of "Record Drawing" or "As-built Drawing" is present.
3. Copies of reports and drawings itemized in SC-4.02.A that are not included with the Bidding Documents may be examined at the Northern Kentucky Water District office located at 2835 Crescent Springs Road, Erlanger, Kentucky 41018 during regular business hours; or may be purchased from Queen City Reprographics, 2863 Sharon Road, Cincinnati, OH 45241 (513-326-2300, for the fees indicated in the invitation to bid.

SC-5. BONDS AND INSURANCE.

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 Liability 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 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.7:

8. 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;

9. with respect to worker's compensation and employer's liability, comprehensive automobile liability, commercial general liability, and umbrella liability insurance, 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 or greater where required by Laws and Regulations:

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. Employer's Liability | \$1,000,000 each occurrence |

2. Contractor's General Liability under paragraphs 5.04.A.3 through 5.04.A.6 of the General Conditions, which shall include completed operations and product liability coverage and eliminate the exclusion with respect to property under the care, custody, and control of Contractor:

- 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.
- f. Excess or Umbrella Liability
  - 1) General Aggregate \$4,000,000
  - 2) Each Occurrence \$4,000,000

3. Automobile Liability under paragraph 5.04.A.6 of the General Conditions:

- 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. The Contractual Liability coverage required by paragraph 5.04.B.4 of the General Conditions shall provide coverage for not less than the following amounts:

- a. Bodily Injury
  - Each Accident \$1,000,000
  - Annual Aggregate \$1,000,000
- b. Property Damage
  - Each Accident \$1,000,000
  - Annual Aggregate \$1,000,000

5. The Railroad Protective Liability coverage required by paragraph 5.04.A.8 shall provide coverage for not less than the following amounts:

- a. Bodily Injury
  - Each Occurrence \$3,000,000
  - General Aggregate \$3,000,000

b. Property Damage	
Each Occurrence	\$3,000,000
General Aggregate	\$3,000,000

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, including paragraphs 5.06.A, 5.06.A.1, 5.06.A.2, 5.06.A.3, 5.06.A.4, 5.06.A.5, 5.06.A.6, 5.06.A.7, 5.06.B, 5.06.C, 5.06.D, and 5.06.E 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 and Contractor, 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-5.07. Waiver of Rights. Delete paragraph 5.07 in its entirety.

SC-5.08. Receipt and Application of Insurance Proceeds. Delete paragraph 5.08 in its entirety.

#### SC-6. CONTRACTOR'S RESPONSIBILITIES.

SC-6.02. Labor; Working Hours. Amend the last sentence of paragraph 6.02.B by striking out the word "Engineer" and inserting the word "Owner" in its place.

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

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

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

A. Owner will obtain and pay for the following permits: Road & Highway Encroachment Permits, Kentucky Division of Water, & Stream Crossing Permits.

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.

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

B. Portions of the project may be exempt from taxes. It shall be the Contractor's responsibility to determine what exemptions may exist.

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.

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. Delete paragraph 6.19.B.8 and insert the following new paragraph in its place:

8. any correction of defective Work by Owner; or



Ernie Fletcher  
Governor

**ENVIRONMENTAL AND PUBLIC PROTECTION CABINET  
DEPARTMENT OF LABOR**

OFFICE OF WORKPLACE STANDARDS  
1047 US Hwy 127 S STE 4  
Frankfort, Kentucky 40601  
Phone: (502) 564-3070  
www.kylabor.net

LaJuana S. Wilcher  
Secretary

Philip J. Anderson  
Commissioner

Christopher H. Smith  
Executive Director

June 9, 2006

Amy Kramer  
Northern Kentucky Water District  
2835 Crescent Springs Road  
Erlanger KY 41018

Re: Northern Kentucky Water District, Ohio River Pump Station #1 Standby Generators

Advertising Date as Shown on Notification: June 8, 2006

Dear Amy Kramer:

This office is in receipt of your written notification on the above project as required by KRS 337.510 (1).

I am enclosing a copy of the current prevailing wage determination number CR-1-024, dated January 25, 2006 for CAMPBELL County. This schedule of wages shall be attached to and made a part of the specifications for the work, printed on the bidding blanks, and made a part of the contract for the construction of the public works between the public authority and the successful bidder or bidders.

The determination number assigned to this project is based upon the advertising date contained in your notification. There may be modifications to this wage determination prior to the advertising date indicated. In addition, if the contract is not awarded within 90 days of this advertising date or if the advertising date is modified, a different set of prevailing rates of wages may be applicable. It will be the responsibility of the public authority to contact this office and verify the correct schedule of the prevailing rates of wages for use on the project. Your project number is as follows: 019-H-00224-06-1, Heavy/Highway

Sincerely,

John Fitzpatrick  
Prevailing Wage Specialist

**CAMPBELL & PENDLETON COUNTIES:**

ASBESTOS/INSULATION WORKERS:

Asbestos/Insulation Workers: (Includes application of all insulating materials, protective coverings, coatings & finishing to all types of mechanical systems):

BASE RATE	\$23.18
FRINGE BENEFITS	10.44

Hazardous Material Handler ((Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials, whether they contain asbestos or not, from mechanical systems):

BASE RATE	\$19.60
FRINGE BENEFITS	7.00

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**CAMPBELL & PENDLETON COUNTIES:**

BOILERMAKERS:

BASE RATE	\$31.29
FRINGE BENEFITS	16.67

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**CAMPBELL & PENDLETON COUNTIES:**

BRICKLAYERS:

Bricklayers, Caulkers, Cleaners, Pointers & Stonemasons:

BASE RATE	\$25.16
FRINGE BENEFITS	8.39

Refractory:

BASE RATE	\$25.66
FRINGE BENEFITS	8.39

Marble Setters, Terrazzo Workers & Tile Setters:  
BUILDING

BASE RATE	\$25.92
FRINGE BENEFITS	7.84

Marble Terrazzo & Tile Finishers: BUILDING

BASE RATE	\$21.48
FRINGE BENEFITS	7.84

Marble Sanders, Polishers, Waxers, & Sawyers:  
BUILDING

BASE RATE	\$21.55
FRINGE BENEFITS	7.84

Terrazzo Base Grinders (While operating base grinding machine):  
BUILDING

BASE RATE	\$21.90
FRINGE BENEFITS	7.84

**CAMPBELL & PENDLETON COUNTIES:**

CARPENTERS:

Carpenters & Piledrivermen (Does not include Walls & Ceiling Work):

BUILDING	BASE RATE	\$19.22
	FRINGE BENEFITS	4.77

Carpenters & Lathers (Walls & Ceiling Work Only):

BUILDING	BASE RATE	\$18.99
	FRINGE BENEFITS	4.98

Carpenters & Piledrivermen:	HEAVY & HIGHWAY	BASE RATE	\$22.42
		FRINGE BENEFITS	4.73

Divers:	HEAVY & HIGHWAY	BASE RATE	\$33.63
		FRINGE BENEFITS	4.73

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**CAMPBELL & PENDLETON COUNTIES:**

CEMENT MASONS:	BUILDING	BASE RATE	\$21.00
		FRINGE BENEFITS	7.50

	HEAVY & HIGHWAY	BASE RATE	\$24.18
		FRINGE BENEFITS	7.35

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**CAMPBELL & PENDLETON COUNTIES:**

ELECTRICIANS:

Electricians:		BASE RATE	\$24.24
		FRINGE BENEFITS	9.34

LINE CONSTRUCTION:

Lineman:	BUILDING	BASE RATE	\$24.10
		FRINGE BENEFITS	6.66

Equipment Operator:	BUILDING	BASE RATE	\$21.69
		FRINGE BENEFITS	6.21

Groundman:	BUILDING	BASE RATE	\$15.67
		FRINGE BENEFITS	5.10

SOUND COMMUNICATIONS:

Installer:		BASE RATE	\$18.00
		FRINGE BENEFITS	3.475

Cable Puller:		BASE RATE	\$9.00
		FRINGE BENEFITS	2.64

**CAMPBELL & PENDLETON COUNTIES:**

ELEVATOR MECHANICS:	BASE RATE	\$30.775
	FRINGE BENEFITS	12.015

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**CAMPBELL & PENDLETON COUNTIES:**

GLAZIERS:	BASE RATE	\$22.05
	FRINGE BENEFITS	7.90

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**CAMPBELL & PENDLETON COUNTIES:**

**IRONWORKERS:**

Ornamental & Structural:	BASE RATE	\$24.00
	FRINGE BENEFITS	14.10

Fence Erector:	BASE RATE	\$21.60
	FRINGE BENEFITS	14.10

Reinforcing: Beyond 30-mile radius of Hamilton County, OH Courthouse	BASE RATE	\$24.70
	FRINGE BENEFITS	12.85

Up to and including 30-mile radius of Hamilton County, OH Courthouse	BASE RATE	\$24.45
	FRINGE BENEFITS	12.85

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**CAMPBELL COUNTY:**

**LABORERS/BUILDING:**

Building & Common Laborer, Cement Mason Tender, Hand Operated Mechanical Mule, Mechanical Sweeper, Signal Person, Asbestos Removal, & Tunnel Laborer:

BUILDING	BASE RATE	\$21.30
	FRINGE BENEFITS	5.85

Skid Steer, Burning Torch Operator, Jackhammer, Air Spade, Chipping Hammer, Mechanical & Air Tamper Operator, Mechanical Concrete Buggy, Power Operated Mechanical Mule, Concrete Pump Hose Man, Vibrator Man, CERCLA Trained Hazardous Material Removal – Levels A, B, C:

BUILDING	BASE RATE	\$21.45
	FRINGE BENEFITS	5.85

**CAMPBELL COUNTY:**

LABORERS/BUILDING:(Continued)

Gunnite Nozzle Operator:	BUILDING	BASE RATE	\$22.05
		FRINGE BENEFITS	5.85
Brick Mason Tender:	BUILDING	BASE RATE	\$23.00
		FRINGE BENEFITS	5.85

LABORERS/HEAVY HIGHWAY:

GROUP 1:

Asphalt Laborer; Carpenter Tender; Concrete Curing applicator; Dump Man (Batch Truck); Guardrail and Fence Installer; Joint Setter; Laborer (Construction); Landscape Laborer; Mesh Handlers & Placer; Right-of way Laborer; Riprap Laborer & Grouter; Scaffold Erector; Seal Coating; Surface Treatment or Road Mix Laborer; Sign Installer; Slurry Seal; Utility Man; Bridge Man; Handyman; Waterproofing Laborer; Flagperson; Hazardous Waste (Level D); Diver Tender; Zone Person & Traffic Control:

HEAVY & HIGHWAY	*BASE RATE	\$22.72
	FRINGE BENEFITS	5.85

GROUP 2:

Skid Steer; Asphalt Raker; Concrete Puddler; Kettle Man (Pipeline); Machine Driven Tools (Gas, Electric, Air); Mason Tender; Brick Paver; Mortar Mixer; Power Buggy or Power Wheelbarrow; Sheeting & Shoring Man; Surface Grinder Man; Plastic Fusing Machine Operator; Pug Mill Operator; & Vacuum Devices (wet or dry); Rodding Machine Operator; Diver; Screwman or Paver; Screed Person; Water Blast, Hand Held Wand; Pumps 4" & Under (Gas, Air or Electric) & Hazardous Waste (Level C); Air Track and Wagon Drill; Bottom Person; Cofferdam (below 25 ft. deep); Concrete Saw Person; Cutting with Burning Torch; Form Setter; Hand Spiker (Railroad); Pipelayer; Tunnel Laborer (without air) & Caisson; Underground Person (working in Sewer & Waterline, Cleaning, Repairing & Reconditioning); Sandblaster Nozzle Person; & Hazardous Waste (Level B):

HEAVY & HIGHWAY	*BASE RATE	\$22.89
	FRINGE BENEFITS	5.85

GROUP 3:

Blaster; Mucker; Powder Person; Top Lander; Wrencher (Mechanical Joints & Utility Pipeline); Yarnier; Hazardous Waste (Level A); Concrete Crew in Tunnels (With air-pressurized - \$1.00 premium); Curb Setter & Cutter; Grade Checker; Utility Pipeline Tapper; Waterline; and Caulker:

HEAVY & HIGHWAY	*BASE RATE	\$23.22
	FRINGE BENEFITS	5.85

GROUP 4:

Miner (With Air-pressurized - \$1.00 premium); & Gunnite Nozzle Person:

HEAVY & HIGHWAY	*BASE RATE	\$23.67
	FRINGE BENEFITS	5.85

**\*Signal Person will receive the rate equal to the rate paid the laborer classification for which he or she is signaling.**

**PENDLETON COUNTY:**

**LABORERS/BUILDING:**

**GROUP 1:**

Asbestos Abatement, Carpenter Tender, General, Concrete Pouring & Curing, Concrete Form Stripping & Wrecking, Hand Digging & Backfilling of Ditches, Clearing of Right-of-ways & Building Sites, Wood Sheeting & Shoring, Signalperson for Concrete Bucket, General Cleaning, Toxic Waste Removal, & Environmental Laborer – Nuclear, Radiation, Toxic & Hazardous Waste Level D:

BUILDING	BASE RATE	\$17.83
	FRINGE BENEFITS	7.08

**GROUP 2:**

Air Tool Operator, Air Track Drill, Asphalt Raker, Tamper, Batch Plant & Scale Man, Chain Saw, Concrete Saw, Electric Hand Grinder, Electric Bush & Chipping Hammer, Flagperson, Forklift Operator, Form Setter (Street or Highway), Gunnite, Hand Spiker, Introflax Burning Rod, Joint Maker, Mason Tender, Pipelayer, Plasterer Tender, Power Driven Georgia Buggy, Power Posthole Digger, Railroad, Sandblaster, Scow Man & Deck Hand, Signalperson, Sweeper & Cleaner Machine, Vibrator Operator, Walk Behind Trenching Machine, Mortar Mixer Machine, Water Pumpman, Metal Form Setter, Heater, Mesh Handler on walkways, Streets & Roadways (Outside Buildings), & Environmental Laborers – Nuclear, Radiation, Toxic & Hazardous Waste – Level C:

BUILDING	BASE RATE	\$18.23
	FRINGE BENEFITS	7.08

**GROUP 3:**

Gunnite Nozzleman & Gunnite Nozzle Machine Operator, Sand Blaster Nozzleman, Concrete or Grout Pumpman, & Plaster Pumpman:

BUILDING	BASE RATE	\$18.43
	FRINGE BENEFITS	7.08

**GROUP 4:**

Powderman & Blaster, & Environmental Laborer – Nuclear, Radiation, Toxic & Hazardous Waste – Level B:

BUILDING	BASE RATE	18.53
	FRINGE BENEFITS	7.08

**GROUP 5:**

Caisson Hole (6 ft & over – Pressure & Free Air Including Tools), Construction Specialist, & Environmental Laborer – Nuclear, Radiation, Toxic & Hazardous Waste – Level A:

BUILDING	BASE RATE	\$19.03
	FRINGE BENEFITS	7.08

**PENDLETON COUNTY:**

LABORERS/BUILDING (continued)

GROUP 6:

Tunnel Man & Tunnel Sand Miner, Cofferdam (Pressure & Free Air), & Sand Hog or Mucker (Pressure or Free Air):

BUILDING	BASE RATE	\$19.33
	FRINGE BENEFITS	7.08

HEAVY HIGHWAY:

Aging & Curing of Concrete; Asbestos Abatement Worker; Asphalt Plant; Asphalt; Batch Truck Dump; Carpenter Tender; Cement Mason Tender; Cleaning of Machines; Concrete; Demolition; Dredging; Environmental – Nuclear, Radiation, Toxic & Hazardous Waste – Level D; Flagperson; Grade Checker; Hand Digging & Hand Back Filling; Highway Marker Placer; Landscaping, Mesh Handler & Placer; Puddler; Railroad; Rip-rap & Grouter; Right-of-Way; Sign, Guard Rail & Fence Installer; Signal Person; Sound Barrier Installer; Storm & Sanitary Sewer; Swamper; Truck Spotter & Dumper; Wrecking of Concrete Forms; General Cleanup:

HEAVY & HIGHWAY	BASE RATE	\$18.08
	FRINGE BENEFITS	8.63

Batter Board Man (Sanitary & Storm Sewer); Brickmason Tender; Mortar Mixer Operator; Scaffold Builder; Burner & Welder; Bushhammer; Chain Saw Operator; Concrete Saw Operator; Deckhand Scow Man; Dry Cement Handler; Environmental – Nuclear, Radiation, Toxic & Hazardous Waste – Level C; Forklift Operator for Masonry; Form Setter; Green Concrete Cutting; Hand Operated Grouter & Grinder Machine Operator; Jackhammer; Pavement Breaker; Paving Joint Machine; Pipelayer; Plastic Pipe Fusion; Power Driven Georgia Buggy & Wheel Barrow; Power Post Hole Digger; Precast Manhole Setter; Walk-Behind Tamper; Walk-Behind Trencher; Sand Blaster; Concrete Chipper; Surface Grinder; Vibrator Operator; Wagon Driller:

HEAVY & HIGHWAY	BASE RATE	\$18.33
	FRINGE BENEFITS	8.63

Asphalt Luteman & Raker; Gunnite Nozzleman; Gunnite Operator & Mixer; Grout Pump Operator; Side Rail Setter; Rail Paved Ditches; Screw Operator; Tunnel (Free air); Water Blaster:

HEAVY & HIGHWAY	BASE RATE	\$18.38
	FRINGE BENEFITS	8.63

Caisson Worker (Free Air); Cement Finisher; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Levels A & B; Miner & Driller (Free Air); Tunnel Blaster; & Tunnel Mucker (Free Air); Directional & Horizontal Boring; Air Track Driller (all types); Powderman & Blaster; Troxler & Concrete Tester if Laborer is Utilized:

HEAVY & HIGHWAY	BASE RATE	\$18.98
	FRINGE BENEFITS	8.63

**CAMPBELL & PENDLETON COUNTIES:**

MILLWRIGHTS:		BASE RATE	\$21.90
		FRINGE BENEFITS	7.92

**CAMPBELL & PENDLETON COUNTIES:**

OPERATING ENGINEERS/BUILDING:

Boom & Jib 250' & Over:	BUILDING	BASE RATE	\$28.04
		FRINGE BENEFITS	8.80
Boom & Jib Over 180' through 249':	BUILDING	BASE RATE	\$27.79
		FRINGE BENEFITS	8.80
Boom & Job 150' through 180':	BUILDING	BASE RATE	\$27.29
		FRINGE BENEFITS	8.80
Master Mechanic	BUILDING	BASE RATE	\$27.04
		FRINGE BENEFITS	8.80

Barrier Moving Machine; Boiler or Compressor Mounted on Crane (Piggy-Back Operation); Boom Truck; Cableway; Cherry Picker; Combination Concrete Mixer & Tower; Concrete Pump with Booms; Crane; Derrick; Dragline; Dredge (Dipper, Clam or Suction) 3 Man Crew; Elevating Grader or Euclid Loader; Floating Equipment; Forklift (rough terrain with winch/hoist); Gradeall; Helicopter Operator & Helicopter Winch Operator (Hoisting Builders Materials); Hoe; Hoist (Two or More Drums); Horizontal Directional Drill; Hydraulic Gantry (Lift System); Laser Finishing Machine; Laser Screed and Like Equipment; Lift Slab or Panel Jack; Locomotive; Maintenance Engineer (Mechanic); Mixer, Paving (Multiple Drum); Mobile Concrete Pump with Boom; Panelboard; Pile Driver; Power Shovel; Prentice Loader; Rail Tamper with automatic lifting & align device; Rotary Drill used on Caisson Work for Foundations & Substructure work; Side Boom; Slip Form Paver; Straddle Carrier; Trench Machine (Over 24" Wide); & Tug Boat:

BUILDING	BASE RATE	\$26.79
	FRINGE BENEFITS	8.80

Asphalt Paver; Bobcat-type and/or Skid Steer Loader with Hoe Attachment Greater than 7,000 lbs.; Bulldozer; C.M.I. Type Equipment; Concrete Grinder/Planer; Endloader; Hydro Milling Machine; Kolman Type Loader (Dirt Loading); Lead Greaseman; Mucking Machine; Pettibone-Rail Equipment; Power Grader; Power Scoop; Power Scraper; Push Cat; & Vermeer Type Concrete Saw:

BUILDING	BASE RATE	\$26.67
	FRINGE BENEFITS	8.80

**CAMPBELL & PENDLETON COUNTIES:**

OPERATING ENGINEERS/BUILDING (Continued):

A-Frame; Air Compressor Pressurizing Shafts or Tunnels; Asphalt Roller (All); Bobcat-type and/or Skid Steer Loader with or without Attachments; Boiler (15 lbs. pressure & over); All Concrete Pumps without Booms & with 5" System; Forklift (Except Masonry); Highway Drills-All Types (with Integral Power); Hoist (One Drum); House Elevator (except those automatic call button controlled); Man Lift; Material Hoist/Elevator; Mud Jack; Pressure Grouting; Pump (Installing or Operating Well Points or other Type of Dewatering Systems); Pump (4" and over Discharge); Railroad Tie Inserter/Remover; Rotovator (Lime soil Stabilizer); Submersible Pump (4" and over Discharge); Switch & Tie Tamper (w/o lifting & aligning device); Trench Machine (24" & under); & Utility:

BUILDING	BASE RATE	\$25.63
	FRINGE BENEFITS	8.80

Ballast Relocator; Backfiller & Tamper; Batch Plant; Bar & Joint Installing Machine; Bull Floats; Burlap & Curing Machines; Clefplanes; Compressor on Building Construction; Concrete Mixer, Capacity more than one bag; Concrete Mixer, one bag capacity (side loader); All Concrete Pumps without Booms with 4" or Smaller System; Concrete Spreading Machine; Conveyor, used for handling building materials; Crusher; Deckhand; Drum Fireman in Asphalt Plant; Farm Type Tractor, Pulling Attachments; Finishing Machines; Form Trencher; Generator; Gunitite Machine; Hydro-Seeder; Pavement Breaker (Hydraulic or Cable); Post Driver; Post Hole Digger; Pressure Pump (over 1/2" discharge); Road Widening Trencher; Roller (except Asphalt); Self-propelled Power Spreader; Self-propelled Sub-Grader; Shotcrete Machine; Tire Repairman; Tractor (Pulling Sheep Foot Roller or Grader); VAC/ALL; Vibratory Compactor (with Integral Power) & Welder:

BUILDING	BASE RATE	\$24.45
	FRINGE BENEFITS	8.80

Allen Screed Paver (concrete); Boiler (less than 15 lbs. Pressure); Directional Drill "Locator"; Masonry Fork Lift; Inboard & Outboard Motor Boat Launch; Light Plant; Oiler; Power Driven Heater (Oil Fired); Power Scrubber; Power Sweeper; Pump (Under 4" discharge); Signal Person; & Submersible Pump (Under 4" discharge):

BUILDING	BASE RATE	\$18.99
	FRINGE BENEFITS	8.80

OPERATING ENGINEERS/HEAVY HIGHWAY

Master Mechanic:	HEAVY & HIGHWAY	BASE RATE	\$27.04
		FRINGE BENEFITS	8.80

**CAMPBELL & PENDLETON COUNTIES:**

OPERATING ENGINEERS/HEAVY HIGHWAY: (Continued):

Air Compressor on Steel Erection; Barrier Moving Machine; Boiler Operator on Compressor or Generator when mounted on a Rig; Cableway; Combination Concrete Mixer & Tower; Concrete Plant (over 4 yd. Cap.); Concrete Pump; Crane (Including Boom Truck, Cherry Picker); Derrick; Dragline; Dredge (Dipper, Clam or Suction); Elevating Grader or Euclid Loader; Floating Equipment; Gradeall; Helicopter Crew (Operator- Hoist or Winch); Hoe; Hoisting Engine on Shaft or Tunnel Work; Horizontal Directional Drill(over 500,000 ft. lbs. thrust) Industrial-Type Tractor; Jet Engine Dryer (D8 or D9) DieselTractor; Locomotive (Standard Gauge); Maintenance Operator Class A; Mixer, Paving (Single or Double Drum); Mucking Machine; Multiple Scraper; Piledriving Machine; Power Shovel; Prentice Loader; Quad 9 (Double Pusher); Refrigerating Machine (Freezer Operation); Side-Boom; Slip-Form Paver; Tower Derrick; Tree Shredder; Trench Machine (Over 24" wide); Truck Mounted Concrete Pump; Tug Boat; Tunnel Machine and/or Mining Machine; Wheel Excavator; Hydraulic Gantry (Lifting System); Rail Tamper (w/Auto Lifting & Alignment Device); Rough Terrain Fork Lift with Winch/Hoist:

HEAVY & HIGHWAY	BASE RATE	\$26.79
	FRINGE BENEFITS	8.80

Asphalt Paver; Automatic Subgrader Machine, Self-Propelled (CMI Type); Bobcat Type and/or Skid Steer Loader with Hoe Attachment Greater than 7,000 lbs.; Boring Machine More than 48"; Bulldozer; Endloader; Kolman-type Loader (production type-Dirt); Lead Greaseman; Power Grader; Power Scraper; Push Cat; Trench Machine (24" wide & under); Concrete Grinder/Planer; Pettibone-Rail Equipment; Vermeer type Concrete Saw; Hydro Milling Machine; Lighting & Traffic Signal Installation Equipment; Material Transfer Equipment (shuttle buggy) Asphalt:

HEAVY & HIGHWAY	BASE RATE	\$26.67
	FRINGE BENEFITS	8.80

A-Frame; Air Compressor on Tunnel Work (low pressure); Asphalt Plant Engineer; Locomotive (narrow gauge); Mixer, Concrete (more than one bag cap.); Mixer, one bag cap. (Side Loader); Power Boiler, 15 lb. Pressure & Over; Pump Operator installing & operating Well Points; Pump (4" & over discharge); Roller - Asphalt; Utility Operator (Small equipment); Welding Machine; Bobcat Type and/or Skid Steer Loader with or without Attachments; Switch and Tie Tamper (w/o Lifting & Aligning Device); Highway Drills; Railroad Tie Inserter/Remover; & Rotovator (Lime-Soil Stabilizer):

HEAVY & HIGHWAY	BASE RATE	\$25.63
	FRINGE BENEFITS	8.80

**CAMPBELL & PENDLETON COUNTIES:**

OPERATING ENGINEERS/HEAVY HIGHWAY (Continued):

Backfiller; Ballast Re-locator; Bars, Joint & Mesh Installing Machine; Batch Plant; Boring Machine Operator (48" or less); Bull Floats; Burlap & Curing Machine; Concrete Plant (capacity 4 yd. & under); Concrete Saw (Multiple); Conveyor (Highway); Crusher; Deckhand; Farm-type Tractor with attachments (highway) except Masonry; Finishing Machine; Fireperson, Floating Equipment (all types); Fork Lift (highway); Form Trencher; Hydro Hammer; Hydro Seeder; Pavement Breaker; Plant Mixer; Post Driver; Post Hole Digger (Power Auger); Power Brush Burner; Power Form Handling Equipment; Road Widening Trencher; Roller (Brick, Grade & Macadam); Self-Propelled Power Spreader; Self-Propelled Power Subgrader; Steam Fireperson; Tractor (Pulling Sheepfoot, Roller or Grader); & Vibratory Compactor with Integral Power:

HEAVY & HIGHWAY	BASE RATE	\$24.45
	FRINGE BENEFITS	8.80

Compressor (Portable, Sewer, Heavy & Highway); Drum Fireperson (Asphalt); Generator; Inboard-Outboard Motor Boat Launch; Masonry Fork Lift; Oil Heater (asphalt plant); Oiler; Power Driven Heater; Power Sweeper & Scrubber; Pump (under 4" discharge); Signalperson; Tire Repairperson; & VAC/ALLS

HEAVY & HIGHWAY	BASE RATE	\$18.99
	FRINGE BENEFITS	8.80

**CAMPBELL & PENDLETON COUNTIES:**

PAINTERS:

Brush; Roller; Paperhanging & Drywall Taping:  
 BUILDING

BASE RATE	\$22.15
FRINGE BENEFITS	5.80

Spray: BUILDING

BASE RATE	\$22.65
FRINGE BENEFITS	5.80

Sandblasting; Waterblasting: BUILDING

BASE RATE	\$22.90
FRINGE BENEFITS	5.80

Lead Abatement: BUILDING

BASE RATE	\$23.15
FRINGE BENEFITS	5.80

Sign Painter & Erector: BUILDING

BASE RATE	\$17.57
FRINGE BENEFITS	4.55

Elevated Tanks: HEAVY & HIGHWAY

BASE RATE	\$22.30
FRINGE BENEFITS	5.90

**CAMPBELL & PENDLETON COUNTIES:**

PAINTERS (Continued):

BRIDGES – GUARDRAILS – LIGHTPOLES – STRIPING:

Bridge/Equipment Tender and/or Containment Builder:

HEAVY & HIGHWAY	BASE RATE	\$19.68
	FRINGE BENEFITS	5.80

Brush & Roller:	HEAVY & HIGHWAY	BASE RATE	\$22.15
		FRINGE BENEFITS	5.80

Spray:	HEAVY & HIGHWAY	BASE RATE	\$22.65
		FRINGE BENEFITS	5.80

Sandblasting; Waterblasting:	HEAVY & HIGHWAY	BASE RATE	\$22.90
		FRINGE BENEFITS	5.80

Elevated Tanks; Steeplejack Work; Bridge & Lead Abatement:	HEAVY & HIGHWAY	BASE RATE	\$23.15
		FRINGE BENEFITS	5.80

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**CAMPBELL & PENDLETON COUNTIES:**

PLASTERERS:	BUILDING	BASE RATE	\$20.65
		FRINGE BENEFITS	7.25

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**CAMPBELL & PENDLETON COUNTIES:**

PLUMBERS & PIPEFITTERS:		BASE RATE	\$26.32
		FRINGE BENEFITS	11.72

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**CAMPBELL & PENDLETON COUNTIES:**

ROOFERS (excluding sheetmetal):			
Roofers:		BASE RATE	\$24.12
		FRINGE BENEFITS	7.62

Pitch:		BASE RATE	\$25.12
		FRINGE BENEFITS	7.62

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**CAMPBELL COUNTY:**

SHEETMETAL WORKERS (including metal roofs):		BASE RATE	\$24.84
		FRINGE BENEFITS	12.55

**PENDLETON COUNTY:**

SHEETMETAL WORKERS (including metal roofs):	BASE RATE	\$28.40
	FRINGE BENEFITS	11.52

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**CAMPBELL & PENDLETON COUNTIES:**

SPRINKLER FITTERS:	BASE RATE	\$26.05
	FRINGE BENEFITS	11.65

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**CAMPBELL & PENDLETON COUNTIES:**

**TRUCK DRIVERS:**

3 Tons & Under; Greaser; Tire Changer; & Mechanic Tender: BUILDING	BASE RATE	\$17.52
	FRINGE BENEFITS	8.04

Over 3 Tons; Semi-Trailer or Pole Trailer; Dump Tandem Axles; Farm Tractor (When used to pull building material & equipment):

BUILDING	BASE RATE	\$17.63
	FRINGE BENEFITS	8.04

Concrete Mixer (Hauling on jobsites); & Truck Mechanic:

BUILDING	BASE RATE	\$17.70
	FRINGE BENEFITS	8.04

Euclid's & Other Heavy Moving Equipment; Lowboy; Winch, A-Frame & Monorail Truck (To transport building materials):

BUILDING	BASE RATE	\$17.80
	FRINGE BENEFITS	8.04

**(On hazardous or toxic waste sites, add \$4.00 premium to all of above)**

Driver:	HEAVY & HIGHWAY	BASE RATE	\$15.85
		FRINGE BENEFITS	4.60

Euclid Wagon; End Dump; Lowboy; Heavy Duty Equipment; Tractor-Trailer Combination; & Drag:

HEAVY & HIGHWAY	BASE RATE	\$16.29
	FRINGE BENEFITS	4.60

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January 25, 2006  
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END OF SECTION

SECTION 00900 - ADDENDA

PART 1 - GENERAL

1.01 ADDENDA

All addenda issued during the bidding of the Project will be reproduced in the signed Contract Documents, on the pages following this heading sheet.

END OF SECTION 00900

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## **Division 1 - General Requirements**

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## SECTION 01010 - SUMMARY OF WORK

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. The Instructions for Bidders, General Conditions, Supplementary Conditions, Divisions 1 through 16 of the Specifications and all Contract Documents shall apply and govern the work of all sections in this Division regardless of how the work may be apportioned to various trades or subcontractors.
- B. Work included in this section of the Specifications includes the furnishing of all labor, material, tools, and other equipment necessary to provide on-site backup generators as shown on the Contract Drawings and as specified herein. Major components of the system upgrade include:
  - 1. Elevated concrete generator/switchgear pad above the floodplain.
  - 2. Two (2) 4160 volt, diesel generators with outdoor enclosure and subbase fuel tank.
  - 3. Two (2) automatic transfer switches in NEMA 3R enclosures.
  - 4. Generator paralleling switchgear in NEMA 3R enclosure.
  - 5. Underground 4160 volt ductbank.
  - 6. SCADA interface.
  - 7. Low voltage power for battery charger, fuel pump, control panel and heaters.

#### 1.02 SCOPE

- A. The Contractor shall furnish and install all miscellaneous material to make all electrical connections to all items of utilization equipment.
- B. 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 equivalent to similar equipment and/or devices specified herein.
- D. Where control 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.
- F. The Contractor shall be responsible for:
  - 1. Shop drawings prior to installation.
  - 2. All equipment required.
  - 3. All wiring and ancillary equipment and appurtenances needed for proper installation and operation of equipment.
  - 4. All labor for installation and start-up of the system.
  - 5. Operations and maintenance manuals.
  - 6. Start-up and training services.
  - 7. Shipping, F.O.B., to the Owners destination, all items required by the contract documents.

1.03 PERMITS

Obtain any permits related or required by the Work in this Contract.

1.04 CODES

Comply with applicable codes and regulations of authorities having jurisdiction. Submit copies of inspection reports, notices, citations and similar communication to the Owner.

1.05 EXISTING CONDITIONS AND DIMENSIONS

- A. The Work in this Contract will primarily be performed in or around existing facilities which must remain functional. This Contractor must maintain the required items and/or systems functional without additional effort by Owner personnel and at no extra costs to the Owner.
- B. The Contractor is responsible for verifying all existing conditions, elevations, dimensions, etc., and providing his finished work to facilitate existing conditions.

PART 2 - PRODUCTS (NOT USED)

PART 3 - INSTALLATION (NOT USED)

END OF SECTION 01010

Section 01015

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, 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. RESPONSIBILITY FOR MATERIALS AND EQUIPMENT.

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

4. 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.

5. 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.

6. 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.

7. 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.

8. OPERATION OF EXISTING FACILITIES. Normal operating hours for the existing pump station are 8:00 PM through 11:00 AM during the summer and 9:00 PM through 9:00 AM plus 2:00 PM through 5:00 PM, when required, during the winter. The pump station must be kept in continuous operation for those hours 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 on weekends which is considered incidental to the project.

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

9. 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 ease 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.

10. 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.

11. 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.

12. 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.

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

- Kentucky Building Code
- Kentucky Plumbing Code
- National Electric Code
- BOCA Mechanical Code

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

14. 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.

15. 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 01030 - ALTERNATIVES

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

This section identifies and details work indicated on the plans or described in the specifications as an Additive or Deductive Alternative.

#### 1.02 RELATED WORK

- A. Section 16621 - Emergency Power System.
- B. Section 16622 - Automatic Transfer Switch and Paralleling Switchgear.

#### 1.03 PERMITS AND CODE COMPLIANCE

Any permit, permit modification, code modification or submittal arising from the acceptance of any of the Alternatives will be the responsibility of the Contractor.

#### 1.04 SUBMITTALS

The Contractor shall provide any information requested by the Owner or Engineer in a timely manner in order to determine whether an Alternative will be accepted. The submission of shop drawings and other required information shall conform with Section 01300 of these specifications.

### PART 2 - SCHEDULE OF ALTERNATIVES

#### 2.01 ALTERNATIVE SCHEDULE

- A. Alternative No. 1: Delete the paralleling switchgear and upsize each generator as necessary to perform the following:
  - 1. Each generator must operate independent of the other. It shall be connected to one of the 4160 volt feeders via an automatic transfer switch. Refer to the Drawings for details.
  - 2. Each generator must be sized to run/start a any single 1250 HP pump with 80% autotransformer starters and approximately 75 kW of continuous load.
- B. Additive Alternative No. 2:
  - 1. Upsize each generator such that two generators in parallel are required to start a any single 1250 HP pump (with 150 kW continuous load), but once that pump is running, one of the generators may be shut down. The generator that is still running must handle that single 1250 HP pump and 150 kW continuous load.
  - 2. Modify generator controls as required.

C. Deductive Alternative No. 3:

1. Delete one (1) automatic transfer switch and setup paralleling switchgear to operate in conjunction with a single automatic transfer switch.
2. Delete wire/conduit associated with the automatic transfer switch.
3. Refer to Drawings for details.

END OF SECTION 01030

## SECTION 01070 - ABBREVIATIONS OF TERMS AND ORGANIZATIONS

### 1.01 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
EEl	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 Unités (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 01300 - SUBMITTALS

1. PROGRESS SCHEDULE. After the preconstruction conference and before Work is started, Contractor shall submit to Owner 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 Owner with each Application for Payment. If the Work falls behind schedule, Contractor shall submit additional progress reports at such intervals as Owner 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 Owner, must be substantiated with satisfactory evidence.

### 3. SHOP DRAWINGS AND ENGINEERING DATA.

3.01. 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 Owner for review, at the Owner's address given in the Agreement. 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 to Owner 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 (including modifications to other facilities that may be a result of the deviation) and all required piping and wiring diagrams.

Five copies (or one reproducible copy) of each drawing and necessary data shall be submitted to Owner. Owner will return two marked copies (or one marked reproducible copy) to Contractor. Facsimile (fax) copies will not be acceptable. Owner 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.

3.02. 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.

Engineer's submittal review period shall be 21 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 Engineer and five corrected copies (or one corrected reproducible copy) resubmitted. Facsimile (fax) copies will not be acceptable.

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.

3.03. 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 Engineer 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 or by failure of Owner to review any submittal within the submittal review period specified herein and to return the submittal to Contractor.

End of Section

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## SECTION 01400 - 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:

- a. Concrete materials and mix designs.
- b. Asphaltic concrete materials and mix designs.
- c. Embedment, fill, and backfill materials.
- d. Geotechnical engineering services for caisson installation. Contractor shall utilize the same firm that performed the site investigations.
- e. 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.

Contractor shall furnish all sample materials and cooperate in the testing activities. Contractor shall interrupt the Work when necessary to allow testing to be performed. Contractor shall have no claim for an increase in Contract Price or Contract Times due to such interruption.

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

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## SECTION 01450 - SERVICES OF MANUFACTURER'S REPRESENTATIVE

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. General: The Equipment Supplier shall provide a qualified service technician to perform the duties herein described. All costs shall be included in the Contract price. Coordinate all site visits with the Owner and Installation Contractor to ensure equipment is ready and Owner is available.
- B. Field Investigation: Control, status, and interlocking requirements are based on specific manufacturers of equipment. Manufacturer representatives and/or electrical contractor shall field verify accuracy of the contract drawings and shall modify as needed to incorporate their equipment into the existing pump control scheme.
- C. Supervision of Installation: Supervision of the workers and advice to the Owner to insure that proper procedures are followed during equipment installation.
- D. Equipment Check-out:
  - 1. After installation of the listed equipment has been completed and the equipment is presumably ready for operation but before it is operated by others, a qualified service technician shall inspect, operate, test and adjust the equipment. The inspection shall include but shall not be limited to, the following points as applicable:
    - a. Soundness (without cracked or otherwise damaged parts).
    - b. Completeness in all details as specified.
    - c. Correctness of configurable parameters.
  - 2. The operation, testing and adjustment shall be as required to prove that the equipment has been installed properly and is capable of satisfactory operation under the conditions specified. On completion of his work, the manufacturer's qualified service technician shall submit in triplicate to the Engineer a complete signed report of the result of his inspection, operation, adjustments and tests. The report shall include detailed descriptions of the points inspected, tests and adjustments made, quantitative results obtained if such are specified and suggestions for precautions to be taken to ensure proper maintenance. The report also shall include a certificate that the equipment conforms to the requirements of the Equipment Contract and is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty null and void.
- E. Field Acceptance Tests: After the Engineer has reviewed the reports from the manufacturer's qualified service technician, the Installation Contractor shall coordinate arrangements to have the Equipment Supply Contractor(s)' technician(s) present when the field acceptance tests are made.

- F. Post Startup and Operation Training: Provision of **on-site** training to maintenance personnel in the operation and maintenance of the equipment after placing the equipment in full operation. Post startup and operation training shall be performed by a qualified service technician. For additional requirements on training, refer to Section 16480, Paragraph 3.02
- G. Post Startup Services: Provision of assistance to the Owner in the calibration, tuning and troubleshooting, plus any additional training which may be required during the year after the equipment is accepted by the Owner.
- H. The required minimum number of on-site manhours required for pre-startup operator training and for post-startup services are listed in Table A.

Spec. No.	Spec. Section	Tasks and Manhours	
		Pre-Startup Operator Training	Post-Startup Services
16621	Emergency Power System	4	8
16622	Automatic Transfer Switch and Paralleling Switchgear	4	8

END OF SECTION 01450

## SECTION 01500 - TEMPORARY FACILITIES

1. WATER. No water is available for the Contractor's use at the site. Water in reasonable amounts required for and in connection with the Work to be performed will be furnished at existing fire hydrants by Owner without charge to Contractor. Contractor shall furnish necessary pipe, hose, nozzles, tanks and tools and shall perform all necessary labor. Contractor shall make arrangements with Owner (who will fix the time, rate, and duration of each withdrawal from the distribution system) as to the amount of water required and the time when the water will be needed. Unnecessary waste of water will not be tolerated. Special hydrant wrenches shall be used for opening and closing fire hydrants. In no case shall pipe wrenches be used for this purpose.

2. POWER. Contractor shall provide all power for heating, lighting, operation of Contractor's plant or equipment, or for any other use by Contractor.

3. SANITARY FACILITIES. Contractor shall furnish temporary sanitary facilities at the Site, as provided herein, for the needs of all construction workers and others performing work or furnishing services on the Project.

Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least one toilet will be furnished for each 20 persons. Contractor shall enforce the use of such sanitary facilities by all personnel at the Site.

4. MAINTENANCE OF TRAFFIC. Contractor shall conduct his work to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross, obstruct, or close roads, driveways, and walks, whether public or private, Contractor shall provide and maintain suitable and safe bridges, detours, or other temporary expedients for the accommodation of public and private travel, and shall give reasonable notice to owners of private drives before interfering with them. Such maintenance of traffic will not be required when Contractor has obtained permission from the owner and tenant of private property, or from the authority having jurisdiction over public property involved, to obstruct traffic at the designated point.

The Contractor shall wherever necessary or as required by the Owner or the authority having jurisdiction provide, erect and maintain proper lights, signs, barricades, temporary guardrail, other traffic control devices, and furnish watchmen and flagmen as may be necessary to maintain safe traffic conditions in accordance with the Manual of Uniform Traffic Control Devices.

The Contractor shall be liable for and hold the Owner free and harmless from all damages occasioned in any way by its actions or neglect or those of its agents, employees, or workmen.

Work that requires the Contractor to shut down the road on weekends or at nights is considered an incidental to the project.

The Contractor at all times shall conduct the work in such manner as to cause as little interference as possible with private business or with private and public travel on the public highway. All damage (other than that resulting from normal wear and tear) to existing roads or pavements shall be repaired to withstand traffic in a safe condition.

Where the Contractor finds it necessary to remove excavated material to some other location, care should be taken not to overload trucks, which would in turn spill material out upon highways. Any such material spilled upon highways shall be immediately cleaned up from the location and properly disposed of per applicable regulation.

5. BARRICADES AND LIGHTS. All streets, roads, highways, and other public thoroughfares, which are closed to traffic, shall be protected by effective barricades on which shall be placed acceptable warning signs. Barricades shall be located at the nearest intersecting public highway or street on each side of the blocked section.

All barricades, signs, lights, and other protective devices shall be installed and maintained in conformity with applicable statutory requirements and, where within railroad and highway rights-of-way, as required by the authority having jurisdiction thereover.

6. TRAFFIC CONTROL. In addition to the requirements of the maintenance of traffic and barricades and lights paragraphs in this section, traffic control shall be as set forth herein.

During periods of inclement weather, rush-hour traffic, or during periods of unusually heavy traffic, the Owner may require the Contractor to cease operations in order to adequately handle the traffic. The Owner reserves the right to require the suspension or delay of certain operations, or the expediting of other operations, at no additional cost to the Owner, to provide a proper sequence of operations which will promote the satisfactory movement of traffic. The Owner may require additional barricades, lights, or flagmen at any time or at any place necessary for proper protection of traffic, but approval by the Owner of the Contractor's method of operation shall not relieve the Contractor of his responsibility to protect traffic.

7. FENCES. All existing fences affected by the Work shall be maintained by Contractor until completion of the Work. Fences which interfere with construction operations shall not be relocated or dismantled until written permission is obtained from the owner of the fence, and the period the fence may be left relocated or dismantled has been agreed upon. A copy of all written permissions shall be submitted to Owner. Where fences must be maintained across the construction easement, adequate gates shall be installed. Gates shall be kept closed and locked at all times when not in use.

On completion of the Work across any tract of land, Contractor shall restore all fences to their original or to a better condition and to their original location.

8. PROTECTION OF PUBLIC AND PRIVATE PROPERTY, DAMAGE TO EXISTING PROPERTY. Contractor shall protect, shore, brace, support, and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by his construction operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all sod, shrubs, trees in yards, parkways, and medians shall be restored to their original or better condition, whether within or outside the easement. Unless otherwise specified, all replacements shall be made with new materials.

Sodded and landscaped areas on improved property (yards) shall be disturbed only to the extent required to permit construction. Such areas shall not be used as storage sites for construction supplies and, insofar as practicable, shall be kept free from stockpiles or excavated materials.

Contractor shall be responsible for all damage to streets, curbs/gutters, roads, sidewalks, shoulders, ditches, embankments, culverts, bridges, traffic loops and other public or private property, regardless of location or character, which may be caused by transporting equipment, materials, or workers to or from the Work or any part or site thereof, whether by him or his Subcontractors. Contractor shall make satisfactory and acceptable arrangements with the owner of, or the agency or authority having jurisdiction over, the damaged property concerning its repair or replacement or payment of costs incurred in connection with the damage and shall furnish a written verification of all agreements.

Should the Contractor's operations damage any existing underground or aboveground utility, installation, structure, or other construction, Contractor shall immediately notify the authority owning or having jurisdiction over and control of the utility, installation, structure, or other construction, and make a report of such damage. A copy of the report shall be submitted to the Owner. The damaged item shall be repaired immediately by and at the expense of the Contractor unless otherwise specified or acceptable to the authority or owner having jurisdiction over, or to the Owner.

The utility, installation, structure, or other structures damaged by Contractor's operations shall be repaired, replaced, or otherwise restored in accordance with the local ordinances, standards, and requirements of the applicable authority or owner having jurisdiction thereover and shall be subject to acceptance by the Owner.

Special precaution shall be taken by the Contractor to avoid damage to existing overhead and underground utilities owned and operated by the Owner or other public or private utility companies.

With particular respect to existing underground utilities, all available information concerning their location has been shown on the drawings. While it is believed that the locations shown are reasonably correct, the Owner cannot guarantee the accuracy or adequacy of this information.

Before proceeding with the work, the Contractor shall confer with all public or private companies, agencies, property owners, or departments that own and operate utilities in the vicinity of the construction work. The purpose of this conference or conferences shall be to notify said companies, agencies or departments of the proposed construction schedule, verify the location of and possible interference with the existing utilities, fire protection systems, lawn irrigation systems, etc., that are shown on the plans, arrange for necessary suspensions of service, and make arrangements to locate and avoid interference with all other utilities (including house connections) that are not shown on the plans. The Owner has no objection to the Contractor arranging for said utility companies, agencies, or departments to locate and uncover their own utilities, however, insofar as the Owner is concerned, the Contractor shall bear entire responsibility for locating and avoiding or repairing damage to said existing utilities.

Where existing utilities or other underground structures are encountered, they shall not be displaced or molested unless necessary, and in such case they shall be replaced in as good or better condition than found as quickly as possible. All such utilities that are so damaged or molested shall be replaced at the Contractor's expense unless in the opinion of the Owner such damage was caused through no fault or action of the Contractor.

It is expected that the Contractor will be diligent in its efforts and use every possible means to locate existing utilities. Any claims for unavoidable damage based on improper or unknown locations will be thoroughly examined in the light of the Contractor's efforts to locate the said utilities or obstructions prior to beginning.

All water mains, and water service connections damaged by Contractor's operations will be repaired by the Owner at the expense of the Contractor unless other arrangements are made. Customer irrigation piping damaged by Contractor's operations shall be repaired by and at the cost of the Contractor.

All fire hydrants and water control valves shall be kept free from obstruction and available for use at all times.

9. TREE AND PLANT PROTECTION. Tree and plant protection is of prime importance. Except where otherwise authorized, indicated, or specified, no trees or plants shall be removed. Activities near trees that are to be protected shall be kept to a minimum. Tree protection shall also include trimming, when necessary, to prevent damage by construction equipment.

Trees and plants to be removed shall be removed in such a manner as to avoid injury to surrounding trees and plants. Contractor shall be responsible for disposal of all trees and plants removed or damaged.

10. HAUL ROUTES. Contractor shall obtain and pay for all necessary permits from the applicable authority having jurisdiction thereover to allow use of public streets to transport equipment and material to and from the Site. At such time the Contractor shall request the agency having jurisdiction to establish the haul routes. A copy of the permit and designated haul routes shall be provided to the Owner prior to commencement of Work in that area.

11. PARKING. Contractor shall provide and maintain suitable parking areas for the use of all construction workers and others performing work or furnishing services in connection with the Project, as required to avoid any need for parking personal vehicles where they may interfere with public traffic, Owner's operations, or construction activities.

Contractor shall clean up all parking areas used and return them to their original state.

The location of the Contractor's parking areas shall be acceptable to Owner, and the owner and tenant of private property or to the authority having jurisdiction over public property upon which the parking area will be located.

12. NOISE CONTROL. Contractor shall take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All construction machinery and vehicles shall be equipped with

practical sound-muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the Work.

13. DUST CONTROL. Contractor shall take reasonable measures to prevent unnecessary dust. Earth surfaces subject to dusting shall be kept moist with water or by application of a chemical dust suppressant. When practicable, dusty materials in piles or in transit shall be covered to prevent blowing dust.

Buildings or operating facilities, which may be affected adversely by dust, shall be adequately protected from dust. Existing or new machinery, motors, instrument panels, or similar equipment shall be protected by suitable dust screens. Proper ventilation shall be included with dust screens.

14. TEMPORARY DRAINAGE PROVISIONS. Contractor shall provide for the drainage of storm water and such water as may be applied or discharged on the Site in performance of the Work. Drainage facilities shall be adequate to prevent damage to the Work, the Site, and adjacent property.

Existing drainage channels and conduits shall be cleaned, enlarged, or supplemented as necessary to carry all increased runoff attributable to Contractor's operations. Dikes shall be constructed as necessary to divert increased runoff from entering adjacent property (except in natural channels), to protect Owner's facilities and the Work, and to direct water to drainage channels or conduits. Ponding shall be provided as necessary to prevent downstream flooding.

15. EROSION CONTROL. Contractor shall prevent erosion of soil on the Site and adjacent property resulting from his construction activities. Effective measures shall be initiated prior to the commencement of clearing, grading, excavation, or other operation that will disturb the natural protection.

Work shall be scheduled to expose areas subject to erosion for the shortest possible time, and natural vegetation shall be preserved to the greatest extent practicable. Temporary storage and construction buildings shall be located, and construction traffic routed, to minimize erosion. Temporary fast-growing vegetation or other suitable ground cover shall be provided as necessary to control runoff.

16. POLLUTION CONTROL. Contractor shall prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris, and other substances resulting from construction activities. No sanitary wastes will be permitted to enter any drain or watercourse other than sanitary sewers. No sediment, debris, or other substance will be permitted to enter sanitary sewers, and reasonable measures shall be taken to prevent such materials from entering any drain or watercourse.

17. CUSTOMER NOTIFICATION. The Contractor after approval by the Owner's representative shall notify all affected Owner customers 24 hours prior to interrupting water service. Notification shall be made by the Contractor using the Northern Kentucky Water District "Interruption of Service Notice". All Owner customers shall be notified prior to having their water turned-off to have ample time to draw water for use until service is restored. Under no circumstance shall a customer of the Owner be without water service overnight. If water service or existing water system cannot be interrupt during normal

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## SECTION 01700 - PROJECT CLOSEOUT

### PART 1 - GENERAL

#### 1.01 RELATED REQUIREMENTS

- A. Section 00700 - General Conditions.
- B. Section 01710 - Cleaning.
- C. Section 01720 - Project Record Documents.

#### 1.02 SUBSTANTIAL COMPLETION

- A. Contractor:
  - 1. Submit written certification to Engineer that project is substantially complete.
  - 2. Submit list of major items to be completed or corrected.
- B. Engineer will make an inspection within seven days after receipt of certification, together with the Owner's representative.
- C. Should Engineer consider that work is substantially complete:
  - 1. Contractor shall prepare, and submit to Engineer, a list of the items to be completed or corrected, as determined by on-site observation.
  - 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. Responsibilities of Owner and Contractor for:
      - (1) Insurance.
      - (2) Utilities.
      - (3) Operation of mechanical, electrical and other systems.
      - (4) Maintenance and cleaning.
      - (5) Security.
    - d. Signatures of:
      - (1) Engineer.
      - (2) Contractor.
      - (3) Owner.
  - 3. Contractor: Complete work listed for completion or correction, within designated time.
- D. Should Engineer consider that work is not substantially complete:
  - 1. The Engineer shall immediately notify Contractor, in writing, stating reasons.

2. Contractor: Complete work, and send second written notice to Engineer, certifying that Project, or designated portion of project is substantially complete.
3. Engineer will re-review work.

#### 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 on-site observation/review 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. The Engineer shall notify Contractor, in writing, stating reasons.
  2. Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to Engineer certifying that work is complete.
  3. Engineer will re-review the work.

#### 1.04 FINAL CLEANING UP

The work will not be considered as completed and final payment made until all final cleaning up has been done by the Contractor in a manner satisfactory to the Engineer. See Section 01710 for detailed requirements.

#### 1.05 CLOSEOUT SUBMITTALS

- A. Project Record Documents: to requirements of Section 01720.
- B. Operation and Maintenance Data: to requirements of particular technical specifications and Section 01730.
- C. Warranties and Bonds: to requirements of particular technical specifications and Section 01740.

#### 1.06 INSTRUCTION

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

1.07 FINAL APPLICATION FOR PAYMENT

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

1.08 FINAL CERTIFICATE FOR PAYMENT

- A. Engineer will issue final certificate in accordance with provisions of General Conditions.
- B. Should final completion be materially delayed through no fault of Contractor, Engineer may issue a Semi-final Certificate for payment.

END OF SECTION 01700

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## SECTION 01710 - CLEANING

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. On a continuous basis, maintain premises free from accumulations of waste, debris, and rubbish, caused by operations.
- B. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave Project clean and ready for occupancy.

#### 1.02 RELATED REQUIREMENTS

- A. Section 01700 - Project Closeout.
- B. Cleaning for Specific Products or 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 volatile or 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 without written permission from the Owner.
  - 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, trash, and rubbish.
- B. Wet down dry materials and rubbish to allay dust and prevent blowing dust.
- C. At reasonable intervals during progress of Work, clean site and public properties. Provide on-site containers for collection of waste materials, debris, trash, and rubbish.
- D. Remove waste materials, debris, trash, and rubbish from site when containers are full, or when directed by the Engineer or Owner's representative, but not less often than once weekly. Legally dispose of all waste materials, debris, trash, and rubbish at dumping areas off of Project site.
- E. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- F. The Contractor shall thoroughly clean all materials and equipment installed.

### 3.02 FINAL CLEANING

- A. Employ experienced workmen, or professional cleaners, for final cleaning.
- B. In preparation for substantial completion, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- C. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.
- D. Broom clean paved surfaces; rake clean other surfaces of grounds.
- E. Maintain cleaning until Project, or portion thereof, is occupied by Owner.
- F. The Contractor shall restore or replace existing property or structures as promptly and practicable as work progresses.

END OF SECTION 01710

## SECTION 01720 - PROJECT RECORD DOCUMENTS

### PART 1 - GENERAL

#### 1.01 RELATED REQUIREMENTS

- A. Section 00700 - General Conditions.
- B. Section 01300 - Submittals.

#### 1.02 MAINTENANCE OF DOCUMENTS

- A. Maintain at job site, one copy of:
  - 1. Contract Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Reviewed Shop Drawings.
  - 5. Change Orders.
  - 6. Other Modifications to Contract.
- B. Store documents in approved location, apart from documents used for construction.
- C. Provide files and racks for storage of documents.
- D. Maintain documents in clean, dry legible condition.
- E. Do not use record documents for construction purposes.
- F. Make documents available at all times for inspection by Engineer and Owner.

#### 1.03 MARKING DEVICES

Provide colored pencil or felt-tip marking pen for all marking.

#### 1.04 RECORDING

- A. Label each document "RECORD DRAWING" in 2-inch high printed letters.
- B. Keep record documents current.
- C. Do not permanently conceal any work until required information has been recorded.
- D. Contract Drawings: Legibly mark to record actual construction:
  - 1. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
  - 2. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
  - 3. Field changes of dimension and detail.

4. Changes made by Change Order or Field Order.
5. Details not on original Contract Drawings.

E. Specifications and Addenda: Legibly mark up each Section to record:

1. Manufacturer, trade name, catalog number, and Supplier of each product and item of equipment actually installed.
2. Changes made by Change Order or Field Order.
3. Other matters not originally specified.

F. Shop Drawings: Maintain as record documents; legibly annotate Shop Drawings to record changes made after review.

#### 1.05 SUBMITTAL

A. At completion of project, deliver record documents to Engineer.

B. Accompany submittal with transmittal letter, in duplicate, containing:

1. Date.
2. Project title and number.
3. Contractor's name and address.
4. Title and number of each record document.
5. Certification that each document as submitted is complete and accurate.
6. Signature of Contractor or his authorized representative.

END OF SECTION 01720

## SECTION 01730 - OPERATING AND MAINTENANCE DATA

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. The Equipment Supplier shall 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. Instruct Owner's personnel in the maintenance and operation of equipment and systems as outlined herein.
- C. 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 Installation Contractor in equipment installation.

#### 1.02 OPERATIONS AND MAINTENANCE MANUAL

- A. The Contractor shall provide to the Engineer the following maintenance and operations manuals:
  - 1. Five (5) final copies, with all required changes, in print format, plus three (3) copies in digital format (.pdf) on compact disc (CD), furnished to the Owner.
- B. The final form of the manuals shall be utilized in instructions of the Owner's personnel.

#### 1.03 FORM OF SUBMITTALS

- A. Prepare data in the form of an instructional manual for use by Owner's personnel.
- B. Format for hard copies:
  - 1. Size: 8-1/2 x 11 in.
  - 2. Drawings:
    - a. Provide reinforced punched binder tab, bind with text.
    - b. Fold drawings to the size of the text pages where feasible.
  - 3. 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.
  - 4. Cover: Identify each volume with types or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:
    - a. Title of Project.

- b. Name, address, website address (if available), and phone number of Contractor.
- c. Identity of general subject matter covered in the manual.

C. Binders:

- 1. Commercial quality, durable and cleanable, 3-hole, ring-type binders, with oil and moisture resistant hard covers.
- 2. When multiple binders are used, correlate the data into related consistent grouping.
- 3. Labeled on the front cover and side of each binder shall be the name of the Contract, and Contract Number.

1.04 CONTENT OF MANUAL

- A. Neatly typewritten data sheet for each section of the manual, arranged in systematic order.
  - 1. Supplier name, address and telephone number.
  - 2. A list of each product required to be included, indexed to the content of the volume.
  - 3. List, with each product, the name, address and telephone number of local source of supply for parts and replacement.
  - 4. Complete model #, serial #, ratings, description and part # of accessories, if any.
  - 5. The value of any programmable parameters that have been changed from the factory default setting.
- B. Product Data: Provide manufacturer's standard user manual and installation manual for the particular product.
- C. Drawings: Supplement product data with drawings as necessary to clearly illustrate:
  - 1. Relations of component parts of equipment and systems.
  - 2. Control diagrams.
- E. Copy of each warranty, bond and service contract issued: Provide information sheet for Owner's personnel.
  - 1. Proper procedures in the event of failure.
  - 2. Instances which might affect the validity of warranties or bonds.
- F. Preliminary copies of the manuals shall be submitted to the Engineer for review and approval. The manuals must be approved by the Engineer before the first completed motor starter is placed in service.

END OF SECTION 01730

## SECTION 01740 - WARRANTIES AND BONDS

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. Compile specified warranties and bonds.
- B. Co-execute submittals when required.
- C. Review submittals to verify compliance with Contract Documents.

#### 1.02 RELATED REQUIREMENTS

- A. Performance and Payment Bonds.
- B. Guaranty.
- C. General Warranty of Construction.
- D. Warranties and Bonds required for specific products: As listed in other Specification sections.

#### 1.03 WARRANTY BONDS OR CORPORATE GUARANTEES IN LIEU OF EXPERIENCE RECORD

- A. When specifically requested in the products and installation general provisions of a Specification section for a particular piece of equipment or product, a record of five (5) years of successful full-scale operation shall be required from the equipment manufacturer. This record of full-scale operation shall be from existing facilities utilizing the equipment or product specified, in an application similar to the application intended for this Project.
- B. The manufacturer shall certify in writing to the Contractor that it has the required record of successful full-scale operation. This certification shall be submitted by the Contractor with his construction materials and/or equipment data list. In the event the manufacturer cannot provide the five (5) year certification of experience to the Contractor, the Contractor shall furnish within thirty (30) days after the Notice of Award, a Warranty Bond or Corporation Guarantee from the equipment manufacturer written in the name of the Contractor and acceptable to the Owner. The Warranty Bond or Corporate Guarantee shall be kept in force for five (5) years from the Date of Substantial Completion of the Contract less the number of years of experience the manufacturer may be able to certify to the Engineer. As a minimum, the Bond or Guarantee shall be in force for one (1) year after the Date of Substantial Completion of the Contract. The Warranty Bond shall be written in an amount equivalent to the manufacturer's quotation, the Contractor's installation cost plus 100 percent (100%). The Warranty Bond or Corporate Guarantee will assure the Owner that, if in the judgment of the Engineer, the equipment does not perform its specified function, the Contractor shall remove the equipment and install equipment that will perform the specified function and the work by the Contractor shall be paid for by the Warranty Bond or Corporate Guarantee.

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## SECTION 02050 - DEMOLITION

### PART 1 - GENERAL

#### 1.01 GENERAL PROVISIONS

- A. Demolition work shall be included in the Contract.
- B. Prior to demolition of structures the following procedures shall be accomplished.
  - 1. Owner release of such structure.
  - 2. All electrical and mechanical services rerouted or shut off outside the area of demolition.
  - 3. Coordinate sequencing with Subcontractors.
  - 4. Survey and record the condition of existing facilities to remain in place that may be affected by the demolition operations. After demolition operations are completed, survey the conditions again and restore existing facilities to the pre-demolition condition, at no additional cost to the Owner.
- C. Demolition work shall include all items indicated on the Drawings.

#### 1.02 SCHEDULE

- A. Perform demolition and removal work at such a time and in such a manner, so as not to interfere with the Owner's operations, the work of other trades and other Contracts. Follow the Progress Schedule as agreed to and worked out with the Owner.
- B. Coordinate demolition and removal work with the work of other Contractors, so that the new construction work installed before, during and after the work of this Section may commence without undue delay.

#### 1.03 PROTECTION

- A. Do not close or obstruct streets, walks, and other facilities occupied and used by the Owner and the public, without prior written permission from the Owner and local authorities having jurisdiction.
- B. The structural stability of structures adjacent to, or affected by the work of this Contract will be the responsibility of the Contractor. Provide temporary shoring, and bracing where required.
- C. Provide all necessary shielding of existing materials and equipment, which are to remain, within or adjacent to work areas.
- D. Maintain in service and protect from damage the existing utilities that are indicated to remain.

#### 1.04 UTILITIES

Notify all utilities in sufficient time prior to razing operations to permit them to disconnect and remove and/or relocate the respective utility.

1.05 SALVAGEABLE MATERIALS

- A. The Owner shall have first right to salvage material.
- B. Salvage material and equipment to be retained by the Owner shall be located as directed by the Engineer.

1.06 DEMOLITION OPERATIONS

- A. Demolition of existing structures shall be conducted to one of the following standards:
  - 1. As shown on the Contract Drawings, or if not detailed on the Contract Drawings,
  - 2. Removed to a minimum of 36 inches below the finished grade, or
  - 3. Removed to 36 inches below the location of a new structure.
- B. Remove existing concrete using an abrasive saw to make initial cuts not less than 2 inches deep, between areas to be removed and areas to remain, providing a smooth, straight joint or cut line. Make cut lines in floor slabs parallel with walls.
- C. If existing abandoned utility lines extend into the area of construction being removed, remove abandoned lines to elevations shown on the drawings, or as directed by the Engineer outside of demolition area and plug permanently with steel cap or concrete.
- D. Adequate drainage of all structures demolished shall be provided by providing openings in the floors and walls of the portion of the structures remaining in place. The Contractor shall notify the Engineer, prior to backfilling the structures remaining in place, in order for him to inspect the drainage provision provided.
- E. Provide all temporary shoring and bracing as required to transfer loads of existing construction to remain from construction being removed. Remove and dispose of temporary support measures when new construction has been installed by other contractors.

END OF SECTION 02050

## SECTION 02100 - SITE PREPARATION

### PART 1 - GENERAL

#### 1.01 SCOPE OF WORK

- A. Furnish all labor, materials, and equipment required and perform all site preparation, complete as shown on the Drawings and as specified herein.
- B. Obtain all permits required for site preparation work prior to proceeding with the work, including clearing and tree removal.
- C. Unless otherwise shown on the Drawings or directed by the Engineer, the areas to be cleared, grubbed, and stripped shall generally consist of the entire project site, with the exception of those areas specifically designated to remain in an undisturbed, natural condition.

#### 1.02 RELATED WORK

- A. Demolition is included in Section 02050.
- B. Earthwork is included in Section 02222.

#### 1.03 SUBMITTALS

- A. Submit all permits required prior to clearing, grubbing, and stripping work.

### PART 2 - PRODUCTS (Not Used)

### PART 3 - EXECUTION

#### 3.01 CLEARING

- A. Cut and remove all timber, trees, stumps, brush, shrubs, roots, grass, weeds, rubbish, and any other objectionable material resting on or protruding through the surface of the ground.
- B. Preserve and protect trees and other vegetation designated on the Drawings or directed by the Engineer to remain as specified below.

#### 3.02 GRUBBING

- A. Grub and remove all stumps, roots in excess of 1-1/2 inch in diameter, matted roots, brush, timber, logs, concrete rubble, and other debris encountered to a depth of 18-inches below original grade or 18-inches beneath the bottom of foundations, whichever is deeper.

- B. Refill all grubbing holes and depressions excavated below the original ground surface with suitable materials and compact to a density conforming to the surrounding ground surface in accordance with Section 02222.

### 3.03 STRIPPING

- A. Strip topsoil from all areas to be occupied by buildings, structures, and roadways, and all areas to be excavated or filled.
- B. Topsoil shall be free from brush, trash, large stones and other extraneous material. Avoid mixing topsoil with subsoil.
- C. Stockpile and protect topsoil until it is used in landscaping, loaming, and seeding operations. Dispose of surplus topsoil after all work is completed.

### 3.04 DISPOSAL

- A. Dispose of material and debris from site preparation operations by hauling such materials and debris to an approved offsite disposal area. No rubbish or debris of any kind shall be buried on the project site.
- B. Burning of cleared and grubbed materials, or other fires for any reason will not be permitted.

### 3.05 PROTECTION

- A. Trees and other vegetation designated on the Drawings or directed by the Engineer to remain shall be protected from damage by all construction operations by erecting suitable barriers, guards, and enclosures, or by other approved means. Conduct clearing operations in a manner to prevent falling trees from damaging trees and vegetation designated to remain and to the work being constructed and so as to provide for the safety of employees and others.
- B. Maintain protection until all work in the vicinity of the work being protected has been completed.
- C. Do not operate heavy equipment or stockpile materials within the branch spread of existing trees.
- D. Immediately repair any damage to existing tree crowns, trunks, or root systems. Roots exposed and/or damaged during the work shall immediately be cut off cleanly inside the exposed or damaged area. Cut surfaces shall be treated with an acceptable tree wound paint, and topsoil spread over the exposed root area.
- E. When work is completed, all dead and downed trees shall be removed. Live trees shall be trimmed of all dead and diseased limbs and branches. All cuts shall be cleanly made at their juncture with the trunk or preceding branch without injury to the trunk or remaining branches. Cuts over 1 inch in diameter shall be treated with an acceptable tree wound paint.
- F. Restrict construction activities to those areas within the limits of construction designated on the Drawings, within public rights-of-way, and within easements provided by the

Owner. Adjacent properties and improvements thereon, public or private, which become damaged by construction operations shall be promptly restored to their original condition, to the full satisfaction of the property owner.

End of Section 02100

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## SECTION 02222 - EXCAVATION

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. Structure excavation.
- B. Shoring excavations.

#### 1.02 RELATED REQUIREMENTS

- A. Standard Specifications - Division 3.
- B. Section 03310 – Structural Concrete.

#### 1.03 PROTECTION

- A. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in or loose soil from falling into excavation.
- B. Underpin adjacent structures which may be damaged by excavation work, including service utilities and pipe chases.
- C. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
- D. Protect bottom of excavations and soil adjacent to and beneath foundations from frost.
- E. Grade excavation top perimeter to prevent surface water run-off into excavation.
- F. Contractor shall provide ample means and devices with which to intercept any water entering the excavation area.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. Subsoil: Excavated material, graded free of lumps larger than 12 inches, rocks larger than 12 inches, and debris.
- B. Pea Gravel: Mineral aggregate graded 1/4 inch to 5/8 inch, free of soil, subsoil, clay, shale, or foreign matter.

#### 2.02 COMPACTED FILL

- A. Soil used for compacted fill should be inorganic clayey soils free of deleterious debris or rocks whose largest dimension is no larger than three (3) inches. The soil should have a liquid limit (LL) of less than 50, a plasticity index (PI) of less than 30, and a

maximum dry density according to the standard Proctor compaction test of at least 100 pcf. The fill should be compacted to at least 95 percent of the SPMDD. The top foot of structural fill shall be compacted to 100 percent of the SPMDD.

- B. The moisture content of the compacted material shall be within two (2) percent of the optimum moisture content as determined by ASTM D698.

### PART 3 - EXECUTION

#### 3.01 PREPARATION

Identify required lines, levels, contours, and datum.

#### 3.02 EXCAVATION

- A. Excavate subsoil required for structure foundations, construction operations, and other work.
- B. Contractor is responsible to adequately brace open cuts and protect workmen and equipment from cave-in.
- C. Remove lumped subsoil, boulders, and rock up to 1/3 cu. yd., measured by volume.
- D. Correct unauthorized excavation at no cost to Owner.
- E. Fill over-excavated areas under structure bearing surfaces in accordance with direction by Engineer.
- F. Stockpile excavated material in area designated on site.

#### 3.03 EXCAVATION FOR STRUCTURES

- A. For structures, excavate to elevations and dimensions indicated, plus ample space for construction operations and inspection of foundations.

#### 3.04 REMOVAL OF WATER

- A. The Contractor, at his own expense, shall provide adequate facilities for promptly and continuously removing water from all excavation.
- B. To ensure proper conditions at all times during construction, the Contractor shall provide and maintain ample means and devices (including spare units kept ready for immediate use in case of breakdowns) with which to remove promptly and dispose properly of all water entering trenches and other excavations. Such excavation shall be kept dry until the structures and appurtenances to be built therein have been completed to such extent that they will not be floated or otherwise damaged.

- C. All water pumped or drained from the Work shall be disposed of in a suitable manner without undue interference with other work, damage to pavements, other surfaces, or property. Suitable temporary pipes, flumes, or channels shall be provided for water that may flow along or across the site of the Work.
- D. If necessary, the Contractor shall dewater the excavations by means of an efficient drainage wellpoint system which will drain the soil and prevent saturated soil from flowing into the excavation. The wellpoints shall be designed especially for this type of service. The pumping unit shall be designed for use with the wellpoints, and shall be capable of maintaining a high vacuum and of handling large volumes of air and water at the same time.
- E. The installation of the wellpoints and pump shall be done under the supervision of a competent representative of the manufacturer. The Contractor shall do all special work such as surrounding the wellpoints with sand or gravel or other work which is necessary for the wellpoint system to operate for the successful dewatering of the excavation.

### 3.05 UNAUTHORIZED EXCAVATION

If the bottom of any excavation is taken out beyond the limits indicated or prescribed, the resulting void shall be backfilled at the Contractor's expense with thoroughly compacted earth material or with Class B concrete, if the excavation was for a structure.

### 3.06 ELIMINATION OF UNSUITABLE MATERIAL

- A. No excavated materials shall be removed from the site of the work or disposed of by the Contractor except as directed or permitted.
- B. Surplus excavated materials suitable for backfill shall be used to backfill normal excavations in rock or to replace other materials unacceptable for use as backfill; shall be neatly deposited and graded so as to make or widen fills, flatten side slopes, or fill depressions. All work shall be as directed or permitted and without additional compensation.
- C. Surplus excavated materials not needed as specified above shall be hauled away and dumped by the Contractor, at his expense, at appropriate locations, and in accordance with arrangements made by him.

### 3.07 BACKFILLING - GENERAL

- A. Backfill areas to contours and elevations. Use unfrozen materials. The Contractor shall keep the foundation and subgrade free from water or unacceptable materials after the fill operations have started.
- B. Backfill systematically, as early as possible, to allow minimum time for natural settlement. Do not backfill over porous, wet, or spongy subgrade surfaces.

- C. Place and compact fill materials in continuous layers not exceeding eight (8) inches loose depth. Field density tests shall be performed on each lift.
- D. Employ a placement method so as not to disturb or damage foundation drainage.
- E. Maintain optimum moisture content of backfill material to attain required compaction density as specified. Material deposited on the fill that is too wet shall be removed or spread and permitted to dry, assisted by disking or blading, if necessary, until the moisture content is reduced to the specified limits.
- F. All crushed stone fill and crushed stone backfill under structures and pavements adjacent to structures shall be DGA per crushed stone per ODOT Construction and Material Specification, unless indicated otherwise. Fill and backfill materials shall be placed in layers not exceeding six (6) inches in thickness and compacted to 95 percent of maximum dry density.
- G. Backfill shall not be placed against or on structures until they have attained sufficient strength to support all loads to which subjected without distortion, cracking, or damage. Deposit soil evenly around the structure.
- H. Slope grade away from structures minimum two (2) inches in ten (10) feet, unless noted otherwise.
- I. Make changes in grade gradual. Blend slopes into level areas.
- J. Remove surplus excavation materials to designated areas.

### 3.08 COMPACTION REQUIREMENTS

- A. Ten feet around structures: Compact each layer of fill or backfill to a minimum of 95% standard proctor (ASTM D698) at or near its optimum moisture content (minus 2 to plus 3%).
- B. Sidewalks: Compact the top 6-inches of existing subgrade (and each 6-inch layer of fill if applicable) to a minimum of 95% modified proctor (ASTM D1557) at or near its optimum moisture content (minus 2 to plus 3%).

### 3.09 EXISTING UTILITIES AND OTHER OBSTRUCTIONS

Prior to the commencement of construction on the project, the Contractor shall contact the utility companies whose lines, above and below ground, may be affected during construction and verify the locations of the utilities as shown on the Contract Drawings. The Contractor shall ascertain from said companies if he will be allowed to displace or alter, by necessity, those lines encountered or replace those lines disturbed by accident during construction, or if the companies themselves are only permitted by policy to perform such work. If the Contractor is permitted to perform such work, he shall leave the lines in as good condition as were originally encountered and complete the Work as quickly as possible. All such lines or underground structures damaged or molested in the construction shall be replaced at the Contractor's expense, unless in the opinion of the Engineer, such damage was caused through no fault of the Contractor.

3.10 FIELD QUALITY CONTROL

Provide for visual inspection of rock surfaces.

End of Section 02222

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## SECTION 02370 - CAISSONS

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

- A. Work included: Extent of caissons is shown on drawings, including locations, diameters of shafts, estimated bottom elevations, top elevations, and details of construction.
- B. Related work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Division I of these Specifications.

#### 1.02 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of American Concrete Institute (ACI) "Standard Specification for the Construction of End Bearing Drilled Piers" (ACI 336.1), and as herein specified.
- B. Caisson Installer Qualifications: Not less than three successfully completed contracts with similar soil conditions, shaft sizes, depths and volumes of work contained in this project. Submit satisfactory proof of compliance to Contractor.
- C. Concrete Testing Services:
  - 1. Engage a testing laboratory acceptable to Owner (see Section 01400) to perform material evaluation tests and to design concrete mixes.
  - 2. Contractor will engage testing laboratory to perform sampling and testing during placement of concrete.
  - 3. Contractor will engage a testing laboratory to conduct tests of compression test specimens.
  - 4. Materials and installed work may require testing and retesting as directed by Contractor, at any time during progress of work. Allow free access to material stockpiles and facilities. Re-testing of rejected materials and installed work, shall be done at Subcontractor's expense.
- D. Geotechnical Services: Engage geotechnical engineering firm that performed site investigations to provide geotechnical engineering services for caisson installation.

#### 1.03 SUBMITTALS

- A. Certified Caisson Report for each caisson, recording actual elevation at bottom and top, elevation of rock (if any), final centerline location at top, variation of shaft from plumb, result of tests performed, actual allowable bearing capacity of bottom, levelness of bottom, seepage of water, still water level (if allowed to flood), elevation of bottom and top of any casing left in place, any unusual conditions, dates of starting excavation, completion of excavation, inspection, testing, and placement of concrete (including any delays in concreting and location of construction joints in shafts).

- B. Shop Drawings - Reinforcement: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required at openings through concrete structures.
- C. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design test as specified.
- D. Material Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Contractor. Material certificates shall be signed by manufacturer and Subcontractor, certifying that each material item complies with, or exceeds, specified requirements.

#### 1.04 JOB CONDITIONS

Existing Utilities: Locate existing underground utilities by careful hand excavation before starting caisson excavation operations. If utilities are to remain in place, provide protection from damage during caisson operations. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult Contractor immediately for directions as to procedure. Cooperate with Owner, and public or private utility companies in keeping their respective service and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

### PART 2 - PRODUCTS

#### 2.01 CONCRETE MATERIALS

Concrete materials as specified in Section 03310.

#### 2.02 REINFORCING MATERIALS

Reinforcing materials as specified in Section 03210.

#### 2.03 PROPORTIONING AND DESIGN OF MIXES

- A. Proportioning and design of concrete mixes as specified in Section 03310 and as noted.
- B. Design mix to produce concrete for caissons with minimum 28-day compressive strength of 3000 PSI.
- C. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement of not less than 1" and not more than 3".

## PART 3 - EXECUTION

### 3.01 CAISSON EXCAVATION

- A. General: Excavate holes for caissons to required bearing strata or elevation as shown on drawings.
- B. Caisson design dimensions shown are minimums. The design of caissons is based on assumed strata bearing capacity. If bearing strata is not capable of maintaining bearing capacity assumed, foundation system will be revised as directed by Contractor. Revisions will be paid for in accordance with contract conditions relative to changes in work.
- C. If required, install casings as excavation proceeds so that earth walls are maintained without spilling into shaft.
- D. Construction Tolerances: Locate centerline of caissons within the following tolerances:
  - 1. Maximum permissible variation of location not more than 1/24th of shaft diameter or 3", whichever is less.
  - 2. Shafts out of plumb, not more than 1.5% of length nor exceeding 12.5% of shaft diameter or 15", whichever is less.
  - 3. Concrete cut-off elevation, plus 1" to minus 3".
  - 4. If above tolerances are exceeded, provide corrective construction to compensate for excessive eccentricity, Submit proposed corrective construction methods to Contractor for review before proceeding.
- E. Obstructions:
  - 1. If rock, boulders, or other unforeseen obstruction are encountered which cannot be removed by standard caisson excavation methods, and if such obstructions are not indicated by available subsurface data, removal of such obstructions will be paid for in accordance with terms of contract relative to changes in work.
  - 2. Remove such obstructions by hand labor using air-powered tools, or by other safe methods recognized in construction industry.
- F. Classification of Rock:
  - 1. Rock is defined as material which cannot be drilled with a conventional earth auger or under reaming tool, and requires use of special rock augers, core barrels, air tools, blasting, or other methods of hand excavation. Earth seams, rock fragments, and voids included in rock excavation area will be considered rock for full volume of shaft from initial contract with rock for pay purposes.
  - 2. The work of this section includes demolition and removal of rock, boulders, concrete, masonry, and other subsurface obstructions which are clearly indicated by contract documents, or by available subsurface exploration data, and such work will not be considered a change in work.

G. Dewatering:

1. Provide and maintain pumping equipment to keep excavations free of water before placing concrete. If excessive water is encountered and drilling operations must be halted, consult with Contractor before using alternate methods of construction.
2. Conduct water to general site run-off ditches and disposal areas with discharge lines. Provide ditching as required to conduct water to site drainage facilities.

H. Inspection:

1. Each caisson must be inspected and tested before placing concrete.
2. Provide facilities as required to assist inspection and testing of excavations, and cooperate with inspecting and testing personnel to expedite work.
3. Notify Contractor and testing facility at least 6 hours prior to time excavations will be ready for inspection and tests.

I. Depth of Bearing Strata:

1. If indicated depth of shaft excavation is reached without developing required strata bearing capacity, immediately suspend excavation operations and inform Engineer. Contractor will determine procedures to be followed in each instance.
2. Where changes in indicated depth or dimensions are required, or additional soil borings are required, proceed with such work when directed in writing by Engineer.

J. Overexcavation: No payment will be made for extra length, when caisson shafts are excavated to a greater depth than required or authorized by Engineer, due to overdrilling by Contractor. Complete caisson and fill extra depth with concrete, if other conditions are satisfactory. Over-excavated shafts will be measured and paid for to original design authorized depth.

K. Excavated Material: Deposit and spread excavated material on site at locations as directed by Owner or Engineer.

### 3.02 REINFORCING STEEL AND DOWELS

Fabricate and erect reinforcing cages in shafts as one continuous unit. Place reinforcement accurately and symmetrically about axis of hole and hold securely in position during concrete placement.

### 3.03 CONCRETE PLACEMENT

A. General: Fill caissons with concrete immediately after inspection and approval by testing laboratory. Use protection sheets (cut out to receive concrete) over excavation openings, extending at least 12" beyond edge.

- B. Place concrete continuously and in a smooth flow without segregating and mixed materials. Provide mechanical vibration for consolidation of at least top 25' of each shaft.
- C. Place concrete by means of bottom discharge bucket, flexible drop chute, elephant truck hopper, or tremie. Use chutes or tremies for placing concrete where a drop of more than 25' is required, or pump concrete into place.
- D. Place concrete in-the-dry unless placing underwater is acceptable to Contractor. If water occurs, and it is impracticable to dewater caisson excavation, and reasonable attempts to seal off water flow have failed, allow water level to attain its normal level and place concrete by tremie method. Control placement operations to ensure that tremie is not broken during continuous placing from bottom to top. Other methods of depositing concrete underwater may be used, if acceptable to Contractor.
- E. Maintain a sufficient head of concrete to prevent reduction in diameter of caisson shaft by earth pressure and to prevent extraneous material from mixing with fresh concrete. Coordinate withdrawal of temporary casings with concrete placement operations to maintain a head of concrete approximately 5' above casing bottom.
- F. Stop concrete placement at cut-off elevation shown, screed level, and apply a scoured, rough finish.
- G. Interrupted placing operations of over one hour duration will require a cold joint installation. Leave resulting shaft surface approximately level and insert steel dowels. At resumption of concrete placing, clean off surface laitance, roughen as required, and slush with a 1-to-1 cement grout or commercial bonding agent before remainder of concrete is placed.

### 3.04 FIELD QUALITY CONTROL

- A. Field quality control for concrete as specified in Section 03310.
- B. Inspection and Tests for Caissons: Geotechnical engineer shall perform and report specified tests, and additional tests which may be required. Conduct tests and provide reports as soon as possible to not delay concreting operations for acceptable excavations.
  - 1. Bottom elevations and bearing capacities and lengths of caissons as shown on drawings are estimated from available soil data. Actual elevations, caisson lengths, and bearing capacities will be determined by soil testing facility from conditions found in excavations. Final evaluations and acceptance of data will be determined by Contractor R.
  - 2. Caissons Bearing on Earth: Make auger probe and visually inspect and classify soil.
  - 3. Caissons Bearing on Rock: The geotechnical engineer (see Section 01400) shall inspect each caisson bottom to determine whether voids, clay seams, or solution channels exist.

### 3.05 MEASUREMENT AND PAYMENT

- A. Basis of Bids: Bids shall be based on number of caissons, total length with each caisson penetrating five feet into bedrock and diameter of shaft as shown on drawings.
- B. Basis for Payment: Payment for caissons will be made on actual length of caissons in place and accepted. The actual length may vary to coincide with elevation where satisfactory bearing strata is encountered. Adjustments will be made on variation of total quantities, based on design dimensions for shafts.
- C. There will be no additional compensation for excavation, concrete fill, reinforcing, casings, or other costs due to unauthorized overexcavating. No payment will be made for rejected caissons.
- D. Prices quoted include full compensation for labor, materials, tools, equipment, and incidentals required for excavation, trimming, shoring, casings, dewatering, reinforcement, concrete, and other items for complete installation.

End of Section

## SECTION 02510 - BITUMINOUS PAVEMENT

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Provide bituminous pavement for following applications, with prepared subbase and compacted base.
  - 1. Restoration of damaged parking areas and driveways.
- B. Provide striping for parking, roadway, and handicapped markings in restored areas.

#### 1.02 SUBMITTALS

Submit for approval product data, test reports.

#### 1.03 QUALITY ASSURANCE

Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. Prime coat: Cut-back asphalt.
- B. Tack coat: Emulsified asphalt.
- C. Asphaltic cement: AASHTO M226 and as required by local authorities.
- D. Aggregate: Crushed stone or crushed gravel.
- E. Traffic paint: Quick-drying chlorinated-rubber alkyd type, color as approved.

### PART 3 - EXECUTION

#### 3.01 PAVEMENT REPLACEMENT

- A. Disturbed pavement shall be reconstructed to original lines and grades with bituminous material in such manner as to leave all such surfaces in fully as good or better condition than that which existed prior to these operations.
- B. Prior to excavation, the pavement shall be scored or cut to straight edges along each side of the construction area to avoid unnecessary damage to the remainder of the

## PART 2 - PRODUCTS

### 2.01 FORM MATERIALS

- A. Plywood; Douglas Fir species; medium density overlaid one side grade; sound, undamaged sheets with straight edges.
- B. Glass fiber fabric reinforced plastic forms; matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surface.
- C. Forms shall be sufficiently rigid to prevent displacement or sagging between supports and so constructed that the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.
- D. For surfaces to be given a rubbed finish, the form surface in contact with the concrete shall be made of heavy gage metal, new plywood (used plywood may not be used), tempered wood fiberboards with smooth surface, or similar material. Metal forms or form linings shall have square edges so that the concrete will not have fins or fluting. Forms shall not be pieced out by use of material different from those in the adjacent form or in such manner as will detract from the uniformity of the finished surface.
- E. For surfaces other than those to be given a rubbed finish, forms shall be made of wood, metal, or other acceptable material. Wooden forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots. Plywood shall be reasonably good as accepted. Metal forms shall be of an acceptable type for the work involved. Edges of forms in contact with concrete shall be flush within 1/16-inch.
- F. Forms for walls, columns, or piers shall have removable panels at the bottom for cleaning, inspection, and scrubbing in of bonding grout. Forms for thin sections (such as walls or columns) of considerable height shall be arranged with suitable openings so that the concrete can be placed in a manner that will prevent segregation and accumulations of hardened concrete on the forms or reinforcement above the fresh concrete, unless special spouts are used to place concrete, and so that construction joints can be properly keyed and treated.
- G. Forms for exposed surfaces shall be built with 3/4-inch chamfer strips attached to produce smooth, straight chamfers at all sharp edges of concrete.
- H. All forms shall be oiled with an acceptable nonstaining oil or liquid form coating before reinforcement is placed.
- I. Before form material is reused, all surfaces that are in contact with the concrete shall be thoroughly cleaned, all damaged places repaired, and all projecting nails withdrawn.

## 2.02 FORMWORK ACCESSORIES

- A. Form ties to be encased in concrete shall not be made of through bolts or common wire, but shall be made and installed as to embody the following features:
  - 1. After removal of the protruding part of the tie, there shall be no metal nearer than 1 inch to the face of the concrete.
  - 2. That part of the tie which is to be removed shall be at least 1/2-inch in diameter, or if smaller, it shall be provided with a wood or metal cone 1 inch long placed against the inside of the forms. Cones shall be carefully removed from the concrete after the forms have been stripped.
  - 3. Ties which pass through walls subject to hydrostatic pressure shall be provided with acceptable water stops, such as washers, securely fastened to the ties.
- B. Form Release Agent: Colorless material which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete. Form oil shall be placed prior to reinforcing steel when possible and surplus oil on form surfaces or reinforcing steel shall be removed.
- C. Fillets for Chamfered Corners: Wood strip type to the size and shape as shown on the Drawings (or 3/4-inch if not shown).
- D. Dovetail Anchor Slots: Minimum 10 gage thick galvanized steel; foam filled; release tape sealed slots; bent tab anchors securable to concrete formwork.
- E. Nails, spikes, lag bolts, through bolts, anchorages: Sized as required of strength and character to maintain formwork in place while placing concrete.

## PART 3 - EXECUTION

### 3.01 INSPECTION

Verify lines, levels and measurements before proceeding with formwork.

### 3.02 PREPARATION

Earth forms not permitted except for continuous strip footings of buildings.

### 3.03 ERECTION

- A. Provide bracing to ensure stability of formwork. Strengthen formwork liable to be overstressed by construction loads.
- B. Camber slabs and beams to achieve ACI 301 tolerances.
- C. Provide temporary ports in formwork to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain. Close ports with tight fitting panels, flush with inside face of forms, neatly fitted so that joints will not be apparent in exposed concrete surfaces.

- D. Concrete surfaces not exposed to view shall be formed with sound tight lumber or other material producing equivalent finish.
- E. Concrete surfaces to be exposed to view shall be formed with material that is not reactive with concrete surfaces and shall be equivalent in smoothness and appearance to that produced by new plywood panels conforming to PS 1, exterior type Grade B-B.

#### 3.04 APPLICATION OF RELEASE AGENT

Apply form release agent on formwork in accordance with manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.

#### 3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for work embedded in or passing through concrete.
- B. Coordinate work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.
- C. Install accessories in accordance with manufacturer's instructions, level and plumb. Ensure items are not disturbed during concrete placement.

#### 3.06 FORM REMOVAL

- A. Do not remove forms and bracing until concrete has sufficient strength to support its own weight and construction and design loads which may be imposed upon it. Remove load supporting forms when concrete has attained 75 percent of required 28-day compressive strength, provided construction is reshored.
- B. Reshore structural members due to design requirements or construction conditions to permit successive construction.
- C. Remove formwork progressively so that no unbalanced loads are imposed on structure.
- D. Do not damage concrete surfaces during form removal.

#### 3.07 CLEANING

- A. Clean forms to remove foreign matter as erection proceeds.
- B. Ensure that water and debris drain to exterior through clean out ports.
- C. During cold weather, remove ice and snow from forms. Do not use deicing salts. Do not use water to clean out completed forms unless formwork and construction proceed within heated enclosure. Use compressed air to remove foreign matter.

END OF SECTION 03100

## SECTION 03210 - REINFORCING STEEL

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. Reinforcing steel.
- B. Shop Drawings.

#### 1.02 RELATED WORK

- A. Section 02370 - Caissons.
- B. Section 03100 - Concrete Formwork.
- C. Section 03251 - Expansion and Contraction Joints.
- D. Section 03310 - Structural Concrete.

#### 1.03 REFERENCES

- A. ASTM A-615.
- B. ASTM A-616.
- C. ASTM A-617.
- D. ACI 351.
- E. ASTM A-120.
- F. ASTM A-185.

#### 1.04 SUBMITTALS

- A. Shop Drawings: The Contractor shall submit a complete set of shop drawings including schedules and bending drawings for all reinforcement used in the work in accordance with the "Manual of Standard Practice for Detailing Concrete Structures" (ACI 351).
- B. Submittals: The Contractor shall submit the shop drawings in accordance with Section 00700 and Section 01300.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. The minimum yield strength of the reinforcement shall be 60,000 pounds per square inch. Bar reinforcement shall conform to the requirements of ASTM A-615, A-616, or A-617. All bar reinforcement shall be deformed.

- B. Smooth dowels shall be plain steel bars conforming to ASTM A-615, Grade 40, or steel pipe conforming to ASTM A-120, Schedule 80. Pipe, if used, shall be closed flush at each end with mortar or metal or plastic cap.
- C. Welded wire fabric shall conform to ASTM 185, welded steel wire fabric for concrete reinforcement.
- D. Reinforcement supports and other accessories in contact with the forms for members which will be exposed to view in the finished work shall have approved high density polyethylene tips so that the metal portion shall be at least 1/4-inch from the form or surface. Supports for reinforcement, when in contact with the ground or stone fill, shall be precast stone concrete blocks.

## 2.02 FABRICATION

- A. Reinforcement shall be bent cold. It shall be bent accurately to the dimensions and shapes shown on the plans and to within tolerances specified in the CRSI Manual of Standard Practice.
- B. Reinforcing shall be shipped with bars of the same size and shape, fastened securely with wire and with metal identification tags giving size and mark.

## PART 3 - EXECUTION

### 3.01 PLACING AND FASTENING

- A. Before being placed in position, reinforcement shall be cleaned of loose mill and rust scale, dirt and other coatings that will interfere with development of proper bond.
- B. Reinforcement shall be accurately placed in positions shown on the Drawings and firmly held in place during placement and hardening of concrete by using annealed wire ties. Bars shall be tied at all intersections except where spacing is less than 1 foot in both directions, then alternate intersections may be tied.
- C. Distance from the forms shall be maintained by means of stays, blocks, ties, hangers or other approved supports. If fabric reinforcement is shipped in rolls, it shall be straightened into flat sheets before being placed.
- D. **Before any concrete is placed, the Engineer shall have inspected the placing of the steel reinforcement and given permission to deposit the concrete. Concrete placed in violation of this provision will be rejected and thereupon shall be removed.**
- E. Unless otherwise specified, reinforcement shall be furnished in the full lengths indicated on the Drawings. Splicing of bars, except where shown on the Drawings, will not be permitted without the approval of the Engineer. Where splices are made, they shall be staggered insofar as possible.
- F. Wire mesh reinforcement shall be continuous between expansion joints. Laps shall be at least one full mesh plus 2 inches, staggered to avoid continuous lap in either direction and securely wired or clipped with standard clips.

- G. Dowels shall be installed at right angles to construction joints and expansion joints. Dowels shall be accurately aligned parallel to the finished surface, and shall be rigidly held in place and supported during placing of the concrete. One end of dowels shall be oiled or greased or dowels shall be coated with high density polyethylene with a minimum thickness of 14 mils.

END OF SECTION 03210

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## SECTION 03310 - CAST-IN-PLACE STRUCTURAL CONCRETE

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

The work in this section shall include all formwork, shoring, bracing, anchorage, concrete reinforcement and accessories for cast-in-place concrete.

#### 1.02 GENERAL REQUIREMENT

All concrete construction shall conform to all applicable requirements of ACI 301, ACI 318 and ACI 350 R, except as modified by the supplemental requirements specified herein.

#### 1.03 RELATED WORK

- A. Section 02222 - Excavation.
- B. Section 02370 - Caissons.
- C. Section 03100 - Concrete Formwork.
- D. Section 03370 - Concrete Curing.
- E. Section 05500 - Miscellaneous Metals, Fasteners, and Special Finishes.

#### 1.04 REFERENCES

- A. The Contractor shall obtain and have available in the field office at all times the following references:
  - 1. Specifications for Structural Concrete for Building ACI 301 (latest revision).
  - 2. Field Reference Manual: Specifications for Structural Concrete for Buildings ACI Sp-15.
  - 3. Manual of Standard Practice - CRSI (latest revision).
  - 4. Placing Reinforcing Bars - CRSI (latest revision).
  - 5. Building Code Requirements for Reinforced Concrete ACI 318.
  - 6. Environmental Engineering Concrete Structures ACI 350R.
- B. The following standard shall also apply to this work:
  - 1. ASTM C-143.
  - 2. ASTM C-150.
  - 3. ASTM C-33.
  - 4. ASTM C-260.
  - 5. ASTM C-494.
  - 6. ASTM A-615.
  - 7. ASTM D-638.
  - 8. ASTM D-695.

9. ASTM D-570.
10. ASTM D-1252.
11. ANSI A-116.1.
12. ASTM A-120.
13. ASTM C-94.
14. ASTM D-2146.
15. Federal Specifications FF-S-325.

#### 1.05 SUBMITTALS

- A. The Contractor shall submit the following data to the Engineer for review:
  1. Proposed mix designs, test results, plotted curves and all other substantiating data as required by ACI 301.
  2. Mix designs for all mixes proposed or required to be used, including all mixes containing admixtures.
  3. A certified copy of the control records of the proposed production facility establishing the standard deviation as defined in ACI 301.
- B. Certification attesting that admixtures equal or exceed the physical requirements of ASTM C-494 for Type A admixture and when required, for Type D admixture.
- C. Notarized certifications by the manufacturer that epoxy bonding adhesive meets the specification contained herein.
- D. Drawings showing locations of all proposed construction joints.
- E. Shop drawing for reinforcing steel showing bar schedules, location, and splices.

#### 1.06 QUALITY ASSURANCE

- A. Consistency:
  1. Concrete shall be of such consistency that it can be worked readily into all parts of the forms and around embedded work, without permitting the materials to segregate, or free water to collect on the surface. Consistency shall be measured by the ASTM Standard Test Method for Slump of Portland Cement Concrete, Designation C143. The consistency of concrete shall be as given in Table I, of the standard.
  2. Slump tests shall be made in the field by the Contractor.
- B. Compression Tests:
  1. During the progress of the work, at least one set of four compression test cylinders shall be made for each 50 cubic yards of concrete or major fraction thereof, and not less than one such set for each type of concrete for each days' pouring. Cylinders made in the field shall be made and cured in accordance with ASTM Standard Method of Making and Curing Concrete Test Specimens in the Field, Designation C31, except that wherever possible molds shall be left on cylinders until they have reached the laboratory.

2. One (1) cylinder of each set shall be broken in accordance with ASTM C-39 at seven (7) days and two (2) at twenty-eight (28) days. Two (2) copies of these test results shall be submitted to the Engineer on the same day of the tests. The remaining cylinder shall be reserved for future testing if required.
3. On evidence of these tests, any concrete that fails to meet the specified strength requirements shall be strengthened or replaced as directed by the Engineer at the Contractor's expense.

C. Inserts in Concrete by Other Trades:

1. All trades shall be notified, at the proper time, to install items to be embedded in concrete.
2. All castings, inserts, conduits, and other metalwork shall be accurately built into or encased in the concrete by the Contractor as directed and all necessary precautions shall be taken to prevent the metalwork from being displaced or deformed.
3. Anchor bolts shall be set by means of substantial templates.
4. The Contractor shall build into new concrete against which facing brick or tile is to be laid, suitable, acceptable, non-corrodible metal, dovetail grooves for ties for securing the brickwork to the concrete.

D. Testing:

1. All testing shall be in accordance with provisions of ACI 301.
2. Testing services listed in ACI 301 shall be performed by a testing agency acceptable to the Engineer. Testing services to meet the requirements of ACI shall be paid for by the Contractor at his expense. Test shall be made for each 50 cubic yards of concrete and/or each day concrete is placed.

E. Additional Requirements:

1. Unless otherwise directed by the Engineer, the vertical surfaces of all footings shall be formed. Excavations and reinforcement for all footings shall have been inspected by the Engineer before any concrete is placed.
2. The installation of underground and embedded items shall be inspected before slabs are placed. Pipes and conduits shall be installed below the concrete unless otherwise indicated. Fill required to raise the subgrade shall be placed as specified in Division 2. Unless shown otherwise, porous fill not less than 6 inches in compacted thickness shall be installed under all slabs, tank bottoms, and foundations. The fill shall be leveled and uniformly compacted to a reasonably true and even surface. The surfaces shall be clean, free from frost, ice, mud and water. Where indicated, waterproof paper, polyethylene sheeting of nominal 4-mil minimum thickness, or polyethylene coated burlap shall be laid over surfaces receiving concrete.

- F. Hot Weather Requirements: Placing of concrete under conditions of high temperatures, low humidity or wind shall be done in accordance with the American Concrete Institute "Hot Weather Concreting" (ACI 305R).

- G. Cold Weather Requirements: Cold weather concreting procedures and precautions shall conform with American Concrete Institute "Cold Weather Concreting" (ACI 306R).

## PART 2 - PRODUCTS

2.01 Contractor shall supply concrete only from an approved ready mixed concrete supplier.

### 2.02 CONCRETE MIX WITHOUT FLY ASH

Structural concrete of the various classes required shall be proportioned by ACI 301, in addition to the limitation herein listed, to produce the following minimum 28-day compressive strengths:

#### A. Selection of Proportions for Class A Concrete:

1. 4,500 psi compressive for strength at 28 days.
2. Type II cement plus water reducing, dispersing agent and air. Type IP cement may be used in place of Type II.
3. Maximum water/cement plus water reducing dispersing agent ratio = 0.42.
4. Minimum cement content = 564 pounds (6.0 bags)/cubic yards concrete.
5. Nominal maximum size coarse aggregate = No. 67 (3/4-inch maximum) or No. 57 (1-inch maximum).
6. Air content = 6 percent plus or minus 2 percent by volume.
7. Slump = 2 inches to 3 inches in accordance with ASTM C-143.

#### B. Selection of proportions for Class B concrete:

1. 3,000 psi compressive strength at 28 days.
2. Type I cement plus water reducing dispersing agent and air.
3. Maximum (water)/(cement plus water reducing dispersing agent) ratio = 0.50.
4. Minimum cement content = 432 pounds (4.5 bags)/cubic yards concrete.
5. Nominal maximum size coarse aggregate = No. 67 (3/4-inch maximum) or No. 57 (1-inch maximum).
6. Air content = 6 percent plus or minus 2 percent by volume.
7. Slump = 3 inches to 4 inches in accordance with ASTM C-143.

### 2.03 OPTIONAL CONCRETE MIX USING FLY ASH

#### A. Selection of Proportions for Class A Concrete:

1. 4,500 psi compressive for strength at 28 days.
2. Type II cement plus water reducing dispersing agent and air.
3. Maximum (water)/(cement plus water reducing dispersing agent) ratio = 0.42.
4. Minimum cement content = 517 pounds (5.5 bags)/cubic yards concrete.
5. Maximum Fly Ash Content = 71 pounds/cubic yards
6. Nominal maximum size coarse aggregate = No. 67 (3/4-inch maximum) or No. 57 (1-inch maximum).
7. Air content = 6 percent plus or minus 2 percent by volume.
8. Slump = 2 inches to 3 inches in accordance with ASTM C-143.

B. Selection of Proportions for Class B Concrete:

1. 3,000 psi compressive strength at 28 days.
2. Type II cement plus water reducing dispersing agent and air.
3. Maximum (water)/(cement plus water reducing dispersing agent) ratio = 0.50.
4. Minimum cement content = 376 pounds (4.0 bags)/cubic yards concrete.
5. Maximum Fly Ash Content = 94 pounds/cubic yards.
6. Nominal maximum size coarse aggregate = No. 67 (3/4-inch maximum) or No. 57 (1-inch maximum).
7. Air content = 6 percent plus or minus 2 percent by volume.
8. Slump = 3 inches to 4 inches in accordance with ASTM C-143.

C. Applicable Standards:

1. ANSI C 311, "Standard Methods of Sampling and Testing Fly Ash for Use as an Admixture in Portland Cement Concrete".
2. ANSI C 618, "Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete".

D. Concrete shall be used as follows:

1. Class A concrete for all concrete work except as noted below.
2. Class B concrete for fill concrete, thrust blocks, drilled piers, and where indicated on the Drawings.

E. All testing shall be or have been performed by an approved independent testing laboratory.

F. Cement for exposed concrete shall have a uniform color classification.

G. Type II cement conforming to ASTM C-150 shall be used in all structural concrete. The alkali content shall not exceed 0.6 percent calculated as sodium oxide. Type IP Cement may be used in place of Type II cement, for mix designs not using fly ash.

H. Coarse aggregate shall conform to all requirements of ASTM C-33.

I. Manufactured sand shall not be used as fine aggregate in concrete.

## 2.04 FLY ASH CONCRETE

A. In the absence of a verified and acceptable history of fly ash concrete mixes, the following procedure is required to establish the quality of the concrete mix.

B. Trial batches must be made starting thirty (30) days ahead of initial concrete pour. Four (4) mixes shall be designed and produced at no cost to the Owner or the Engineer as follows:

1. Mix using Type II cement with water reducing admixture for normal temperatures (Class A).
2. Mix using Type II cement with water reducing admixture for cold weather temperatures (Class A).

3. Mix using Type II cement with water reducing admixture for hot weather temperatures (Class A).
  4. Mix using Type II cement with water reducing admixture for normal weather temperatures (Class B).
- C. Four (4) test cylinders shall be cast for each of the four (4) mixes. Two (2) cylinders shall be broken at 7 days, and two (2) cylinders shall be broken at 28 days, for each of the four (4) mixes. The trial batch design report shall include strength breaks at 7 days and 28 days, air content, etc.
  - D. The water-reducing, cement dispersing admixture (such as Master Builders Pozzolith 344-N, Nox-Crete Plastiflow, Plastocrete 161 by SIKA Chemical Company, or approved equivalent) used in fly ash concrete, shall be a normal, accelerated, or retarded hardening admixture. The admixture shall be used at optimum dosage to offset the slow strength development and setting characteristics of the fly ash. Only those brands of admixture that can provide readily available field service on short notice to provide field services, inspection, and assistance, will be acceptable.
  - E. Recent mill reports shall be submitted prior to the use of fly ash concrete, with continuing reports on a regular basis during the project. Maximum loss on ignition (LOI) shall be 6 percent.
  - F. Tests for air content shall be made twice a day at the jobsite prior to placement, for all mixes containing fly ash.

## 2.05 ADMIXTURES

- A. An air entraining admixture shall be used on all concrete and shall be the neutralized vinsol resin type such as Master Builders MB-VR, or Euclid Chemical Co. AIR-MIX or equivalent. The admixture shall meet the requirements of ASTM C-260. Certification attesting to the percent of effective solids and compliance of the material with ASTM C-260 shall be furnished, if requested.
- B. A water reducing, set controlling admixture (non-lignin type) shall be used in all concrete. The admixture shall be a combination of polyhydroxylated polymers including catalysts and components to produce the required setting time based on job site conditions, specified early strength development, finishing characteristics required, and surface texture, as determined by the Engineer.
- C. Certification shall be furnished attesting that the admixture exceeds the physical requirements of ASTM C-494, Type A, water reducing and normal setting admixture, and when required, for ASTM C-494, Type D, water reducing and retarding admixture when used with local materials with which the subject concrete is composed.
- D. The admixture manufacturer, when requested, shall provide a qualified concrete technician employed by the manufacturer to assist in proportioning concrete for optimum use. He also will be available when requested to advise on proper addition of the admixture to the concrete and on adjustment of the concrete mix proportions to meet changing job conditions.

- E. The use of admixtures to retard setting of the concrete during hot weather, to accelerate setting during cold weather, and to reduce water content without impairing workability will be permitted if the following conditions are met.
- F. The admixture shall conform to ASTM C-494 except that the durability factor for concrete containing the admixture shall be at least 100 percent of control, the water content a maximum of 90 percent of control and length change shall not be greater than control, as defined in ASTM C-494.
- G. Where the Contractor finds it impractical to employ fully the recommended procedures for hot weather concreting, the Engineer may at his discretion require the use of a set retardant admixture for mass concrete greater than 2.5 feet thick and for all concrete whenever the temperature at the time concrete is cast exceeds 80 degrees F. The admixture shall be selected by the Contractor subject to the review of the Engineer. The admixture and concrete containing the admixture shall meet all the requirements of these Specifications. Preliminary tests of this concrete shall be required at the Contractor's expense.
- H. Admixtures shall be used in concrete design mixes in the same manner and proportions as in the field so that the effects of the admixtures are included in preliminary tests submitted to the Engineer for review prior to the start of construction.
- I. When more than one admixture is used, all admixtures shall be compatible. They should preferably be by the same manufacturer.
- J. Calcium chloride will not be permitted as an admixture in any concrete.

## 2.06 WATER

The water for concrete shall be potable water. Site added mix water, where allowed, shall also be potable.

## 2.07 AGGREGATES

- A. Fine aggregates shall be natural sand having clean, hard, uncoated grains, free from injurious amounts of clay, dust, organic matter or other deleterious substances, and shall conform to ASTM C-33.
- B. Coarse aggregates shall be crushed stone having clean, hard, uncoated particles, and shall be free from injurious amounts of soft, friable, thin, elongated or laminated pieces. Shale may not be used as aggregate. Coarse aggregates shall conform to ASTM C-33 and shall not exceed the following maximum sizes:
  1. 3/4-inch for slabs, beams, girders, and walls.
  2. 1-inch for all other concrete.

## 2.08 TESTING AGGREGATES AND DETERMINING PROPORTIONS

- A. No concrete shall be used in the work until the materials and mix design have been accepted by the Engineer.

- B. The conformity of aggregates to the specifications hereinbefore given shall be demonstrated and determined by tests per ASTM C-33 made with representative samples of the materials to be used on the work.
- C. The actual proportions of cement, aggregates, admixtures and water necessary to produce concrete conforming to the requirements set forth shall be determined by making test cylinders using representative samples of the materials to be used in the work. A set of four (4) standard 6-inch cylinders shall be made and cured per ASTM C-31. Two (2) shall be tested at 7 days and two (2) at 28 days per ASTM C-39. The slump shall not be less than the greatest slump expected to be used in the work.
- D. Reports on the tests and a statement of the proportions proposed for the concrete mixture, shall be submitted in triplicate to the Engineer for review as soon as possible, but not less than five (5) days prior to the proposed beginning of the concrete work. If the Contractor furnishes in writing, similar, reliable detailed information from an acceptable source, and of date not more than four (4) months prior to the time when concrete will be used on this project, the above requirements for laboratory tests may be modified by the Engineer. Such data shall derive from mixtures containing constituents, including the admixtures where used, of the same types and from the same sources as will be used on this project.
- E. The Engineer shall have the right to make check tests of aggregates and concrete, using the same materials, and to order changes as may be necessary to meet the specified requirements.
- F. The Contractor may request permission to add water at the job site, and when the addition of water is permitted by the Engineer, the quantity added shall be the responsibility of the Contractor and in no case shall the total water per bag of cement exceed that determined by the designed mix.
- G. All concrete exposed to weather, such as foundations, walls, exterior steps and retaining walls, etc. shall be air entrained.
- H. If concrete of the required characteristics is not being produced as the work progresses, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure concrete of the specified quality. The Contractor shall make such changes at his own expense and no extra compensation will be allowed because of such changes.

## 2.09 MIXING

All central plant and rolling stock equipment and methods shall conform to the Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers' Bureau of the National Ready Mixed Concrete Assn., as well as the ACI Standards for Measuring, Mixing and Placing Concrete (ACI 614), and with Sections 7 to 14, inclusive, of the ASTM Standard Specification for Ready Mixed Concrete, Designation C94-78a, insofar as applicable.

## 2.10 WATERSTOPS

See Section 03251 - Expansion and Contraction Joints.

## PART 3 - EXECUTION

### 3.01 PLACING AND COMPACTING CONCRETE

- A. At least 20 hours before the Contractor proposes to make any placement of concrete, he shall notify the Engineer of his intention and planned procedure. Unless otherwise permitted, the work shall be so executed that a section begun on any day shall be completed during daylight of the same day.
- B. Ready mixed concrete shall be transported to the site in watertight agitator or mixer trucks. The quantity of concrete to be mixed or delivered in any one batch shall not exceed the rated capacity of the mixer or agitator for the respective conditions as stated on the nameplates.
- C. Central mixed concrete shall be plant mixed a minimum of 1-1/2 minutes per batch, and then shall be truck mixed or agitated a minimum of 8 minutes. Agitation shall begin immediately after the premixed concrete is placed in the truck and shall continue without interruption until discharge. For transit mixed concrete, the major portion of the mixing water shall be added and mixing started immediately after the truck is charged.
- D. The amount of water initially added shall be recorded on the delivery slip for the Engineer's information, no additional water shall be added, either in transit or at the site, except as directed. Mixing (at mixing speed) shall be continued for at least 10 minutes followed by agitation without interruption until discharge. Concrete shall be discharged at the site within 1-1/2 hours after water was first added to the mix, and shall be mixed at least 5 minutes after all water has been added.
- E. Concrete which has become compacted or segregated during transportation to or on the site of the work shall be satisfactorily remixed just prior to being placed in the forms.
- F. Partially hardened concrete shall not be deposited in the forms. The retempering of concrete which has partially hardened (that is, the remixing of concrete with or without additional cement, aggregate, or water) will not be permitted.
- G. The concrete shall be mixed only in the quantity required for immediate use. Concrete that has developed an initial set shall not be used. The Contractor shall have sufficient plant capacity and transporting apparatus to insure continuous delivery at the rate required.
- H. The temperature of the concrete mixture immediately before placement shall be between 50 degrees F and 90 degrees F.
- I. Concrete mixed in stationary mixers and transported by nonagitating equipment shall be placed in the forms within 45 minutes from the time ingredients are charged into the mixing drum. Concrete that is truck mixed or transported in truck mixers or truck agitators shall be delivered to the site of the work and discharge completed in the forms within the time specified in paragraph 10.7 of ASTM C-94, except that when the concrete temperature exceeds 85 degrees F, the time shall be reduced to 30 minutes. Transit mixed concrete that is completely mixed at the site of concrete placement or batched cement and aggregates transported to mixers shall be placed in the forms within 1-1/2

hours after cement has been added. Concrete shall be placed in the forms within 15 minutes after discharge from the mixer at the job site.

- J. If concrete is placed by pumping, no aluminum shall be used in any parts of the pumping system which contact or might contaminate the concrete. Aluminum chutes and conveyors shall not be used.
- K. No concrete shall be placed on frozen subgrade or in water, or until the subgrade, forms, and preliminary work have been accepted. No concrete shall be placed until all materials to be built into the concrete have been set and have been accepted by the various trades and by the Engineer. All such materials shall be thoroughly clean and free from rust, scale, oil, or any other foreign matter.
- L. Forms and excavations shall be free from water and all dirt, debris, and foreign matter when concrete is placed. Except as otherwise directed, wood forms and embedded wood called for or allowed shall be thoroughly wetted just prior to placement of concrete.
- M. Concrete placed at air temperatures below 40 degrees F shall have a minimum temperature of 50 degrees F and a maximum of 70 degrees F when placed.
- N. Chutes for conveying concrete shall be metal or metal lined and of such size, design, and slope as to ensure a continuous flow of concrete without segregation. The slope of chutes shall have approximately the same slope. The discharge end of the chute shall be provided with a baffle, or if required, a spout and the end of the chute. The spout shall be kept as close as practicable to, but in no event more than 5 feet above the surface of the fresh concrete. When the operation is intermittent, the chute shall discharge into a hopper.
- O. In thin sections of considerable height (such as walls and columns), concrete shall be placed in such manner as will prevent segregation and accumulations of hardened concrete on the forms or reinforcement above the mass of concrete being placed. To achieve this end, suitable hoppers spouts with restricted outlets, etc. shall be used as required or permitted unless the forms are provided with suitable openings.
- P. Chutes, hoppers, spouts, etc. shall be thoroughly cleaned before and after each run and the water and debris shall not be discharged inside the form.
- Q. For any one placement, concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section, and so as to maintain until the completion of the unit, an approximately horizontal plastic surface.
- R. No wooden spreaders shall be left in the concrete.
- S. During and immediately after being deposited, concrete shall be thoroughly compacted by means of suitable tools and methods, such as internal type mechanical vibrators operating at not less than 5,000 rpm. or other tool spading to produce the required density and quality of finish. Vibration shall be done only by experienced operators and shall be carried in such manner and only long enough to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents, "pumping" of air, or other objectionable results.

- T. The concrete shall be thoroughly rodded and tamped about embedded materials so as to secure proper adhesion and prevent leakage. Care shall be taken to prevent the displacement of such materials during concreting.
- U. The distance between construction joints shall not exceed 25 feet for all concrete construction and not less than 48 hours shall elapse between casting of adjoining units unless these requirements are waived by the Engineer. Provision shall be made for jointing successive units as indicated or required. Where joints are not shown on the Drawings, they are required to be made at a spacing of approximately 25 feet. Additional construction joints required to satisfy the 25 foot spacing requirement shall be located by the Contractor subject to the review of the Engineer. The Contractor shall submit for review Drawings separate from the steel reinforcing Drawings, showing the location of all proposed construction joints. All construction joints shall be prepared for bonding as specified in ACI Standard 301. Joints in walls and columns shall be maintained level.
- V. Formwork for beam soffits and slabs and other parts that support the weight of concrete shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise specified or permitted.

### 3.02 BONDING CONCRETE AT CONSTRUCTION JOINTS

- A. In order to secure full bond at construction joints, the surface of the concrete previously placed (including vertical, inclined, and substantially horizontal areas) shall be thoroughly cleaned of foreign materials and laitance, if any, and then roughened.
- B. The previously placed concrete at the joint shall be free of standing water.
- C. Waterstops shall be used on all construction joints below water level.

### 3.03 CURING AND PROTECTION

- A. All concrete, particularly slabs and including finished surfaces, shall be treated immediately after concreting or cement finishing is completed, to provide continuous moist curing for at least seven days, regardless of the adjacent air temperature. Walls and vertical surfaces may be covered with continuously saturated burlap, or kept moist by other acceptable means. Horizontal surfaces, slabs, etc., shall be ponded to a depth of 1/2-inch wherever practicable, or kept continuously wet by the use of lawn sprinklers, a complete covering of continuously saturated burlap, or by other acceptable means.
- B. For at least seven days after having been placed, all concrete shall be so protected that the temperature at the surface will not fall below 45 degrees F. The methods of protecting the concrete shall be subject to the review of the Engineer.
- C. No manure, salt, or other chemicals shall be used for protection.
- D. The above mentioned 7-day periods may be reduced to 3 days in each case if high-early-strength cement is allowed to be used in the concrete.
- E. Wherever practicable, finished slabs shall be protected from the direct rays of the sun to prevent checking and crazing.

### 3.04 TRIMMING AND REPAIRS

- A. The Contractor shall use suitable forms, mixture of concrete, and workmanship so that concrete surfaces, when exposed, will not require patching. Concrete which, in the opinion of the Engineer has excessive honeycomb, aggregate pockets, or depressions will be rejected and the Contractor shall, at his own expense remove the entire section containing such defects and replace it with acceptable concrete.
- B. As soon as the forms have been stripped and the concrete surfaces exposed, fins and other projections shall be removed, recesses left by the removal of form ties shall be filled and surface defects which do not impair structural strength shall be repaired.
- C. Defective concrete shall be cut perpendicular to the surface until sound concrete is reached, but not less than 1-inch deep. The remaining concrete shall be thoroughly roughened and cleaned. Concrete around the cavity or the form tie recess shall be thoroughly wetted and promptly painted with a 1/16-inch brush coat of neat cement mixed to the consistency of thick paint. The hole shall then be filled with mortar.
- D. Mortar shall be 1:1-1/2 cement and sand mix with sufficient white cement, or fine limestone screening in lieu of sand, to produce a surface matching the adjoining work. Cement and sand shall be from the same sources as in the parent concrete.
- E. Mortar in patches shall be applied so that after partial set it can be compressed and rubbed to produce a finish flush and uniform in texture with the adjoining work. All patches shall be warm-moist cured as above specified.
- F. The use of mortar patching as above specified shall be confined to the repair of small defects in relatively green concrete. If substantial repairs are required, the defective portions shall be cut out to sound concrete and the defective concrete replaced by means of a cement gun, or the structure shall be taken down and rebuilt, all as the Engineer may decide or direct.

### 3.05 FINISHES

- A. Exposed to View Concrete Surfaces:
  - 1. All concrete exposed to view in the completed structure shall be produced using materials and workmanship to such quality that only nominal finishing will be required. The provisions of ACI shall apply to all exposed to view concrete surfaces (limited to 1 foot below grade and 1 foot below the minimum liquid level for structures that will contain liquids).
  - 2. Forms for exposed concrete surfaces shall be exterior grade, high density overlay plywood, steel, or wood forms with smooth tempered hard board form liners.
  - 3. Forms shall be coated with Nox-Crete Form Coating Release Agent, Debond Form Coating by L & M Construction Chemicals, Inc. or an approved equivalent, before initial pour and between subsequent pours, in accordance with the manufacturer's printed instructions. Form boards shall not be wet with water prior to placing concrete.
  - 4. Recessed joints in concrete shall be formed using lacquer coated wooden battens or forms, milled to indicated profiles. Battens and corner strips shall be carefully inspected before concrete is placed and damaged pieces replaced.

5. Chamfer strips shall be 1-inch radius with leg, polyvinyl chloride strips by Gateway Building Products, Saf-T-Grip Specialties Cor., Vinylex Corp., or equivalent.
  6. Particular attention is directed to the requirements of ACI 301. Form panels shall be provided in the maximum sizes compatible with the form joints. Wherever practicable, form joints shall occur at recessed joints. All form joints in exterior exposed to view surfaces shall be carefully caulked with an approved nonstaining caulking compound. Joints shall not be taped. Form oil or other material which will impart a stain to the concrete shall not be allowed to contact concrete surfaces.
  7. Care shall be taken to prevent chipping of corners or other damage to concrete when forms are removed. Exposed corners and other surfaces which may be damaged by ensuing operations shall be protected from damage by boxing, corner boards or other approved means until construction is completed.
  8. Form ties shall remain in the walls and shall be equipped with a waterseal to prevent passage of water through the walls. Particular care shall be taken to bend tie wire ends away from exposed faces of beams, slabs and columns. In no case shall ends to tie wires project toward or touch formwork. Minimum set back of form ties shall be 1 inch from faces of wall. The hole left by removal of tie ends shall be sealed and grouted as per ACI and in accordance with procedure described hereinafter. Form ties will be permitted to fall within as cast areas of architecturally treated wall surfaces; this does not apply to walls receiving textured decorative waterproof masonry coating.
  9. All formed exposed to view concrete shall be prepared as required, then rubbed and coated with Thoroseal or other Engineer approved product. The manufacturer's recommendations for surface preparation, application procedures and rates, and temperature and moisture conditions shall be followed. Exterior vertical surfaces shall be finished to one foot below grade. Interior exposed to view vertical surfaces of dry pits shall be finished full height, interior vertical surfaces of liquid containers shall be finished to one foot below the minimum liquid level that will occur during normal operations.
  10. Slope all slabs to prevent water pocketing.
- B. All vertical surfaces below minimum liquid level in liquid containing structures shall have a smooth form finish.
- C. All smooth form concrete vertical surfaces shall be true plane within 1/4-inch in 10 feet as determined by a 10 foot straight edge place anywhere on the surface in any direction. Abrupt irregularities shall not exceed 1/8-inch.
- D. Basin, flume, conduit and tank floors shall have a "troweled" finish unless shown otherwise on Drawings.
- E. Weirs and overflow surfaces shall be given a troweled finish.
- F. Exterior platforms, steps and landings shall be given a broom finish. Broom finish shall be applied to surfaces which have been steel troweled to an even smooth finish. The troweled surface shall then be broomed with a fiber bristle brush in the direction transverse to that of the main traffic.
- G. Walking surfaces of slabs shall have a troweled finish unless shown otherwise on Drawings.

- H. Patching of holes due to removal of tie ends and other repairable defective areas shall be as follows: Entire contact area of hole shall be coated with two part moisture insensitive epoxy bonding compound in accordance with manufacturer's specifications, and prior to placing of freshly mixed patching mortar. Patching mortar shall be mixed and placed in general accordance with ACI.
- I. Nox-Crete Harbeton, L & M Construction Chemicals Chem Hard, or an approved equivalent shall be applied to all exposed concrete floors in occupied spaces. The floors shall be thoroughly cured, cleaned, and perfectly dry with all work above them completed. The hardener shall be applied evenly and freely and in conformance with manufacturer's instructions, using not less than three (3) coats, allowing 24 hours between coats. One gallon of hardener shall cover not more than 100 square feet. After the final coat is completed and dry, surplus hardener shall be removed from the surface of the concrete by scrubbing and mopping with water.

### 3.06 CONCRETE WALKS AND CURBS:

- A. Subgrade shall be true and well compacted at the required grades. Spongy and otherwise unsuitable material shall have been removed and replaced with properly compacted, approved material. Concrete walks shall be placed upon 4-inch crushed stone fill unless noted otherwise on the Drawings.
- B. Concrete walks shall be not less than 4 inches in thickness. Walks shall have contraction joints every 5 linear feet in each direction, formed in the fresh concrete by cutting a groove in the top surface of the slab to a depth of at least one-fourth the slab thickness with a jointing tool. Transverse expansion joints shall be installed at driveways, and opposite expansion joints in adjacent curbs. Where curbs are not adjacent, transverse expansion joints shall be installed at intervals of approximately 40 feet. Sidewalks shall receive a broomed finish. Scoring shall be in a transverse direction. Edges of the sidewalks and joints shall be edged with a tool having a radius not greater than 1/6-inch. Sidewalks adjacent to curbs shall have a slope of 1/4-inch per foot toward the curb. Sidewalks not adjacent to curbs shall have a transverse slope of 1/4-inch per foot or shall be crowned as directed by the Engineer. The surface of the concrete shall show no variation in cross section in excess of 1/4-inch in 5 feet. Concrete walks shall be reinforced with 6 x 6 - W1.4 x W1.4 welded wire fabric unless noted otherwise on the Drawings.
- C. Concrete curbs shall be constructed to the section indicated on the Drawings, and all horizontal and vertical curves shall be incorporated as indicated or required. Forms shall be steel or as approved by the Engineer. At the option of the Contractor, the curbs may be precast or cast-in-place. Cast-in-place curbs shall be divided into Sections 8 to 10 feet in length using steel divider plates. The divider plates shall extend through the concrete and shall be removed. Precast curbs shall be finished smooth. Dividers shall be installed where the curb crosses pipe trenches or other insecure area. Transverse expansion joints shall be installed at all curb returns and at intervals of approximately 40 feet.

### 3.07 GROUTING BASE PLATES, BEARING PLATES AND MACHINE BASES

- A. Column base plates, bearing plates for beams and similar structural members, machinery and equipment bases shall, after being plumbed and properly positioned, be

provided with full bearing on epoxy nonshrink grout, as described in Section 03610, Precision Grouting. Concrete surfaces shall be rough, clean, free of oil, grease and laitance and shall be moistened thoroughly immediately before grout is placed. Metal surfaces shall be clean and free of oil, grease and rust. Mixing and placing shall be in conformance with the material manufacturer's printed instructions.

- B. Grout fill which is formed in place by using rotating equipment as a screed, such as for clarifiers and similar types of equipment, shall be mixed in proportions and consistencies as required by the manufacturer or supplier of the equipment.

### 3.09 EQUIPMENT PADS

Unless otherwise shown or directed, all equipment and items such as lockers, motor control centers, etc., shall be installed on concrete bases. The bases shall be constructed to the dimensions shown on the Drawings or as required to meet plan elevations. Where no specific plan elevations are required, the bases shall be 6 inches thick and shall extend 3 inches outside the equipment base. In general, the concrete bases shall be placed up to 1-inch below the base. The equipment shall then be properly shimmed to grade and the 1-inch void filled with nonshrink epoxy grout as described in Section 03610, Precision Grouting.

END OF SECTION 03310

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## SECTION 03370 - CONCRETE CURING

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

Concrete curing materials and methods.

#### 1.02 RELATED WORK

Section 03310 – Cast-in-Place Structural Concrete.

#### 1.03 REFERENCES

- A. ACI 301 - Specifications for Structural Concrete for Buildings.
- B. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- C. ASTM D2103 - Polyethylene Film and Sheeting.
- D. FS TT-C-800 - Curing Compound, Concrete for New and Existing Surfaces.

#### 1.04 QUALITY ASSURANCE

Conform to requirements of ACI 301.

#### 1.05 SUBMITTALS

Submit manufacturer's product data and installation instruction in accordance with the requirements of Section 01300.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. Water: Clean and not detrimental to concrete curing.
- B. Absorptive Mat: Burlap fabric of clean, roll goods.
- C. Membrane Curing Compound: Clear finish, conforming to ASTM C-309, Type 1-D, Class A or B, minimum 18% solids.
- D. Impervious sheet conforming to ASTM C-171, polyethylene film shall be white opaque.

## PART 3 - EXECUTION

### 3.01 GENERAL

Protect freshly placed concrete from premature drying and excessive temperatures. Begin curing immediately after free water has disappeared from exposed surface. Keep exposed surface continuously moist for not less than seven (7) days.

### 3.02 MEMBRANE CURING COMPOUND

- A. Apply curing compound in two (2) coats with second coat at right angles to the first.
- B. Apply in accordance with manufacturer's instructions.

### 3.03 SPRAYING

Spray water over slab areas; maintain continuously moist for seven (7) days.

### 3.04 ABSORPTIVE MAT

Spread absorptive mat over slab areas. Lap edges and ends 12 inches. Spray with water until mat saturation. Maintain saturation for seven (7) days.

### 3.05 CURING COMPOUNDS

- A. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within three (3) hours after initial application. Maintain continuity of coating and repair damage during curing period.
- B. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- C. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing compound.

End of Section

## SECTION 03610 - PRECISION GROUTING

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

Provide all labor, material, equipment and services required for grouting of equipment, machinery, structural steel, handrails, anchor bolts and other items or work for which grouting is specified or required. All unnecessary holes, openings and cracks in existing concrete shall be filled and patched.

#### 1.02 DESCRIPTION OF WORK

- A. Provide labor and materials to set anchor bolts and provide high-strength, precision support of machine bases and soleplates, including supporting equipment subject to thermal movement and repetitive dynamic loading by means of a non-shrink, ready-to-use, precision grout material.

#### 1.03 RELATED WORK

- A. Section 03310 - Cast-in-Place Structural Concrete.
- B. Review all divisions and sections for equipment, machinery and other items to be grouted.

#### 1.04 QUALITY ASSURANCE

Comply with the following codes, standards, test and recommended practices for foundation concrete as apply to precision grouting:

- A. ACI 347 "Recommended Practice for Concrete Formwork".
- B. ASTM C 309 "Standard Specifications for Liquid Membrane Forming Compounds for Curing Concrete".
- C. Manufacturer's Information on Use of Grout: Attached to each bag of grout.

#### 1.05 SUBMITTALS

- A. Manufacturer's data of grout to be used shall be submitted to Engineer for review in accordance with the requirements of the General Conditions and Section 01300.

### PART 2 - PRODUCTS

#### 2.01 GROUT

- A. Precision-support grout shall consist of a non-shrink, ready-to-use, precision grout material; proportioned, pre-mixed and packaged at the factory; delivered to the job site to place with only the addition of water; forming, placing and curing as stipulated by the manufacturer.

- B. Grouts which depend upon aluminum powders, chemicals, or other agents which produce gas for expansion are not acceptable.
- C. Precision-support grout shall also meet the following requirements:
  - 1. Free of gas producing agents.
  - 2. Free of oxidizing catalysts.
  - 3. Free of inorganic accelerators, including chlorides.

2.02 WATER

Water shall be suitable for drinking.

PART 3 - EXECUTION

3.01 PREPARATION FOR GROUTING

- A. Remove laitance down to sound concrete.
- B. Surface to receive grout shall be rough and reasonably level.
- C. Surface shall be properly cured. DO NOT USE CURING COMPOUNDS.
- D. Clean surface of oil, grease, dirt, and loose particles.
- E. Clean bolt holes, bolts and underside of equipment base.
- F. Install per manufacturer's recommendations.

3.02 FORMWORK

- A. Formwork shall be compatible with proposed method of placing grout. Design for rapid, continuous and complete filling of space to be grouted.
- B. Build strong, tight forms braced so they will not leak or buckle under weight of fluid grout.

3.03 FINISHING AND CURING

- A. Follow manufacturer's printed instructions for the brand and type of grout being used.
- B. The grout shall meet the following compressive strength standards:

	Plastic Mix	Flowable Mix
1 day	4,000 psi	2,000 psi
3 days	6,000 psi	3,000 psi
7 days	8,000 psi	5,000 psi
28 days	10,000 psi	7,000 psi

End of Section

**Division 4 - Not Used**

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## **Division 5 - Metals**

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SECTION 05500 - MISCELLANEOUS METALS, FASTENERS,  
SPECIAL FINISHES

PART 1 - GENERAL

1.01 WORK INCLUDED

Provide all labor, materials, equipment and service necessary for fabrication and erection of structural steel and aluminum and for fabrication and installation of miscellaneous non-ferrous metals as shown on the Drawings and not specifically included under other sections of these Specifications.

- A. Erection.
- B. Shop and Erection Drawings.
- C. Aluminum Work Protection.
- D. Cleaning Aluminum Work.
- E. Miscellaneous Items.
- F. Aluminum Pipe Railing.
- G. Aluminum Stairs.
- H. Cast Aluminum Nosings.

1.02 RELATED WORK

Section 05530 - Aluminum Grating.

1.03 REFERENCES

All work under this Section shall be governed by:

- A. Aluminum Construction Manual, Section 1, Specifications for Aluminum Structures - the Aluminum Association.
- B. All welding shall conform to the latest code of the American Welding Society.
- C. ASTM A-276.
- D. ASTM F-593, F-594.
- E. Federal Specification FF-S-325.
- F. Federal Specification TT-V-51F.

#### 1.04 SUBMITTALS

- A. As required by the Specifications, the Contractor shall submit for review completely detailed and certified shop and erection drawings of the miscellaneous metal work. All coatings or other protection against corrosion to be applied at the shop or in the field shall be indicated on these drawings. The shop drawings for aluminum work shall show the alloys and tempers to be used, and the finish, if any to be applied.
- B. Shop drawings, giving complete information necessary for fabrication, layout and installation of metal work shall be submitted to the Engineer for review prior to fabrication.
- C. Preparation of shop drawings for fabricated metal items shall be coordinated by the Contractor with the manufacturers of various equipment in order to comply with details, locations, openings, and arrangements required by the manufacturers.
- D. Field measurements shall be made to verify all dimensions in the field which may affect installation of work before shop drawings are made and/or fabrication is performed.

#### 1.05 QUALITY ASSURANCE

- A. Where welding is permitted or required, it shall conform to the current requirements of the American Welding Society for the type of work in question.
- B. Aluminum work shall be fabricated in a shop where the quality of work is in accordance with the highest standards for work of this type. All work shall be executed by mechanics skilled in the fabrication of aluminum, and shall be true to detail with sharp, clean profiles, fitted with proper joints and intersections and with finishes as specified.
- C. All miscellaneous metal work shall be formed to shape and size with sharp lines and angles. Shearing and punching shall leave clean true lines and surfaces.

#### 1.06 RESPONSIBILITY FOR DIMENSIONS

The general design and dimensions of the miscellaneous metal work are indicated on the Drawings, but the Contractor shall be responsible for the correctness of the details and dimensions of the finished articles. He shall verify conditions at the job before fabrication and coordinate the work with that of all other trades to prevent interference.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. Stainless steel shall be Type 304 unless otherwise indicated or specified.
- B. Aluminum work shall be fabricated of plates, rolled or extruded shapes, sheets or casting conforming (unless otherwise permitted or indicated) to the following alloy and temper designations of the Aluminum Association:
  - 1. Structural rolled or extruded shapes 6061-T6.
  - 2. Extruded shapes 6063-T5.

3. Plates 6061-T6.
4. Gratings (bearing bars) 6061-T6 (crimp bars) 6063-T6.
5. Castings 214.
6. Sheets 3003-F.
7. Bolts and nuts 2024-T4.
8. Pipe Railing 6063-T6.

- C. The Contractor shall furnish the Engineer with mill certificates and a signed statement from the fabricator that all aluminum work furnished is of the proper alloys, as specified above.

## 2.02 ALUMINUM

All structural and miscellaneous aluminum shall be Alloy 6061 (Alloy 6063 for extrusions), Temper T6, unless otherwise noted, indicated or accepted by the Engineer. Where welding is necessary in fabrication, it shall be done in conformance with Section 7 "Welded Construction" of Specification for Aluminum Structures, referenced hereinbefore.

## 2.03 ALUMINUM WORK PROTECTION

- A. Aluminum surfaces, which after erection would otherwise be in contact with concrete or with mortar, shall be protected from contact therewith by a coat of bitumastic super service black manufactured by the Koppers Company, Inc., Pittsburgh, PA; Tarmastic 100 manufactured by Porter Coating Division, Porter Paint Company, Louisville, KY; 450 Heavy Tnemecol manufactured by Tnemec Company, North Kansas City, MO; or an acceptable equivalent product. Areas where the paint has been damaged by abrasion or other cause shall be cleaned and repainted as directed so that the aluminum will have a complete protective paint film when brought into contact with the material against which it is being protected. Before application of coating, the surface shall be cleaned of all dirt, heavy deposits of grease or oil, and other foreign substances and shall be immersed in or swabbed with an acceptable solvent. Next the surfaces shall be rinsed with clear water and thoroughly dried.
- B. The Contractor's attention is directed to the requirements of the Specifications in regard to protection against electrolysis where aluminum is to be used in conjunction with dissimilar metals.
- C. Where a shop coating of methacrylate lacquer has been specified on aluminum work to protect the surface from stain, the protective coating of lacquer worn off during handling or erection shall be replaced in the field by a new coating of lacquer of the same type.
- D. During construction, care shall be taken to prevent damage to the aluminum work from splashing or the accumulation of paint, concrete, mortar, or other similar materials.

## 2.04 STAINLESS STEEL

Stainless steel shapes shall be ANSI Type 304 or 316 in accordance with ASTM A-276. Miscellaneous bar stock products such as pipe straps shall be 400 Series stainless steel. Anchor bolts, nuts and washers shall be ANSI Series 300 stainless steel.

## 2.05 FASTENERS

### A. Bolts, Nuts and Washers:

1. Structural bolts shall be high strength, stainless steel bolts, nuts and washers and shall be ANSI Type 300 Series stainless steel in accordance with ASTM F-593, with ASTM F-594 nuts. All bolts shall have hexagonal heads.
2. Anchors and bolts including nuts and washers shall be provided where necessary for securing the work in place. Sizes, types and spacings of anchors and bolts not indicated or specified otherwise shall be as necessary for their purposes. Anchor bolts, nuts, and washers for all uses including, but not limited to, underwater use and for the installation of equipment, piping, pumps and motors shall be stainless steel Type 304.

### B. Expansion Anchors (In Concrete):

1. Expansion anchors shall be stainless steel wedge type.
  - a. Stainless steel wedge type anchors shall be ITW Ramset/Red Head or approved equal of Type 300 stainless steel. Anchors shall meet or exceed latest Government GSA Federal Specifications FF-S-325, Group II, Type 4, Class 1. Anchor shall be used with 300 series stainless steel bolt and washer.
2. Stainless steel expansion anchors shall be installed in accordance with manufacturer's recommendations.
3. After installation, pull-out tests by the anchor manufacturer's representative may be requested by the Engineer. If so, the Engineer's Resident Representative will stipulate the number and location of the tests.

## 2.06 MISCELLANEOUS ITEMS

Items of miscellaneous metal work not particularly specified hereinafter shall be of the shape, size, material and details indicated on the Drawings or suitable for the purpose intended.

## 2.07 ALUMINUM PIPE RAILING

- A. The aluminum pipe railing shall be the product of company normally engaged in the manufacture of pipe railing. Railing shall be shop assembled in lengths not to exceed 24 feet for field erection.
- B. Handrails and stair rails shall be designed to withstand a 200-pound concentrated load applied in any direction at any point on the top rail. Handrails and stair rails shall also be designed to withstand a load of 50 lbs/ft. applied horizontally to the top rail. The 200-pound load will not be applied simultaneously with the 50 lbs/ft. load. In addition, the handrails shall be designed to withstand a load of 100 lbs/ft. applied vertically downward to the top rail and simultaneously with the 50 lbs/ft. horizontal load. The 100 lbs/ft. vertical load does not apply to stair rails.
- C. The manufacturer shall submit calculations to the Engineer for approval. Testing of base castings or base extrusions by an independent lab or manufacturer's lab (if manufacturer's lab meets the requirements of the Aluminum Association) will be an

acceptable substitute for calculations. Calculations will be required for approval of all other design aspects.

- D. Post spacing shall be a maximum of 6 feet 0 inches. Posts and railings shall be a minimum of 1-1/2 inches Schedule 40 aluminum pipe alloy 6063-T6, ASTM-B-429 or ASTM-B-221. The handrail manufacturer shall show that their posts are of adequate strength to meet the loading requirements. If the manufacturer's posts are not of adequate strength, the manufacturer may reduce the post spacing or add reinforcing dowels or may do both in order to meet loading requirements.
- E. The handrail shall be made of pipes joined together with component fittings. Samples of all components, bases, toe plate and pipe must be submitted for approval. Components that are glued or pop riveted at the joints will not be acceptable. All components must be mechanically fastened with stainless steel hardware. Handrail and components shall be Thompson Fabricating Company or approved equal.
- F. Posts shall not interrupt the continuation of the top rail at any point along the railing, including corners and end terminations. The top surface of the top railing shall be smooth and shall not be interrupted by projecting fittings.
- G. The midrail at a corner return shall be able to withstand a 200-pound load without loosening.
- H. Railing posts shall be mounted to the sides or tops of concrete structures with mounting plates and expansion bolts. Expansion bolts shall be spaced 10 diameters apart and 5-diameter edge distance for no reduction in pullout strength. A safety factor of four shall be used on expansion bolt pullout values published by the manufacturer. Expansion bolts shall be stainless steel type 300 wedge bolts.
- I. Toe plate shall conform to OSHA standards. Toe plate shall be a minimum of 4 inches high and shall be an extrusion that attaches to the posts with clamps which will allow for expansion and contraction between posts. Toe plates shall be set 1/4-inch above the walking surface. Toe plates shall be provided on handrails as required by OSHA and/or as shown on Drawings. Toe plates shall be shipped loose in stock lengths with pre-manufactured corners for field installation.
- J. Openings in the railing shall be guarded by a self-closing gate. Safety chains shall not be used unless specifically shown on the Drawings.
- K. Finish shall be Aluminum Association M10-C22-A41 (215-R1). The pipe shall be plastic wrapped. The plastic wrap is to be removed after erection.
- L. Aluminum surfaces in contact with concrete, grout or dissimilar metals will be protected with a coat of bituminous paint, mylar isolators or other approved material.

## 2.08 ALUMINUM STAIRS

- A. The aluminum stairs shall have structural aluminum channel stringers and supports, aluminum tread plate treads and platforms and sheet aluminum risers as indicated on the Drawings and in the details.

- B. The treads shall be aluminum grating (see Section 05530). The treads shall be supported by and attached to 1-1/4 inch by 3/16 inch aluminum carrier angles bolted to the stringers. The treads shall be the widths indicated.
- C. The Contractor shall provide all structural aluminum angle hangers, struts, rod hangers, closure plates and brackets indicated or necessary to complete the stairs as indicated.

## 2.09 CAST ALUMINUM NOSINGS

- A. The cast aluminum nosing shall be abrasive cast aluminum nosings securely fastened with stainless steel, flat head bolts and wing anchors set into the fresh concrete. The nosings shall be the products of Wooster Products, Inc., Wooster, OH; American Abrasive Metals Company, Irvington, NJ; Andco Building Specialties, Division of Andco Industries Corporation, Greensboro, NC; or acceptable equivalent products.
- B. Cast aluminum nosings for concrete steps and platforms shall be of the widths indicated and shall be Type 101 made by Wooster Products, Inc.; Style A made by American Abrasive Metals Company; Style 801 made by Andco Building Specialties, or acceptable equivalent products.

## PART 3 - EXECUTION

### 3.01 ANCHORAGE ITEMS

The Contractor shall furnish all bolts, nuts, shims, pins, screws, straps, nails and other anchors which may be required by the Drawings or job conditions to secure all items permanently in place whether or not specifically called for or shown on the Drawings.

### 3.02 FABRICATION AND INSTALLATION OF METAL WORK

- A. General: All metal items shall be accurately fabricated and erected with exposed joints close fitting. All joints shall be of such character and so assembled that they will be as strong and rigid as adjoining sections. Joints shall be located where least conspicuous. Items shall have smooth finished surfaces except where otherwise shown or specified.
- B. Built-in Items: Members or parts to be built-in with masonry or concrete shall be in a form affording a suitable anchorage or shall be provided with approved anchors, expansion shields or other approved means of securing members.
- C. Dissimilar Metals: Ferrous and non-ferrous metals shall be insulated at all contacts with felt washer, strips or sheets, bitumastic paints, or other acceptable means. All aluminum surfaces in contact with concrete shall be coated with two (2) coats of Federal Specification TT-V51F Asphalt Varnish, or approved equal.
- D. Connections:
  - 1. All required anchors, couplings, bolts, and nuts required to support miscellaneous metal work shall be furnished and installed as required.
  - 2. Weights of connections and accessories shall be adequate to safely sustain and withstand stresses and strains to which they will be normally subjected.

3. Connections shall be bolted except where welding is called for in the Drawings. Bolts shall be 3/4-inch diameter unless noted or required otherwise.
- E. Expansion Anchors:
1. Expansion anchors shall be installed in holes drilled into concrete with carbide tipped drill bits conforming to ANSI B94.12-1977, using a rotary impact hammer for 1/2-inch and 3/8-inch anchors. Hole depth shall equal or exceed the anchor manufacturer's minimum recommended embedment. Should hole depth equal anchor manufacturer's minimum recommended embedment, hole shall be cleaned out by air pressure. The minimum hole depth shall be per anchor manufacturer's recommendations. Contractor shall assure hole is perpendicular and conforms in size to anchor manufacturer's recommendation.
  2. Washer and nut shall be assembled on anchor so that the top of the nut is flush with the top of the anchor. Then the anchor shall be driven into the hole through the work until the washer bears against the work. The anchor shall be expanded in accordance with the manufacturer's recommendations.
  3. General: Provide stainless steel fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
  4. Bolts and Nuts: Regular hexagon head type, stainless steel, Grade A.

End of Section 05500

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## SECTION 05530 - ALUMINUM GRATING

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

Provide all labor, materials, equipment and services required to furnish and install metal bar grating where shown on the Drawings.

#### 1.02 RELATED WORK

Section 05500 - Miscellaneous Metal and Fasteners.

#### 1.03 REFERENCES

- A. Design, fabrication and installation of grating shall be in accordance with the following standards:
  - 1. Standard Specifications and Voluntary Code of Practice in Metal Bar Grating Manual, Latest Edition, published by National Association of Architectural Metal Manufacturers, Chicago, IL (ANSI A-202.1).
  - 2. ASTM B-210.
  - 3. ASTM B-221.
  - 4. Federal Specification TT-V-51F.

#### 1.04 SUBMITTALS

- A. Submit shop drawings to the Engineer for review before fabrication:
  - 1. Indicate areas to receive grating, grating details and dimensions, and material specifications.
  - 2. Show anchorage details and locations.
  - 3. Indicate coordination with equipment suppliers where openings for such equipment are required.

### PART 2 - PRODUCTS

#### 2.01 DESIGN CRITERIA

- A. Support uniform live load of 100 psf.
- B. Deflection not to exceed span of bearing bars (in inches) divided by 240.
- C. Maximum Fiber Stress: 12,000 psi.

## 2.02 BASIC DESIGN

- A. The gratings shall be riveted aluminum gratings, Type K. The bearing bars shall be 3/16-inch thick by the depths indicated in the grating span chart in the details. Bearing bar spacing shall be 1-1/8 inch face to face with crimp bars riveted on 7-inch centers. The gratings shall be fabricated in standard size sections and secured in place by at least four (4) approved removable-type fasteners per grating panel. The ends of each grating section shall be banded with bearing bars. The top surfaces of all crimp bars shall be serrated for a nonskid surface, and raised slightly above the top surfaces of the bearing bars.
- B. All openings for fixtures or pipes, which require the cutting of three main bars or more, shall be finished in a similar manner as the ends.
- C. Gratings in concrete shall have aluminum angle frames with mitered corners and with welded joints ground smooth where exposed. The frames shall have welded anchors and shall be set in the concrete as it is placed.
- D. Bearing and cross bars shall be flush at surface.
- E. All free and supported bar ends around perimeter and around cutouts shall be banded.
- F. Provide removable sections of grating with suitable end bearing where noted on the Drawings or otherwise required.
- G. The aluminum grating shall be as manufactured by Borden Metal Products Co., Elizabeth, NJ; or approved equivalent

## 2.03 MATERIAL

- A. The materials for grating panels shall be as listed:
  - 1. Bearing Bars: ASTM B-221, 6061-T6 or 6063-T6, aluminum.
  - 2. Cross Bars: ASTM B-221 (extruded) or ASTM B-210 (drawn) aluminum.
  - 3. All steel fasteners used with aluminum grating shall be galvanized.
  - 4. Finish: Aluminum mill finish (as fabricated).
  - 5. Anchors: Saddle clips of manufacturer's standard design, galvanized.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Grating shall be fabricated as indicated by shop drawings, which have been revised to reflect actual field measurements.
- B. Grating shall be set with full and uniform end bearing to preclude rocking; do not use wedges or shims.
- C. Provide 1-inch minimum bearing with maximum erection clearance of 1/4-inch all around.

- D. Anchor grating with saddle clips in accordance with manufacturer's recommendations or as detailed on the Drawings.
- E. Provide cutouts for the passage of pipe, valve and equipment operators, conduit, stems and similar work; cutouts for circular obstructions shall be at least 2 inches larger in diameter than the obstruction.
- F. Protect all surfaces of angles and frames to be in contact with concrete or dissimilar metals with two (2) coats of Fed. Spec. TT-V-51F Asphalt Varnish.

END OF SECTION 05530

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**Divisions 6 through 15 - Not Used**

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## **Division 16 - Electrical**

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## SECTION 16010 - ELECTRICAL SUMMARY OF WORK

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. The Instructions for Bidders, General Conditions, Supplementary Conditions, Division 1 of the Specifications and all Contract Documents shall apply and govern the work of all sections in this Division regardless of how the work may be apportioned to various trades or subcontractors.
- B. Work included in this section of the Specifications includes the furnishing of all labor, material, tools, excavation, backfill and other equipment necessary to install the electrical system as shown on the Contract Drawings and as specified herein. Major components of the system upgrade include:
  - 1. Two (2) new 4160 volt, diesel generators in outdoor enclosure with subbase fuel tank.
  - 2. Two (2) 4160 volt automatic transfer switches.
  - 3. 4160 volt paralleling switchgear.
  - 4. New underground 4160 volt feeders.
  - 5. Main switchgear modifications at the existing outdoor switchgear pad.
  - 6. SCADA interface.
  - 7. Miscellaneous low voltage power.

#### 1.02 SCOPE

- A. The Contractor shall furnish and install all conduit, wire, disconnect switches and miscellaneous material to make all electrical connections to all motors and all other items of utilization equipment or wiring devices except as otherwise specified.
- B. 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 type of operation described in these Specifications and/or by the Contract Drawings and/or as shown in manufacturer furnished, Engineer reviewed shop drawings.
- C. 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 equivalent to similar equipment and/or devices specified herein.
- D. Where control 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.

E. The Contractor shall be responsible for:

1. Shop drawings prior to installation.
2. All equipment required by schedule.
3. All wiring and ancillary equipment and appurtenances needed for proper installation and operation of equipment.
4. All labor for installation and start-up of the system.
5. Operations and maintenance manuals.
6. Start-up and training services.
7. Shipping, F.O.B., to the Owners destination, all items required by the contract documents.

1.03 PERMITS

Obtain any permits related or required by the Work in this Contract.

1.04 CODES

Comply with applicable codes and regulations of authorities having jurisdiction. Submit copies of inspection reports, notices, citations and similar communication to the Owner.

1.05 EXISTING CONDITIONS AND DIMENSIONS

- A. The Work in this Contract will primarily be performed in or around existing facilities which must remain functional. This Contractor must maintain the required items and/or systems functional without additional effort by plant personnel and at no extra costs to the Owner.
- B. The Contractor is responsible for verifying all existing conditionals, elevations, dimensions, etc., and providing his finished work to facilitate existing conditions.

PART 2 - PRODUCTS (NOT USED)

PART 3 - INSTALLATION (NOT USED)

End of Section 16010

## SECTION 16050 - GENERAL ELECTRICAL PROVISIONS

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. Work included shall be as outlined in Section 16010 - Electrical Summary of Work.
- B. Auxiliary and accessory equipment necessary for placing in operation the complete system, such as transducers or relays to interface with existing equipment shall be provided whether specified or not, at no additional cost.
- C. Equipment shall be fabricated, assembled, installed, and placed in proper operating condition in full conformity with specifications, engineering data, instructions and recommendations of the equipment manufacturer.

#### 1.02 SUBMITTALS

- A. Shop drawings, clearly marked to show only items applicable to this specific contract, shall be submitted for review in accordance with requirements in Section 01300 and as follows:
  - 1. Shop drawings for each required item shall contain manufacturer's drawings, bills of material, panel and equipment layouts, data, and information for each assembly submitted in one package insofar as possible. Partial submittals may be returned without action.
  - 2. Manufacturers standard publications which form a part of the submittal shall be clearly marked to indicate the exact item being submitted. This type of submittal which is not marked will be returned without action. Non-applicable items shall be crossed out, blanked out, or otherwise deleted.
  - 3. Bills of material shall include a numbered list of all components, with manufacturer's name, catalog number, rating, and other identification of each component. The item number or similar identifications, shall appear on all Drawings where the item appears. Where components of a major piece of equipment have been purchased by the equipment manufacturer for use in fabrication of major equipment, the bill of material shall show the original manufacturer's name and his catalog number of the component part as well as any different part number assigned to it by the major equipment manufacturer.
  - 4. Shop drawings required are contained in, but not necessarily limited to the general listing near the beginning of each specification section entitled "SUBMITTALS".
  - 5. Early submission shall be made of certain drawings where dimensions of equipment, location of conduit entrances, etc., are important to facilitate construction.
  - 6. Shop drawings shall include one line diagrams, schematic diagrams and wiring diagrams. Other Drawings, such as control sequence diagrams, relay diagrams, etc. may also be needed. Each drawing shall be complete, showing all local and remote devices associated with each item or system.
  - 7. The Engineer reserves the right of acceptance or rejection of equipment. Where the shop drawings representing equipment vary from the intent of the Contract Documents, they will be rejected and correction and a resubmission called for. Fabrication of equipment will not be allowed until corrected drawings have been submitted, reviewed and accepted by the Engineer. **No equipment will be**

**verbally accepted and acceptance of equipment prior to the bid opening will not be forthcoming.**

8. Time-current characteristic curves for all circuit breakers and fuses used on this project shall be submitted for a review of selective coordination as well as the short circuit capabilities of the overcurrent devices proposed for use by the Contractor on this project.
9. When the Engineer cannot make a proper determination from the submitted shop drawing as to whether an item meets the requirements, additional information may be sought or, in certain cases, a sample of the item in question requested. The Contractor shall provide the Engineer with this information or sample as soon as possible after the request has been made so as not to deter construction progress. Samples will be returned as soon as the Engineer has made his determination. The Engineer reserves the right, however, to fully test the sample and to disassemble it if necessary to gain full information. While care will be taken not to damage the sample, no guarantee is made or implied that the sample will be in working order or even repairable when returned.
10. As soon as possible after the award of contract, the Contractor shall submit all information and data on the wires, cables, and other long delivery items he proposes to use. Early submission for review and early ordering is required to avoid delays in completion of the work.

B. Submittals shall be required for the following:

1. Generators.
2. Automatic transfer switches.
3. Paralleling switchgear.
4. Raceway.
5. Wire and cable.
6. Boxes, cabinets and enclosures.

#### 1.03 GUARANTEE

The Contractor shall refer to the article on Guarantees and Warranties in the General Conditions and Special Conditions to determine the extent of his guarantee periods.

#### 1.04 CONTRACTOR'S REPRESENTATIVE

The Contractor shall keep on his work at all times during its progress, a competent foreman satisfactory to the Engineer. The foreman shall not be changed, except with the consent of the Engineer, unless he proves to be unsatisfactory to the Contractor and ceases to be in his employ. The foreman shall represent the Contractor in his absence and all directives given to him shall be as binding as if given to the Contractor.

#### 1.05 OR EQUIVALENT CLAUSE

The use of the manufacturers' names and catalog numbers used herein is to indicate minimum standards of quality and performance. Where the words "equivalent to" or "or equivalent" are used in the particular specification, equipment of equivalent quality, rating, and performance may be considered by the Engineer. It shall be the sole responsibility of the Contractor to prove equality and if, as a result of substitution, any modifications are necessary to meet the quality and design criteria of the specified material and/or systems, the Contractor shall be responsible for those modifications with no additional charge to the Owner or the Engineer. Any necessary modifications shall be shown on the shop drawings submitted for approval.

1.06 DIMENSION VERIFICATION AND DOCUMENTATION

Scale dimensions as shown on the Drawings shall be considered as approximate. The Contractor shall be responsible for making field verifications. Specific attention shall be given to the exact location of any underground lines installed under this contract. These lines shall be dimensioned to easily identifiable points on permanent building structures for location and elevation and these dimensions shall be entered and shown on the record drawings.

1.07 RECORD DRAWINGS

The Contractor shall obtain from the Engineer one (1) set of Blue-Line prints of the Contract Drawings and these prints shall be kept and maintained in good condition at the project site. Where construction differs from the Drawings, a qualified representative of the Contractor shall, at the end of each working day, enter upon these prints the actual "as built" record of any and all changes that have been made during that day's construction progress. These plans will be subject to inspection by the Engineer and, where found not to be up-to-date, shall be updated prior to application for the next applicable partial payment. Entries and notations shall be made in a neat and legible manner and these prints shall be delivered to the engineer upon completion of the construction. **Approval for final payment will be contingent upon compliance with this provision.**

1.08 CODES AND STANDARDS

- 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 laws and/or regulations and/or the ENGINEER's design require a higher standard than the current NEC or KBC, then these laws and/or regulations and/or the design shall be followed.
- B. Following is a list of applicable Standards or Codes:

<u>Organization/Code/Standard</u>	<u>Abbreviated Title</u>
1. Kentucky Building Code	KBC
2. National Electrical Code	NEC
3. National Electrical Safety Code	NESC
4. Underwriter's Laboratories, Inc.	UL
5. Factory Mutual System	FM
6. National Fire Protection Association	NFPA
7. National Electrical Manufacturers Association	NEMA
8. Occupation Safety and Health Administration	OSHA
9. Insulated Cable Engineers Association, Inc.	ICES
10. Illuminating Engineering Society of North America	IES
11. Instrument Society of America	ISA
12. Institute of Electrical and Electronic Engineers, Inc.	IEEE
13. Certified Ballast Manufacturers Association	CBM
14. American National Standards Institute, Inc.	ANSI
15. Lightning Protection Institute	LPI
16. Joint Industry Council	JIC
17. American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.	ASHRAE

## PART 2 - PRODUCTS

### 2.01 GENERAL

All materials and equipment installed shall be new and unused and shall be of the latest design of manufacturers regularly engaged in the manufacture of such products that conform with the requirements of the Contract Drawings and Specifications.

### 2.02 APPROVAL AND MARKING OF EQUIPMENT

Electrical devices and materials shall be listed and/or labeled by the Underwriters' Laboratories, Inc., wherever standards have been established by that agency and the equipment shall bear the UL seal. Where Underwriters' Laboratories listing is not available for equipment, the Contractor shall submit certified test reports of an adequately equipped, recognized, independent testing laboratory, approved by the local inspecting authority, indicating that the equipment is in conformance with local code requirements or any other applicable requirements. In lieu of the independent test reports, written approval of the equipment by the local electrical inspecting authority will be acceptable. The Contractor shall bear the costs of tests necessary for approval of equipment.

### 2.03 IDENTIFICATION MARKERS

- A. Machine engraved, laminated plastic identification markers shall be provided throughout the project. Unless otherwise noted elsewhere in the Contract Documents, letters shall be 1/2 inch and color shall be white letters on a black background. They shall be securely mounted on equipment by means of sheet metal screws, machine screws and nuts or pop rivets. In exterior location stainless steel screws, bolts and nuts shall be utilized. Adhesive mounting will not be acceptable.
- B. All switchgear shall have identification markers on the front door of the enclosure.
- C. Each major component of equipment shall have the manufacturer's name, address, and catalog number on a metal plate securely attached to the item of equipment. The nameplate shall be easily readable and care shall be taken during the construction so as not to obscure the nameplate information with paint or other markings. Where applicable, this nameplate shall give information about the equipment as follows:
  - 1. Rated voltage.
  - 2. Rated amperage (on the motor control centers horizontal bus bar rated amperage and vertical bus bar amperage shall be shown).
  - 3. Ground bus ampere rating.
  - 4. Number of phases.
  - 5. Number of poles.
  - 6. Frequency.
  - 7. Horsepower where motor rated.
  - 8. Starter NEMA standard size.
  - 9. Short circuit current interrupting rating in Amperes, RMS, Symmetrical.
  - 10. Short circuit current withstand rating.

## 2.04 PROTECTION OF ELECTRICAL EQUIPMENT

Electrical equipment shall be protected from the weather, especially from water dripping or splashing upon it, at all times during shipment, storage, and construction. Equipment shall not be stored outdoors even if its enclosure is rated as weatherproof, watertight, etc. Where equipment is installed or stored in moist areas, such as unheated buildings, etc., it shall be provided with an acceptable means of preventing moisture damage such as a uniformly distributed source of heat to prevent condensation.

## 2.05 DEFECTIVE OR DAMAGED EQUIPMENT

- A. Should it be determined by the Contractor, Owner, or Engineer that any equipment or material has been subjected to possible damage by water, it shall be thoroughly dried and put through a dielectric test as directed by the manufacturer, at the expense of the Contractor or shall be replaced by the Contractor without change in contract price. Any equipment found to be marginal or that fails to meet manufacturer's standards shall be replaced at no additional charge to the Owner or Engineer.
- B. Any material or equipment damaged during shipment, while stored, or during construction shall be replaced at the Contractor's expense. Minor scratches on equipment cabinets, etc. may be repaired on site. Any current carrying parts, switch blades, operators, coils, contacts, etc. which are damaged, shall be replaced at no cost to the Owner or Engineer.

## PART 3 - INSTALLATION

### 3.01 GENERAL

- A. The Contract Drawings indicate the extent and general locations of equipment, conduit and wiring. The Contractor shall be responsible for coordination with all trades involved and for changes required in the field to avoid interference of the new equipment with existing facilities. Any change shall be coordinated with the Engineer before the change is made and, if approved, the Contractor shall be responsible for showing the change on the Record Drawings.
- B. These Specifications, the associated Drawings, and other Contract Documents have been prepared with the intention of their yielding, through construction, electrical installations that are fully operable, safe, complete and in full compliance with the latest editions of the National Electrical Code, local codes and ordinances, and any other authority having jurisdiction over the work. The omission of miscellaneous electrical items or accessories not specifically called for in these Contract Documents which would detract from this intention shall not relieve the Contractor of the responsibility of furnishing and installing these items and accessories.
- C. Equipment grounding conductors sized per the NEC shall be run in all conduits.
- D. No more than one 480 VAC circuit shall be installed in any one conduit.
- E. No more than five 120 VAC branch circuits shall be run in any one conduit.
- F. Control conductors may be run in the same conduit as 480 VAC power conductors only if the power conductors are No. 6 AWG or smaller and if they control the device to which the 480 power conductors feed. Regardless, control conductors shall be run in separate conduits where so indicated on the Plans.

- G. Number 14 AWG shall be the minimum control wire size and number 12 AWG shall be the minimum power wire size.
- H. All conduit shall be installed to avoid conflicts with other trades.
- I. The electrical installation in general shall be installed so as to allow accessibility to equipment for service or maintenance.
- J. Equipment layout shall maintain National Electric Code (NEC) clearances as a minimum.
- K. All electrical devices, conduits, wiring and grounding must be installed and connected by a licensed electrical contractor. All electrical work shall comply with all local, state, and federal electrical codes.

### 3.02 PERMITS AND APPROVALS

- A. The Contractor shall obtain all permits necessary. The Contractor shall furnish inspection by an agency licensed or otherwise qualified to perform electrical inspections in the Commonwealth of Kentucky.
- B. The Contractor shall notify the Electrical Inspector, in writing, immediately upon the start of the work and **a copy of the notice shall be sent to the Engineer.**
- C. Inspection shall be scheduled for rough-in as well as finish work. The rough-in inspection shall be divided into as many inspections as may become necessary to cover all roughing-in.
- D. All costs incidental to the electrical inspection shall be borne by the Contractor.
- E. The Contractor shall furnish certificates of final approval by the electrical inspector and **final payment will be withheld until he has presented the Engineer with the aforementioned certificate of approval.**
- F. When it is determined by the Electrical Inspector that materials, equipment or installations shown on the Drawings or specified herein are in violation of the National Electrical Code, the Contractor shall contact the Engineer immediately. The Contractor shall be prepared to tell the Engineer the Articles of the National Electrical Code that are violated by the project requirements.

### 3.03 CLEANING, CUTTING AND PATCHING

- A. Unless otherwise specified, the Contractor shall clean all conduit, equipment and accessories installed under this Contract. After all work has been completed by all contractors and subcontractors, the Contractor shall thoroughly clean all exposed and visible equipment installed under his contract.
- B. Any cutting and patching of building structures for the installation of equipment furnished and installed under the Contract shall be the responsibility of the Contractor. Openings in walls, floors or ceilings required for passage of raceway shall be drilled with a rotary type drill, except that structural members shall not be cut or drilled unless specific written approval is obtained from the Engineer. All surfaces shall be restored to match the existing surface.

### 3.04 INTERFERENCE AND ERRONEOUS LOCATIONS

- A. The locations of electrical equipment, devices, outlets, and similar items, as indicated on the Drawings, are approximate only. Exact locations shall be as determined or accepted by the Engineer during construction. Any substantial changes shall be as approved by the Engineer and shown as a revision on the Record Drawings.
- B. The electrical, structural and equipment Drawings and Specifications are complementary to one another. It would behoove the Contractor to study closely ALL Drawings and Specifications as he will be responsible for furnishing labor and materials for rough-in through final connections of electrical service to any and all equipment whether furnished by the Contractor, or any of the subcontractors under any of the Contract Documents. The Contractor shall also be responsible for all damages caused by erroneously connected equipment.
- C. The Contractor shall field verify the locations of any and all equipment requiring electrical service before rough-in work begins. If the actual location varies substantially from that shown on the Drawings, he shall contact the Engineer immediately for further instructions.

### 3.05 TESTS

- A. The Contractor shall provide all tests as specified herein and all additional tests necessary to establish the adequacy, quality, safety completed status and suitable operation of each system and components thereof. The final inspection will be made after the Engineer is satisfied that the work has been completely installed and that complete preliminary tests were made which indicate the adequacy, quality, completion and satisfactory operation of the system.
- B. See Section 01450 - Services of Manufacturer's Representative, for additional requirements.

### 3.06 TEMPORARY WIRING

The Electrical Contractor shall coordinate with the General Contractor and other subcontractors regarding the construction sequence so that temporary wiring, where necessary, can be installed in a timely manner and with a minimum of down time for plant start-up and testing.

### 3.07 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 training shall be scheduled through the CONTRACTOR with the OWNER. The timing of the training shall closely coincide with the startup of the equipment, but no training shall be conducted until the equipment is operational.

- D. See Section 01450 - Services of Manufacturer's Representative for additional requirements.

### 3.08 GROUNDING AND BONDING

All metallic conduit, cabinets, equipment and service shall be grounded in accordance with the latest issue of the National Electrical Code. All starter panel 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.

### 3.09 EQUIPMENT CORROSION

All new switchgear enclosures shall have industrial corrosive inhibitors installed inside the enclosure. The size and number of inhibitors shall be as per manufacturer's recommendations. The inhibitors shall be Hoffman or equal. Contractor to provide 20% spares for all sizes.

END OF SECTION 16050

## SECTION 16110 - RACEWAY

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. The basic materials and accessories required in the conduit system shall be of the type and grade in accordance with the stated Underwriter's approved standards as particularly applicable and specified herein. New material and equipment shall be used for the entire project.
- B. This section of the Specifications shall include, but is not limited to, furnishing and installing the following:
  - 1. Rigid steel conduit.
  - 2. Aluminum conduit.
  - 3. PVC Conduit.
  - 4. Flexible conduit.
  - 5. Raceway fittings.

#### 1.02 RELATED WORK

- A. Section 16050 - General Electrical Provisions.
- B. Section 16120 - Wire and Cable (Conductors).
- C. Section 16450 - Grounding.

### PART 2 - PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

- A. Tubular Raceways:
  - 1. Steel, Galvanized, Rigid, Heavy-Wall, Threaded - "Wheatland Tube Co.," "Triangle," "Allied Tube & Conduit Corp.," or approved equivalent.
  - 2. Aluminum, Rigid, heavy-wall, Threaded - "VAW," "Alcoa," or approved equivalent.
  - 3. Plastic (PVC); Type A (Thin Wall); Type 40 (or Schedule 40); Type 80 (or Schedule 80) (Heavy-Wall)- "Robin-Tech," "Carlton," or approved equivalent.
  - 4. Flexible Metal Conduit - "AFC," "Alflex," or approved equivalent.
  - 5. Liquidtight Flexible Metal Conduit - "Carol Cable Co., Inc.," "Superflex," "OZ Gedney," or approved equivalent. B.Raceway Fittings:
    - a. Conduit fittings - "Crouse-Hinds," "Appleton," "OZ Gedney," or approved equivalent.
    - b. Non-metallic conduit fittings - "Robin-Tech," "Carlton," or approved equivalent.
    - c. Flexible conduit fittings - "Raco," "T & B" "OZ Gedney," or approved equivalent.

## 2.02 MATERIALS

- A. Rigid Conduit: Rigid conduit shall be standard weight, mild steel pipe. The conduit shall receive a protective zinc coating both inside and outside by means of hot-dip galvanizing. Threads shall not have any coating which will reduce the conductivity of the joint. Couplings, bends, elbows, fittings, etc., shall be subject to the same requirements as for the straight lengths. All conduit and fittings shall be UL approved. Rigid conduit shall be delivered with plastic protectors on the threads.
- B. 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. 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. Plastic conduit shall be Schedule 40 PVC or Schedule 80 PVC, heavy wall, rated for use with 90 degree C conductors. This Contractor shall provide all fittings, adapters, etc., required for a complete installation as shown on the drawings. Expansion joints shall be used as recommended by the manufacturer.
- D. Flexible metal conduit shall be spirally wound electrogalvanized steel. Connections shall be by means of galvanized malleable iron squeeze type fittings, or twist in type as manufactured by Tomic in sizes not to exceed 3/4 inch trade size. Minimum size shall be 3/4 inch. (See separate article on grounding.)
- E. Liquid tight flexible metallic conduit shall be constructed of flexible or spirally wound galvanized steel enclosed in light gray colored PVC outer jacket.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. No conduit smaller than 3/4 inch shall be used.
- B. Sleeves, Chases, Inserts and Concrete Encasements:
  - 1. The Contractor shall be responsible for setting of all sleeves for his work. Passage of conduit through masonry and concrete walls shall be provided with Schedule 40 steel pipe sleeves. Sleeves shall be flush with each face of the wall. Seal space between sleeve and conduit with oakum and waterproof mastic.
  - 2. All conduit 1-1/4 inches and larger shall be sleeved.
  - 3. In general, conduit shall be installed exposed. Where chases through the building(s) are required to conceal conduit runs, they shall be the responsibility of this Contractor. Sizes and locations shall be fully coordinated with and approved by the Engineer and coordinated with the General Contractor. No junction or pull boxes shall be installed inside chases.
  - 4. Where conduit is to be supported from poured concrete slabs, inserts shall be installed on the forms before the concrete is placed. Inserts installed by firing a power type driver shall be used only with prior approval of the Engineer.
  - 5. Concrete encasements of underground conduit shall be installed where shown on

the Drawings, or specified herein. Concrete shall be 2500 psi in strength, dyed red throughout and shall be sized and have reinforcing steel as detailed on the drawings.

C. Conduit and Tubing:

1. Adapters shall be used and rigid steel extended from underground or below slab-on-grade PVC to above grade and through slabs. PVC shall be concrete encased where it passes under roadways. PVC shall not be used where exposed on the exterior nor where exposed to direct sunlight. PVC Schedule 80 shall be used where exposed in interior spaces with corrosive atmospheres. Conduit shall be kept at least 6 inches from parallel runs of flues, steam pipes, hot gas pipes, hot water pipes or any line which is continually hot during the normal operation. Conduits shall have supports spaced not more than 5 feet apart and shall be installed with runs parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings, with right angle turns consisting of cast metal fittings or symmetrical bends. Conduit shall be installed so as to insure against trouble from the collection of trapped condensation. This Contractor shall plan his work to avoid interference with equipment being installed by other trades.
2. 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 interferences prevent the installation of the raceways, or setting of boxes, cabinets, or other electrical equipment, as indicated on the drawings, deviations must be approved by the Engineer prior to installation, and after approval, shall be made without additional charge and shown on the record drawings. The number of raceways shall not be less than indicated on the drawings.
3. All conduit shall be run continuous between outlets with a minimum number of bends. Back-to-back 90 degree bends (180 degree change of direction) will not be acceptable.
4. During construction, all new conduits shall be kept dry and free of moisture and debris. Before the wire is pulled in, all conduits shall be swabbed to clear all moisture and debris which may have unavoidably accumulated.
5. Rigid conduits, where they enter panelboards, cabinets, pull boxes or outlet boxes shall be secured in place by galvanized, double locknuts (one inside and one outside) and bushings. Conduit bushings shall have insulating material which has been permanently fastened to the fittings. Bushings for conduit 1-1/2 inches trade size and larger shall be complete with grounding lug and shall be bonded to the box by means of bare copper wire. (See Section 16450 - Grounding.)
6. All field bends shall be made with standard tools and bending equipment manufactured especially for this purpose. Bends in metallic conduit shall be made while cold and in no case shall the conduits be heated. Conduits shall not be bent through more than 90 degrees.
7. Size of conduits shall not be less than that required by the National Electrical Code. The Contractor shall install larger size conduits than detailed where there is more than 100 feet of unbroken run or where the total of the angles through which the conduit has been bent during a single run exceeds 270 degrees.
8. Neoprene covered flexible metallic conduit shall be used wherever it is an extension of a rigid steel conduit system. Non-covered flexible conduit may be used in systems where it is an extension of a conduit system that is not rigid steel, indoors in a non-corrosive atmosphere and as "flex-tails" to light fixtures.

9. Neoprene covered flexible conduit shall be installed from motor terminal boxes or other vibrating equipment to outlet or device boxes or to conduit. Lengths of flexible conduit shall not exceed 48" nor be less than 12" and they shall be installed in such a manner so as not to tend to pull away from the connectors.
10. Holes cut to a depth of more than 1-1/2" in reinforced concrete beams or to a depth of more than 3/4" in concrete joints shall avoid cutting the main reinforcing bars. In any case, no holes shall be cut or drilled in structural members for the passage of conduit without written permission from the Engineer.
11. Where conduits cross building expansion joints, the Contractor shall furnish and install a sliding expansion joint. Expansion joints for rigid steel conduit shall be installed with bonding strap and clamps.
12. All conduit joints shall be made up tight and no running threads shall be permitted on threaded connections. Where metallic conduits are cut, the inside edge shall be reamed smooth to prevent injury to conductors. No kinked, clogged or deformed conduits shall be permitted on the job.
13. During construction, all installed conduits shall be temporarily capped or corked.
14. Set screw connections shall not be used on any conduit.
15. All moisture proofing or other material for thread protection shall be removed from conduit threads prior to installation. No material of insulating quality shall be used on the conduit threads or other places which will reduce the overall conductivity of the conduit system.
16. Where conduits are installed in groups on a common steel channel type support, each conduit shall be secured thereto by Korn's, Unistrut or Kindorf clamps. Where slabs are framed for future openings, the contractor shall run the conduits so as to avoid the framed areas.
17. Raceways shall be securely and rigidly fastened in place at intervals specified hereinbefore with wall brackets, conduit clamps, approved conduit hangers, beam clamps or ceiling trapeze. Fastenings shall be by wood screws or screw type nails to wood; by toggle bolts on hollow masonry units; by expansion bolts on concrete or brick; by machine screws, welded threaded studs, heat treated or spring steel tension clamps on steel work. Bolts, screws, etc. used in securing the work shall be galvanized and of ample size for the service. Assembly bolts, nuts, washers, etc., shall be zinc or cadmium coated. Raceways shall NOT be welded to steel structures.
18. Horizontal and vertical conduit runs shall be supported by one hole straps with clamp backs, special brackets, or other approved devices with suitable bolts, expansion shields where required, or beam clamps for mounting to building structure.
19. The use of perforated iron straps or wire for supporting conduits will not be permitted.
20. In general, conduit may not be run in concrete slabs but shall be below slabs-on-grade, exposed or concealed behind dropped ceilings, hollow walls and the like.
21. Where it is absolutely necessary to run conduit in a concrete slab, the conduit shall be rigid galvanized steel and shall be installed as close to the middle of the concrete slabs as practicable without disturbing the reinforcement. The outside diameter shall not exceed one-third of the slab thickness and conduits shall be placed not closer than three diameters on centers, except at cabinet locations where the slab thickness shall be increased upon consultation with, and approval by the Engineer.
22. Raceway shall not be installed horizontally within concrete slabs-on-grade. For slab-on-grade construction, horizontal runs of coated rigid steel or schedule 40

PVC conduit shall be installed below the floor slab. When a capillary water barrier is used, the conduit shall be installed below the barrier. Conduit passing vertically through slabs-on-grade shall be rigid steel. Steel conduits installed below slab-on-grade or in the ground shall be field wrapped with 0.010-inch thick pipe wrapping plastic tape applied with a 50 percent overlap, or shall have a factory applied asphaltum tar specifically made for this purpose. When the asphaltum tar coating method is used, the Contractor shall notify the Engineer just prior to backfilling so that he may inspect the coating and approve it before the conduit is covered.

23. Raceway shall be fitted with an acceptable, compound filled, commercial sealing fitting where shown on the drawings.
24. Fireproof seals shall be provided as required by NFPA codes and as shown on the drawings.
25. Conduits running vertically at I-beam type columns shall be installed inside the open part of the beam utilizing Kindorf type column mounting supports and 1-1/2 inch "U" channel.
26. 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.
27. All conduits entering and leaving instrument enclosures shall be sealed around the wires with silicone.
28. Areas of use for each type of conduit: CONTRACTOR shall use the same type conduit throughout any given area and not mix types in the same area.

D. Conduit Schedule:

Location	Schedule 40 PVC	Schedule 80 PVC	Aluminum	GRS	EMT
1. Building Interior - Exposed			X		
2. Building Interior - Concealed				X	
3. Emergence from UG				X	
4. Below Slab-on-grade	X	X			
5. Underground	X	X			
6. Exterior Exposed				X	

End of Section 16110

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## SECTION 16120 - 600V WIRE AND CABLE (CONDUCTORS)

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. Provide all labor, materials, equipment and services required for the furnishing of all wire, cable, and their installation to provide a complete and fully operable electrical system as detailed on the Drawings and/or hereinafter specified.
- B. All wire and cable shall conform to the latest requirements of the NEC and shall meet all ASTM/UL specifications. Wire and cable shall be new; shall have size, grade of insulation, voltage rating and manufacturer's name permanently marked on the outer covering at regular intervals. Complete descriptive literature shall be submitted to the Engineer for review and acceptance prior to installation.
- C. Wire and cable shall be suitably protected from weather and damage during storage and handling and shall be in first class condition when installed.

#### 1.02 SUBMITTALS

- A. Catalog data on conductors.
- B. Certification data on conductors.
- C. Testing reports.

### PART 2 - PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

- A. Building Wire (Types "THHN", "XHHW" and "RHH"-cu.) - "Rome," "American," "Carol," or approved equivalent.
- B. Flexible Cords and Cables (Types "SO" (600V) "SJO" and "SVO" - 300 V), "American," "Carol," or approved equivalent.
- C. Communication and Control Cables (Shielded or Unshielded) 600V max. - "Belden," "General Cable," "Okonite," or approved equivalent.

#### 2.02 WIRE AND CABLE - 600 VOLT AND BELOW

- A. All wiring and cable installation shall conform to NEC regulations and shall comply with local codes. All conductors shall be copper. Wiring shall not be operated above 75° C.
- B. For electrical equipment feeders (motor control centers, motor branch circuits, etc.), located below grade or for exterior control and motor circuits, wiring shall be Type THHN through #2 AWG and Type XHHW or RHH for larger than #2 AWG.

- C. For branch circuits for lighting and receptacles, wiring shall be Type THHN in conduit. For branch circuits for interior control, wiring shall be Type MTW.
- D. Power wiring shall be 12 AWG minimum, and control wiring shall be 14 AWG minimum.
- E. All signal wires shall be in conduit separate from any AC power lines. All motor circuits must be in separate conduits apart from any lighting, receptacle, or control wiring.
- F. All conductors shall be sized such that voltage drop does not exceed three percent for branch circuits or five percent for feeder branch circuit combinations.
- G. All terminal blocks shall be Allen Bradley terminals Model #1492-CA1 for wire sizes #22-#8 with mounting channel Model #1492-N16, and end anchors Model #1492-N23, or approved equivalent. Bare wire ends shall be connected into the recessed terminals. No fork-tongue compression terminals shall be used unless approved by the Owner for specific applications. A UL-listed anti-oxidation compound shall be used on any wires connected with wire nuts.
- H. Direct Burial Cable: No cable buried directly in the earth, not in raceway will be allowed on this project.

#### 2.03 PULLING COMPOUND

- A. Nontoxic, noncorrosive, noncombustible, nonflammable, wax-based lubricant; UL listed.
- B. Suitable for rubber, neoprene, PVC, polyethylene, hypalon, CPE, and lead-covered wire and cable.
- C. Suitable for zinc-coated steel, aluminum, PVC, bituminized fiber, and fiberglass raceways.
- D. Manufacturers and Products:
  - 1. Ideal Co.; Yellow 77.
  - 2. Polywater, Inc.
  - 3. Cable Grip Co.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Wire and Cable (600 volts and below):
  - 1. Wire shall not be installed until all work of any nature that may cause injury to the wire is completed.
  - 2. Mechanical means shall not be used in pulling in wires No. 8 or smaller.
  - 3. Approved wire pulling lubricant shall be used as required to prevent insulation damage and overstressing of the wire while pulling through conduit. In no case shall conductors be greased or coated with any substance injurious to the conductor insulation or sheath.

4. Panel Wiring: All wiring in panels, control equipment, cabinets, etc., shall be neatly wrapped, taped, or laced into groups to provide a neat and orderly appearance in the equipment.
5. If the size and number of conductors in a conduit on the Drawings is not shown then it shall be assumed to be three (3) No. 12 wires in a 3/4-inch conduit.
6. Unless specified otherwise herein or shown otherwise on the Drawings, all wiring shall be installed in conduit.
7. All wires connected to terminal boards, terminal blocks, or to other similar terminals shall terminate by means of pressure terminals. Where terminal boards, terminal blocks, etc. are designed and manufactured to accept bare wire and have a pressure plate on each side of the wire, no pressure terminals on the wire will be required. Where the wire would have to encircle the holding screw to make a proper connection, the wire terminals are required.
8. Where the wire is shown larger than that required for the load, it is done so for voltage drop or other purposes and must be installed as shown. Where the wire is stranded, the removal of strands in order to install the wire into a lug provided on any equipment will not be permitted. A larger lug shall be installed which will accept the wire size indicated.

B. Conductor Identification:

1. Each wire shall be labeled at both termination points. Individual conductor or circuit identification shall be carried throughout, with circuit numbers or other identification clearly stamped on terminal boards and printed on directory cards in distribution cabinets and panelboards.
2. In all junction boxes, cabinets, control compartments and terminal boxes where no terminal board is provided, each wire, including all power wires, shall be properly identified by plastic coated, self-adhesive, wire marker.
3. In cases similar to the above where the terminal boards are provided for the control, indicating, and metering wires, all wires including motor leads and other power wires shall be identified by wire markers as specified above.
4. Equipment ground wire insulation shall be colored green or green with two or more yellow stripes.
5. In general and unless otherwise shown on the Drawings, no two wires of the same color shall be run in the same conduit except such as control wiring, switch legs, neutral, and ground. Where a conduit run is shown on the Drawings to have two or more wires connected to the same phase and, therefore, are the same color, pressure sensitive, plastic marked wire marker identification tape shall be used wherever the wire is accessible (junction boxes, panels, device boxes, etc.). The numbers shall in each case, correspond to the circuit number and panelboard from which the circuit emanates. Control wiring inside any compartment which may be energized from a source outside the compartment shall have yellow insulation. Where yellow insulated wires are used inside any cabinet, compartment, etc., a machine engraved, laminated plastic identification marker shall be installed on the outside of the compartment which reads:

CAUTION	5/8 inch letters
Wires inside may be energized from separate source	3/8 inch letters

Marker shall be white letters on a red background.

6. Insulation on ungrounded conductors larger than AWG #10 and on grounded (neutral) and grounding (equipment ground) conductors larger than AWG #6 may be black with color coding accomplished with the use of colored plastic tape. Tape shall be installed on the conductors wherever they are visible and shall be wrapped at least three (3) turns around the conductor.
7. All wiring on this project, except control wiring, shall reflect the phase relationship as follows:

480Y/277 volt system: Brown, orange and yellow for ungrounded conductors, gray with brown tracer for neutral conductors.

208Y/120 volt system: Black, red and blue for ungrounded conductors, white for neutral conductors.

End of Section 16120

## SECTION 16121 -WIRE CONNECTIONS AND CONNECTING DEVICES

### PART1 - GENERAL

#### 1.01 REQUIREMENTS

Wire connection and connecting devices shall be as herein specified.

### PART2 - PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

- A. Connectors, Lugs, etc. "T & B," "Anderson," "Burndy," or approved equivalent.
- B. Ties and Servings -"T & B," "Panduit," or approved equivalent.
- C. Termination and splice connectors -"3M Scotchlok," "Anderson," "T & B," "Burndy," or approved equivalent.

#### 2.02 MATERIALS

- A. Wire Splicing and Terminations (600 Volts and Below):
  - 1. Electrical Terminal and Splice Connectors (#22- #4 AWG):
    - a. Terminals and splice connectors from #22- #4 AWG shall be compression types with barrels to provide maximum conductor contact and tensile strength. Performance, construction, and materials shall be in conformance with UL standards for wire connectors and rated for 600 volts and 105 degrees Celsius.
    - b. Connectors shall be manufactured from high conductivity copper and entirely tin plated. Terminal barrels shall be separated on the inside surface and have a chamfered conductor entry. Terminals shall have funnel entry construction to prevent strand fold-back. All barrels shall be brazed seam or seamless construction.
    - c. Spade type terminals shall be sized for the appropriate stud and shall be locking type that snap firmly onto studs with a close fit for maximum retention. Spade type terminals shall be insulated with an insulation suitable for maintaining a high dielectric strength when crimped and be made from nylon, PVC, or approved equivalent.
  - 2. Electrical Lugs and Connectors (#6 AWG -#1000 KCM): Lugs and splice connectors from #6 AWG -1000 KCM 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 two (2) hole lugs with NEMA spacing. The lugs shall be rated for operation through 35 KV. The lugs shall be of closed end construction to exclude moisture migration into the cable conductor.

3. Twist-on Wire Connectors (#22 AWG -#10 AWG):
  - a. All twist-on wire connectors must have a corrosion resistant spring that is free to expand within a steel jacket. The steel jacket must be insulated with a flexible vinyl jacket capable of withstanding 105 degrees Celsius ambient temperatures and of sufficient length to cover wires that are inadvertently overstripped.
  - b. Each connector size must be listed by UL for the intended purpose and color coded to assure that the proper size is used on the wire combinations to be spliced. The connectors must be compatible with all common rubber and thermoplastic wire insulations.
  - c. Twist-on wire connectors shall be used for lighting, HVAC, and receptacle circuits only. Use UL listed anti-oxidation compound when using connectors.
4. Solderless/Re-usable Lugs: 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. Wires shall be coated with electrical joint compound, T & B Kopr-Shield, Penn-Union Coal-Aid, or approved equivalent before being bolted into the connector.

## PART 3 - EXECUTION

### 3.01 INSTALLATION/APPLICATION/ERECTION

#### A. Insulation of Splices and Connections:

1. Connections/splices with a smooth even contour shall be insulated with a conformable seven (7) mil thick vinyl plastic insulating tape which can be applied under all weather conditions and is designed to perform in a continuous temperature environment up to 105 degrees Celsius. The tape shall have excellent resistance to abrasion, moisture, alkalis, acids, corrosion, and varying weather conditions (including sunlight). The tape shall be equivalent to Scotch 33+ and shall be applied in conformance with manufacturer's recommendations. In addition, it shall be applied in successive half-lapped layers with sufficient tension to reduce its width to 5/8 of its original width. The last inch of the wrap shall not be stretched.
2. Connections/splices with irregular shapes or sharp edges protruding shall be first wrapped with 30 mil rubber tape to smooth the contour of the joint before being insulated with 33+ insulating tape specified in the previous paragraph. The rubber tape shall be high voltage (69 KV) corona-resistant based on self-fusing ethylene propylene rubber and be capable of operation at 130 degrees Celsius under emergency conditions. The tape must be capable of being applied in either the stretched or unstretched condition without any loss in either physical or electrical properties. The tape must not split, crack, slip, or flag when exposed to various environments. The tape must be compatible with all synthetic cable insulations. The tape must have a dissipation factor of less than five (5) percent at 130 degrees Celsius, be non-vulcanizing, and have a shelf life of at least five (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 equivalent to Scotch 23 or 130C electrical splicing tape.
3. All splices made in exterior pull or junction boxes including any concrete pull boxes or hand holes shall be made waterproof and shall be made with a splicing kit containing materials approved for making waterproof splices. Splice kits shall be as manufactured by 3M company and properly sized for the wire being spliced. For wire sized AWG #12 and smaller water proof splices shall be made using "Scotchlok" connectors in conjunction with 3M Co. #3570 sealing pack. For wire sized AWG #10 and larger waterproof splices shall be made using "Scotchlok" compression connectors in conjunction with 3M Co. type PST cold shrink waterproof insulators. Splices shall be made closely following the manufacturer's instructions.

B. Connection Make-Up:

1. Connections of lugs to bus bars, etc., shall be made up with corrosion resistant steel bolts having non magnetic properties with matching nuts, and shall utilize a belleville spring washer (stainless steel) to maintain connection integrity. Connections shall be torqued to the proper limits. Prior to bolting up the connection, electrical joint compound shall be brushed on the contact faces of the electrical joint.
2. All motor lead connections ( excluding motors over 200 horsepower) shall be made up using ring tongue compression lugs with proper size stainless steel nuts and bolts. Electrical joint compound shall be utilized and belleville type spring washers shall be used to maintain tension on the connections. The connections shall then be insulated using the procedure described for irregular shapes, utilizing rubber tape in conjunction with vinyl electrical tape.
3. At the time of final inspection, the Engineer shall request the Contractor to disassemble three (3) randomly selected motor lead connections in the Engineer's presence, to assure conformance with these Specifications. The connections shall be reassembled by the Contractor.
4. The Contractor shall include all necessary tools, materials, and labor in his bid for disassembly of the connections and for remaking them with new insulating materials after inspection.

End of Section

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## SECTION 16123 - 5 kV CABLE

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

Provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install 5 kV cable and shall retain the services of an independent testing firm to perform acceptance testing of the cable installation.

#### 1.02 QUALITY ASSURANCE

##### A. Requirements of Regulatory Agencies:

1. Codes: Install cable in accordance with the current standards and recommendations of the National Electrical Code and with any applicable local codes. Where discrepancies arise between codes, the most restrictive regulation shall apply.
2. Tests by Independent Regulatory Agencies: Cable shall bear the label of the Underwriters' Laboratories, Incorporated.
3. Utilities.

##### B. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. National Electrical Code.
2. ASTM B 3, Uncoated Annealed Copper Conductors.
3. ASTM B 8, Specification for Concentric Lay Stranded Copper Conductors.
4. ICEA S-93-639, Shielded Power Cables.
5. AEIC CS8, Specification for Extruded Dielectric Shielded Power Cables Rated 5 through 46 kV
6. UL 1072, Revised Outline of Requirements for Medium Voltage Cables.
7. ANSI C2, National Electrical Safety Code.
8. NETA, InterNational Electrical Testing Association.
9. IEEE 48, Standard Test Procedures and Requirements for Alternating-Current Cable Terminations 2.5kv through 765kv.
10. EEE 404, Standard for Cable Joints for Use with Extruded Dielectric Cable Rated 5000-138,000 V and Cable Joints for Use with Laminated Dielectric Cable Rated 2500-500,000 V.

##### C. Factory Production Tests:

1. Conductors shall meet the electrical resistance requirements of ICEA.
2. Insulation resistance test shall be performed in accordance with the requirements of ICEA. Each cable shall have an insulation resistance not less than that corresponding to the insulation resistance constant of 20,000 megohms-1000 ft. at 15.6 C.
3. A high voltage AC and DC test shall be performed in accordance with ICEA. The AC and DC test voltages shall be in accordance with AEIC.
4. Shield resistance shall be measured and recorded from end to end on the

- completed cable.
5. Corona Test: Each reel of completed shield power cable shall be partial discharge tested in accordance with AEIC.
- D. Testing Firm Qualifications: The testing firm shall have experience in the inspection and testing of cables of the type specified and shall be NETA certified.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

#### A. General:

1. Cable furnished under this Specification shall be rated for an insulation level of 133 percent at 5 kV.
2. Cable insulation shall be thermosetting rubber based suitable for normal installation, indoors or outdoors, in conduit, in air, and intermittent or continuous submersion in water.
3. Cable shall be single conductor bearing UL label "MV 105" and comply with or exceed ICEA and AEIC standards.

#### B. Materials:

1. Conductor: All conductors shall be soft or annealed copper with concentric-lay Class B round stranding in accordance with the current ASTM Standards B 8, and either B 33 or B 189.
2. Insulation System: The cable insulation system shall include two separate shield layers and the primary insulation.
  - a. Conductor shield shall consist of an extruded inner layer of semiconducting material.
  - b. Primary insulation shall be a high quality ozone resistant ethylene-propylene rubber based compound. The insulation system shall be suitable for use at conductor temperatures not exceeding 105 C for normal operation, 140 C for emergency overload conditions, and 250 C for short circuit conditions. Minimum average thickness of the insulation system at any point of the cable shall not be less than 220 mils. The minimum thickness at any part of the cable shall not be less than 90 percent of the specified average.
  - c. Insulation Shield:
    - 1) Over the insulation shall be applied an extruded conducting thermosetting insulation shield. It shall be in intimate contact with the outer surface of the insulation and shall be free-stripping, leaving no conducting particles or other residue on the insulation surface. This layer shall be legibly identified as being conducting.
    - 2) Directly over the extruded insulation shield shall be a helically applied 5 mil uncoated copper shielding tape with a minimum lap of 12.5%.

- d. Jacket: A continuous jacket of moisture, heat, oil resistant black polyvinyl chloride shall be applied over the insulation and shielding system. The average minimum thickness of the jacket at any point of the cable shall be in accordance with ICEA.

C. Manufacturer: Provide one of the following:

1. Rome Cable Company
2. Kerite Company.
3. The Okonite Company.

D. Cable Connectors:

1. All connectors shall be copper, tin-plated, long barrel compression type. Suitable for voltage applications up to 35 kV.
2. For sizes 250 MCM and larger, connectors shall be two hole mount type with provisions for two bolts for joining to apparatus terminal.
3. Product and Manufacturer: Provide one of the following:
  - a. Burndy Hylug.
  - b. T&B Connectors.
  - c. Or equal.

E. Cable Terminations:

1. All cable terminations shall meet Class 1 requirements of IEEE 48.
2. Terminations shall be of the molded elastomer, wet-process porcelain or heat-shrinkable types with grounding provisions for the cable shielding.
3. Product and Manufacturer: Provide one of the following:
  - a. Elastimold.
  - b. G&W Electric Co.
  - c. Raychem Corporation.
  - d. 3M Co.
  - e. Or equal.

F. Cable Splices:

1. All cable splices shall be made using standard splice kits which reinstate the cable's insulation and jacket and continue the metallic shielding through the entire cable joint.
2. Splices shall be premolded, conventional tape or heat-shrinkable type.
3. Product and Manufacturer: Provide one of the following:
  - a. Elastimold.
  - b. G&W Electric Co.
  - c. Raychem Corporation.
  - d. 3M Co.
  - e. Or equal.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install all cables complete with proper terminations at both ends. Check for proper phase sequence and proper motor rotation.
- B. Splice and terminate all 5 kV cables in strict accordance with the cable manufacturer's recommendations.
  - 1. Use experienced personnel familiar with the materials and procedures to be employed.
  - 2. Make splices watertight in all cases below grade and submersible in all manholes and handholes.
- C. Pulling:
  - 1. Use insulating types of pulling compounds containing no mineral oil.
  - 2. Pulling tension shall be within the limits recommended by the cable manufacturer.
  - 3. Use a dynamometer where mechanical means are used.
  - 4. Cut off section subject to mechanical means.
- D. Bending Radius: Limit to 12 times cable overall diameter.
- E. Slack: Provide maximum slack at all terminal points and in manholes.
- F. Wrap cables located within manholes, handholes and boxes with fireproofing tape for their entire length on an individual cable basis. Tape shall be 30 mills thick of self-extinguishing material which will not support combustion. Tape shall not deteriorate when subjected to water, salt, sewage or fungus and shall be secured with glass cloth tape. Fireproofed cables in accordance with the cable manufacturer's recommendations and then cover with tape extending at least one inch into any duct.
- G. Identification: Identify all conductors by circuit number and phase at each terminal or splice location.
- H. Color code cables by applying general purpose, flame retardant tape, wrapped in overlapping turns covering an area of at least 2 inches.
- I. Install in conformance with National Electrical Code and National Electrical Safety Code.

### 3.02 TESTING

- A. Perform acceptance testing of the 5 kV cable system. Each cable circuit shall be inspected and tested on an individual per phase basis. All testing and inspection shall be performed by the testing firm.
- B. Visual and Mechanical Inspection: Perform inspection of each power cable installation in accordance with the latest NETA acceptable testing specifications. All splices and terminations shall be inspected.

- C. Electrical Tests: Perform electrical testing of each power cable in accordance with the latest NETA testing procedures. Testing shall include the following:
1. Shield continuity test.
  2. DC high potential test.
  3. Adhere to following procedures before performing dc over potential tests:
    - a. Disconnect all equipment, including, but not limited to, transformers, switches, motors, circuit breakers, and surge arrestors from cable circuit to prevent test interruptions due to flashovers or trip outs resulting from excessive leakage current.
    - b. Establish adequate clearance between the circuit test ends and any grounded object and to other equipment not under test.
    - c. Ground all circuit conductors not under test, all cables shields and nearby equipment.
    - d. Clean insulation surfaces.
    - e. Keep cable ends dry.
  4. Apply high-potential slowly in 8 to 10 equal steps to 80 percent of the manufacturer's test value. Record the leakage current at each test voltage and plot the curve on graph paper.
  5. Stop test if the leakage current increases excessively or a "knee" appears in the curve before reaching maximum test voltage.
  6. Upon reaching the specified maximum test voltage, maintain the voltage for 15 minutes, record the leakage current at 30 seconds and one minute and at one-minute intervals thereafter. Plot leakage current versus time on the same graph as the step voltage curve.
  7. Reduce conductor test potential to zero and measure residual voltage at discrete intervals.
  8. Apply grounds for a time period adequate to drain all insulation stored charge.
  9. Repair or replace and retest new cable failing tests.
  10. The test curves shall be signed by the individual who performed the tests, and sent to OWNER for review.

End of Section 16123

seams. Covers shall be galvanized steel and held in place by screws. Covers over 600 square inches shall be hinged on one side with hinges spaced a maximum of 18 inches and shall be held in place by screws.

- C. Damp or Wet Locations: Cabinets, pullboxes and junction boxes in damp or wet locations shall be of the cast type, rust and corrosive resistant with threaded hubs and gasketed covers and shall conform to NEMA 3R construction. Sizes shall be as required by Article 370 of the National Electrical Code.
- D. Pull Boxes: Pull boxes for exterior underground work shall be provided as required. Interior pull boxes are shown where necessary for clarity only and shall be used as needed. Pull box types are as follows:
  - 1. Exterior: Per detail on the Contract Drawings.
  - 2. 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 equivalent. Hardware shall be stainless steel. Metallic boxes shall be used with metallic conduit.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Where specifically detailed or indicated on the Drawings, boxes shall be provided, installed and supported as shown. Where not specifically shown on the Drawings, the Specifications hereinafter shall apply. Boxes shall be provided in the wiring or raceway systems where shown on the Drawings, wherever required for pulling of wires, making connections, and mounting of devices or fixtures. Each box shall be sized as shown on the Drawings or shall have the volume required by the National Electrical Code for the number of conductors enclosed in the box. Boxes installed for concealed wiring shall be provided with suitable extension rings or plaster covers, as required. Boxes and supports shall be fastened to wood with wood screws or screw-type nails of equal holding strength, with bolts and metal expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screws or beam clamps on steel work. In overhead spaces, cast metal boxes threaded to raceways need not be separately supported except where used for fixture support. Sheet metal boxes shall be supported except where used for fixture support. Sheet metal boxes shall be supported directly from the building structure or by bar hangers. Where bar hangers are used, the bar shall be attached to raceways on opposite sides of the box and the raceway shall be supported with an approved type fastener not more than 24 inches from the box. Penetration of more than 1-1/2 inches into reinforced concrete joists shall avoid cutting any main reinforcing steel.
- B. 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 16130

## SECTION 16190 - SUPPORTING DEVICES

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

Electrical equipment shall be 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

"Kindorf," "Unistrut," or approved equivalent.

#### 2.02 MATERIALS

- A. All mounting brackets and strut used outside shall be stainless steel. Fasteners used to mount equipment outside shall be stainless steel.
- B. All mounting brackets and strut used inside for stainless steel equipment shall be stainless steel. All other mounting brackets and strut used inside shall be extruded aluminum unless in direct contact with concrete or block, then it shall be galvanized. If galvanized is used, then the cut ends shall be cold galvanized painted. Fasteners used inside to mount equipment shall also be stainless steel. Ungalvanized strut is prohibited.

End of Section 16190

- N. Grounded and Grounding Conductor: Connections to the grounding conductor and/or the neutral (grounded) conductor shall be made in such a manner that removal of any device or equipment will not interrupt the continuity of these conductors to any device downstream from the device removed.

### 3.02 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. 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:
    - a. Manufacturer.
    - b. Model Number.\*
    - c. Confirm fall-of-potential test.
    - d. Serial Number.\*
    - e. Where instrument was obtained.

\*These two 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.

End of Section 16450

## SECTION 16460 - SMALL POWER AND MISCELLANEOUS TRANSFORMERS

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. Transformer locations and size shall be as shown on the Contract Drawings, or as specified herein.
- B. The following shall be provided and installed where indicated on the Contract Drawings:
  - 1. Current transformers (refer to Specification Section 16622).
  - 2. Potential transformers (refer to Specification Section 16622).
  - 3. Small power distribution transformers.

#### 1.02 RELATED WORK

- A. Section 16470 - Power Distribution.
- B. Section 16621 - Standby Generator.
- C. Section 16622 - Automatic Transfer Switch and Paralleling Switchgear.

#### 1.03 SUBMITTALS

Provide Shop Drawings and wiring diagrams.

### PART 2 - PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

"Square-D," or equivalent.

#### 2.02 FABRICATION

- A. Dry-type Transformers:
  - 1. Three phase transformers shall be 480 volts delta primary and 208Y/120 volt secondary. Transformers 25 KVA and larger shall have a minimum of four (4) (two (2) above, two (2) below) 2-1/2 percent full capacity primary taps.
  - 2. Transformers shall be 115 degrees Celsius (150 degrees Celsius for transformers mounted in MCC's) temperature rise above a 40 degrees Celsius ambient. The transformer shall be capable of carrying a fifteen (15) percent continuous overload without exceeding a 150 degrees Celsius rise in a 40 degrees Celsius ambient. All insulating materials are to be in accordance with the latest NEMA Standards for a 220 degree Celsius UL recognized insulation system.
  - 3. 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.
4. 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 and 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.
  5. 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.
  6. The entire transformer enclosure shall be degreased, cleaned, phosphatized, primed, and finished in the same color as the motor control equipment.
  7. The maximum temperature of the top of the enclosure shall not exceed 35 degrees Celsius rise above a 40 degrees Celsius ambient.
  8. 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.
  9. The transformers shall be manufactured to requirements of applicable standards, especially as they apply to noise level and surface temperatures.
  10. Sound levels shall not exceed the following:

TRANSFORMER RATING, KVA	AVERAGE SOUND LEVEL, DECIBELS
0 - 9	40
10 - 50	45
51 - 150	50
151 - 300	55
301 - 500	60

End of Section

## SECTION 16470 - POWER DISTRIBUTION

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

This Section covers materials and installation procedures for the panelboards, fuses, safety switches and other items related to power distribution equipment.

#### 1.02 RELATED WORK

- A. Section 16050 - General Provisions.
- B. Section 16120 - Wire and Cable.
- C. Section 16130 - Boxes, Cabinets and Enclosures.
- D. Section 16621 - Standby Generator.

#### 1.03 SUBMITTALS

Complete shop drawings and layout drawings with actual dimensions, ratings, etc. of all equipment.

### PART 2 - PRODUCTS

#### 2.01 EQUIPMENT

- A. Panelboards:
  - 1. All panels shall be of the dead front type and shall be labeled in accordance with the Underwriters' Laboratories standards for panelboards and enclosing cabinets. Panels shall consist of toggle operated, automatic short circuit and over-current protective devices of the circuit breaker type, factory assembled into a single interior unit with a front designed to be flush or surface mounted or mounted in a motor control center as shown on the Drawings or in the schedules. All panels inside the generator enclosure shall be in NEMA 1 enclosures; panel shown outside shall be in a NEMA 3R enclosure. Panels shall be designed for number of phases, wires, voltage, etc. as shown on the Drawings.
  - 2. 208Y/120 volt panels shall be equivalent to Square-D, Type (NQOB), bolt-in breakers, and 480Y/277 volt lighting and power panels shall be equivalent to Square-D Type NEHB bolt-in breakers, and shall have a minimum of 6-1/2 inches wiring space on sides and 5 inches on top and bottom. Boxes shall be 5-3/4 inches deep. All bussing shall be 98 percent conductivity copper. Each panel shall have an equipment ground bar separate from the neutral bar and bonded to the enclosure. The ground bar shall contain lugs of sufficient number and size to accommodate the grounding conductors for the circuits originating in the panels.
  - 3. All breakers in lighting and power panels shall be equivalent to Square-D, Type QOB or Q1B for 208Y/120 volt systems, 10,000 AIC; and Square-D, Type EHB frame for 480Y/277 volt systems, 14,000 AIC. Sizes shall be shown in the

Panelboard Schedule. Two- and 3-pole breakers shall be factory assembled in one molded case. **Attachments which tie two or three single pole breaker handles together will not be acceptable.**

4. Fronts shall be non-tamperable, complete with door and flush chrome plated pin type cylinder lock and catch. All panelboards both lighting and power shall be keyed alike. Furnish Owner with six (6) keys for all locks on doors. **Fronts on flush mounted panels shall have adjustable indicating trim clamps which shall be completely concealed when the door is closed.** Doors shall be mounted to the front by means of concealed hinges. Fronts shall have directory frames on the inside with clear plastic covering complete with directory cards. Fronts shall have the number of frames equal to the number of directory cards required with circuits printed on one side only. All components of the panels shall be Underwriters' Laboratories listed.
5. All panels shall be shipped from the factory with the correct size and number of lugs per phase to accommodate feeder or branch circuits as shown on the Drawings. Field alterations will not be allowed.
6. Panel fronts for flush mounted panels and panel fronts and tubs for surface mounted panels shall be furnished in gray enamel.
7. The panelboard schedules are shown on the Drawings.
8. Panels as manufactured by Square-D or equivalent will be considered for this project.

B. Safety Switches:

1. All safety switches shall be heavy-duty load break type with a quick-make, quick-break, switch mechanism. The switches shall be fused or unfused as indicated on the Drawings. The handle position shall give visual indication of open and closed switch position. Padlocking capability shall be provided for locking the switch in the off position.
2. The switch jaws shall be multi-spring type for positive grip of the switch blades and shall be provided with arc suppressors. The fuse clips shall be spring reinforced, positive pressure type of electrolytic copper. (Fuse clips shall be rejection type.)
3. The switch shall be provided with cover-blade interlock so that the cover cannot be opened when the switch blades are closed, nor can the switch blades be closed with the cover open. Interlock bypassing devices shall be included for use by authorized personnel. NOTE: Where indicated, safety switches shall have integral electrical interlocks. Contacts shall be open when the switch is in the off position.
4. Enclosures shall be NEMA 12 where used inside the building and NEMA 4 where used outside unless otherwise shown on the Drawings.
5. Each safety switch shall be provided with ground lugs as required to accept grounding conductors as shown on the Drawings. The grounding lugs shall be factory installed and shall have direct metal-to-metal contact with the switch enclosure.
6. Switches shall be Square-D or equivalent.

C. Fuses (600 Volts and Below):

1. The Contractor shall provide fuses as called for on the Drawings. Where the fuse size is not indicated the Contractor shall size the fuse for actual load installed. Where the fuse size is indicated on the Drawings the Contractor shall verify the actual load installed and provide fusing accordingly.

2. Unless otherwise indicated on the Drawings, all fuses shall be non-renewable, current limiting, dual element, time-lag rejection type. The fuses shall have an interrupting capacity of at least 100,000 amperes RMS symmetrical. The basis fuse time current interrupting characteristics shall be as follows:

500 percent load	10 sec. interrupting time
400 percent load	19 sec. interrupting time
300 percent load	39 sec. interrupting time
200 percent load	110 sec. interrupting time

3. Fuse clips shall be identified as to what size fuse is required in the particular switch as given in these Contract Documents and Drawings. "Stick-on" identification will not be acceptable. Permanent markers such as plastic nameplates shall be used. These plates may be installed between fuse clips.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Installation of equipment specified in this Section shall be where shown on the drawings. Where no details are shown concerning mounting or other installation methods, equipment shall be installed as per manufacturer's recommendations or as specified hereinafter.
- B. Panels as well as safety switches shall be mounted directly on or in (as shown) walls where shown on the Drawings. Mounting shall be in such a manner that no pressure or weight is placed on any conduit entering the enclosures. Where no walls are near the locations where safety switches are shown, bracket mounting on steel channels such as those manufactured by Unistrut, Kindorf or equivalent will be required.
- C. Where lugs are provided for installation of wire such as terminal strips, ground bars, circuit breakers, neutral bars, or separately mounted lugs, not more than one conductor shall be installed under one lug.
- D. Circuit designations shall be TYPED on circuit directory cards.
- E. Certain panelboards are existing and shall require modifications. The Contractor shall add/delete circuits as required and revise the circuit directory cards where necessary.

End of Section

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## SECTION 16600 - UNDERGROUND SYSTEM

### PART 1- GENERAL

#### 1.01 SCOPE OF WORK

Furnish and install a complete underground system of raceways and handholes as shown on the Drawings and as specified herein.

#### 1.02 RELATED WORK

- A. Section 02222 - Excavation.
- B. Section 03210 - Reinforcing Steel.

#### 1.03 SUBMITTALS

Submit to the Authority, in accordance with Section 00830, manufacturer's shop drawings, product data sheets, and catalog numbers of all materials specified in this Section.

#### 1.04 QUALITY ASSURANCE

Contractor shall be responsible for delivering a quality product manufactured and installed in accordance with NFPA 70, to the Authority and shall be solely responsible for quality control inspection and the quality of work performed.

#### 1.05 DELIVERY, STORAGE AND HANDLING

Deliver materials in manufacturer's original unopened and undamaged packages with labels legible and intact. Store materials in unopened packages in manner to prevent damage from the environment and construction operations. Handle in accordance with manufacturer's instructions.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. Raceways shall be Schedule 40 PVC conduit. Refer to Section 16110 for material specification. Conduit under roads, drives, parking lots, or any asphalt paving shall be encased in concrete.
- B. Handholes:
  - 1. Handholes shall be precast concrete, heavy-duty type, designed for a Class H-20 wheel load and shall conform to ASTM C478.
  - 2. Non-metallic cable racks shall be installed on two sides of each handhole. Bolts shall be cast in the handholes for mounting of the cable racks. Field drilling of handholes shall not be acceptable.

- C. Handhole frames and covers shall be cast iron, heavy duty type for Class H-20 wheel loading as manufactured by Neenah Co., LeBaron Inc., or approved equivalent.
- D. Ground rods and other grounding materials and methods shall be as specified under other Sections of Division 16.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install raceways to drain away from buildings. Raceways between handholes shall drain toward the handholes. Raceway slopes shall not be less than 3in per 100-ft.
- B. Reinforce raceway banks as shown on the Drawings.
- C. Lay raceway lines in trenches on mats of bank gravel not less than 6-in thick and well graded.
- D. Use plastic spacers located not more than 5-ft apart to hold raceways in place. Spacers shall provide not less than 3-in clearance between raceways.
- E. The minimum cover for raceway banks shall be 24-in unless otherwise permitted by the Engineer. Conduit below floor slabs shall be a minimum of 2 inches below bottom of slab.
- F. Make raceway entrances to buildings and vaults with steel conduit not less than 10-ft long. Conduits run below floor slabs in slab-on- grade construction shall be steel.
- G. Raceway terminations at handholes shall be with end bells for FRE conduit and insulated throat grounding bushings for steel conduit.
- H. Where bends in raceways are required, use long radius elbows, sweeps and offsets.
- I. Where PVC coated conduits are stubbed up from a concrete floor or structure, they shall extend at least 6 inches out of the surface.
- J. Swab all raceways clean before cable installation.
- K. Plug spare raceways and seal them watertight at all handholes, buildings and structures.
- L. Seal the ends of raceways and make watertight at all handholes, buildings and structures.
- M. Maintain 12-inch minimum separation at all times between power/feeder conduits and control/instrumentation conduits.

#### 3.02 EXCAVATION, BACKFILLING AND GRADING

- A. The Contractor shall perform all earth and rock excavation, backfilling and grading required for this part of the work. Rock excavation shall be made to a depth of 4 inches below pipe and filled to subgrade with dense graded aggregate limestone. Sub-surface investigations have been made and are available for the convenience of the Contractor.

If for any reason, the Contractor doubts the reliability of the information shown or wishes additional information, he shall, at his own expense, make whatever soundings that he deems necessary before submitting his bid. After the bid is submitted there will be no additional funds forthcoming for excavation work on this project. All excavation shall be bid as unclassified.

- B. Trenches shall be maintained free of water until backfilling is completed.
- C. Trench excavations shall be backfilled with compacted and approved silty clay, clay, shale, sand and gravel. All clayey soil materials used should be moisture conditioned to within 2% below to 3% above optimum moisture content for compaction, and then placed in shallow layers, 4 to 6 inches thick, with each layer thoroughly compacted to densities not less than 95%, as per ASTM D698. Granular backfill should be compacted to at least 75% relative density as per ASTM D4253 and D4254. Under no condition should any backfill be flushed in an attempt to obtain compaction.

End of Section 16600

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## SECTION 16620 - EMERGENCY POWER SYSTEM

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

The Electrical Contractor shall provide the labor tools, equipment, and materials necessary to furnish and install two (2) standby diesel generator sets, two (2) automatic transfer switches, and paralleling switchgear in accordance with the plans, National Electric Code (NEC) Article 701, and as specified herein.

#### 1.02 SYSTEM RESPONSIBILITY

- A. To ensure one source of responsibility and all equipment specified in Sections 16620, 16621, and 16622 are to be furnished by the generator set supplier. The generator set supplier shall have total responsibility for coordinating all work involved in these systems, and for furnishing all submittals and manufacturer's services required by these specification for these systems.
- B. Generator sets, transfer switches, and paralleling switchgear have been specified based on a certain manufacturer. Substitutions are acceptable; however, it will be the responsibility of the Contractor to provide all necessary equipment to make the system fully operational as per manufacturer's requirements. This includes, but is not limited to, control wiring between components; alternate generator, transfer switch or switchgear layout that may impact the padsize.

#### 1.03 RELATED WORK

- A. Section 16621 - Standby Generator.
- B. Section 16622 - Automatic Transfer Switch and Paralleling Switchgear.

#### 1.04 GENERAL

- A. Materials and Workmanship - All materials, equipment, and parts comprising the units specified herein, shall be new and unused, of current manufacture and of highest grade.
- B. Warranty - Equipment furnished under this section shall be guaranteed against defective parts or workmanship under terms of the manufacturer's and dealer's standard warranty, but in no case less than two (2) years from date of initial startup of the system and shall include labor and travel time for repairs at the jobsite for the entire warranty period. Prorating of any item is not acceptable. All equipment furnished must be supported 100% by the generator set supplier. Units with the engine or generator warranty from a manufacturer other than the manufacturer of the generator set are not acceptable.
- C. Start-up and Instructions - On completion of the installation, start-up of the system shall be performed by a factory-trained dealer service representatives from the generator set and switchgear supplier. Operating and maintenance instruction books shall be supplied upon delivery of the unit to the owner or his representative at this time and procedures explained to operating personnel. Additional switchgear testing and instructions are specified in the switchgear section of this specification.
- D. Service - The generator set supplier must have the ability, from within his own operation, to service the engine, generator, automatic transfer switch, paralleling switchgear, and all

auxiliary components regardless of how major the repair. Hiring the service of an outside vendor or service company is not acceptable. Provide a description and location of emergency generator suppliers parts and service facility within 60 miles of the jobsite, including parts inventory and names of at least three qualified field service personnel provided with their own service truck plus regular and after hours phone numbers where they may be reached. The dealer must have service people available 24/7, no exceptions.

- E. NEC Compliance: Comply with applicable standby generator requirements of NEC including, but not limited to emergency and standby power generation systems, and Articles 230,517,700,701, and 702.
- F. NFPA Requirements: Comply with applicable requirements of NFPA No. 37 and 110 pertaining to stationary combustion engines, and life safety code.
- G. UL Compliance: Comply with applicable requirements of UL 1008, Automatic Transfer Switches.
- H. Specifications and Drawings: The bidders shall furnish information showing manufacturers' model numbers, dimensions and weights for the generator sets, paralleling switchgear, automatic transfer switches and major auxiliary equipment. Proposed deviations from the specifications shall be stated in the bid.
- I. Dealer Experience: The local generator set supplier must be qualified with at least 20 years of successful experience on projects with engine generator parallel systems similar to that required for project. A list of these installations in the dealer's service territory will need to be provided if requested by the Engineer or Owner.

#### 1.05 SUBMITTALS

- A. Submit the following in accordance with conditions of this contract:
  - 1. Shop Drawings: Submit shop drawings to substantiate that the materials and equipment comply with specification requirements. Submit the following types of drawings with options and accessories to be provided clearly indicated and those not to be provided clearly deleted on each and every sheet of the submittal:
    - a. Material List: Submit a list of materials giving quantities, manufacturer's name, and catalog numbers.
    - b. Product Data: Submit manufacturer's technical product data sheets on all equipment to be furnished.
    - c. Dimensional Drawings: Submit drawings which show dimensional layouts of the engine/generator set and its spatial relationship to associated equipment. Fabrication and installation shall be in accordance with the approved shop drawings.
    - d. Wiring Diagrams: Submit wiring diagrams for the engine/generator set, automatic transfer switch, and paralleling switchgear showing connections to feeders, load, and accessory equipment. Clearly differentiate between portions of the wiring that are manufacturer installed and portions to be field wired.
  - 2. Manufacturer's Recommendations: Submit the manufacturer's current recommended method of installation for the products to be furnished.

## 1.06 OPERATING AND MAINTENANCE MANUALS

- A. After final acceptance of the equipment, the Generator and Switchgear Manufacturer shall submit to the Owner complete, three bound copies of the installation, operation and maintenance instructions for each item of equipment to be furnished. All final instructions shall be certified by each as applicable to the equipment furnished and shall be specifically identified, such as by serial number, etc.
- 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 panel, and Master Cubicle shall be included in this overview.

## PART 2 – PRODUCTS (NOT USED)

## PART 3 – EXECUTION

### 3.01 INSTALLATION

- A. Material and equipment shall be installed in a neat, workmanlike manner, and in accordance with the manufacturer's written recommendations as approved by the Engineer.
- B. Contractor shall provide all labor for installation, testing, training, and startup of the emergency power system.
- C. Contractor shall provide shipping, F.O.B., to the Owner's destination.

End of Section 16620

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## SECTION 16621 – STANDBY GENERATOR

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. The Contractor shall secure two (2) standby diesel generator sets of the latest commercial type and design as specified herein.
- B. Unless otherwise noted, requirements contained in Section 16620 apply to the equipment specified herein.

#### 1.02 RELATED WORK

- A. Section 16460 – Small Power and Miscellaneous Transformers.
- B. Section 16470 – Power Distribution.
- C. Section 16620 – Emergency Power System.
- D. Section 16622 – Automatic Transfer Switch and Paralleling Switchgear.

#### 1.03 GENERAL

- A. Manufacturer - The specified generator set, including radiator, engine, and generator, must be of one U.S. manufacturer engaged in the production of such equipment for at least 25 years. The unit shall be factory designed, certified prototype tested, factory assembled and tested. All of the equipment furnished under this specification shall be sold and shipped to the jobsite by the manufacturer's authorized dealer for Kentucky having a full parts and service facility within 60 miles of the jobsite.
- B. Testing - Each generator set shall receive the manufacturer's standard factory load testing. Prior to acceptance of the installation at the site, each unit shall be tested to show it is free of any defects, will start automatically and be subjected to full load test using a load bank provided by the generator supplier for a period of not less than four hours. Load steps: 50% one hour, 75% one hour, 100% two hours, followed by 5 minute cool-down at no load. Then demonstrate 100% block load capability, per NFPA 99/110. In addition, the load bank shall be used to set up the paralleling switchgear. Additional testing using building load will be done as required to insure the complete system performs as specified.
- C. Emissions: Each engine shall be EPA Tier 2 Capable and labeled as such by the manufacturer.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

Acceptable manufacturers for engine/generator are Caterpillar, Kohler, or approved equivalent.

2.02 GENERATOR SET CHARACTERISTICS

A. Rating at 1800 RPM.

Standby kW each with fan	1500 kW
Standby kVA each with fan	1875 kVA
Prime power kW each with fan	1350 kW
Prime power kVA each with fan	1688 kVA
Engine Rating Conditions	29.61 HG and 77°F.
Power Factor	0.8
Frequency	60 Hz.
Maximum Ambient Temperature	109°F.
Minimum Ambient Temperature	-20°F.

B. The specified standby kW shall be available with varying loads for the duration of the interruption of the normal utility source in accordance with ISO3046/1. Prime power is the output available with varying loads for an unlimited time in accordance with ISO8528.

C. Ratings must be substantiated by manufacturer's standard published curves. Special ratings or maximum ratings are not acceptable. The specified rating is the net kW available after deducting all engine driven accessories.

D. Voltage - Each generator output voltage shall be 4160 volt, 3 wire delta.

2.03 ENGINES

A. Type - Each engine shall be water cooled in line, 4 stroke cycle compression ignition diesel with a minimum piston displacement of 4,210 cubic inches. It shall meet specifications when operating on No. 2 domestic burner oil (ASIM D396). Diesel engines requiring premium fuels will not be considered. Each engine shall be equipped with fuel, lube oil, and intake air filters, lube oil coolers, fuel transfer pump, and gear driven water pump. The engine shall be manufactured in the United States.

B. Structural and Metallurgy - The design of the basic engine shall provide for maximum structural integrity to extend service life. Materials used in the engine shall incorporate the highest level of proven metallurgical and manufacturing technology. The block shall be of one piece design and cast of high tensile strength iron in the system manufacturer's own foundry. The crankshaft shall be of one piece forging with wear surfaces hardened through heat treat methods. Cylinder wear surfaces shall be induction hardened over the entire length with rolled and furnished edges. Main and rod bearings shall consist of aluminum bonded by copper to a steel backing. The wear surface shall be coated with a lead-tin overlay and the bearing covered by a tin

flashing. Connecting rods shall be high strength steel with taper pin bore. Pistons shall be elliptically ground across the skirt and tapered from crown to skirt. Compression rings shall have integral cast iron ring bands. Top rings shall be keystone sections. Valves shall be hardened face with receptacle inserts.

- C. Lubrication System - The lubrication oil pump shall be a positive displacement type that is integral with the engine and gear driven from the engine gear train. The system shall incorporate full flow lube filtration with bypass valve to continue lubrication in the event of filter clogging. The bypass valve must be integral with the engine filter base or receptacle. Systems where bypass valves are located in the replaceable oil filter are not acceptable. Pistons shall be oil cooled by continuous jet spray to the under side of the crown and piston pin.
- D. Inlet Air System - Each engine shall not require more than 2.5 CFM of air per brake horsepower for combustion. The air cleaners shall be engine mounted with dry elements requiring replacement no more than one each year.
- E. Turbocharging and Aftercooling - The turbochargers shall be of the turbine type driven by engine exhaust gases and direct connected to a blower supplying engine combustion air. The aftercooler core air surfaces shall be coated with a corrosion inhibitor to minimize oxidation.
- F. Governors - Each engine governor shall be a Caterpillar electronic type with load sharing capability and maintain isochronous frequency regulation from no load to full rated load. Steady state operating band shall be  $\pm 0.25\%$ .
- G. Mounting - Each unit shall be mounted on a tubular steel base and shall be provided with spring type vibration isolators between the base and concrete slab.
- H. Safety Devices - Safety shutoffs for high coolant temperature, low coolant level, low oil pressure, overspeed, and engine overcrank shall be provided.
- I. Lube Oil - Shall be furnished by the generator set supplier.

#### 2.04 OVERSIZED GENERATORS

- A. Type - Each generator shall be oversized for motor starting ability, 3 phase, 60 Hz, single bearing, synchronous type with brushless exciter, 2/3 pitch, be built to NEMA Standards and rated 2000 kW with a temperature rise not to exceed 130°C. Class H insulation shall be used on both the stator and rotor. The generator rotor shall be layer wound, tested for 150% overspeed at 170°C ambient and dynamically balanced to 1/2 mil. Generator shall incorporate reactive droop compensation for parallel operation and a 900 watt 120 volt generator space heater to minimize condensation when the generator is idle.
- B. Regulators - Provide a generator mounted digital voltage regulator with programmable volts per hertz characteristics and true RMS 3 phase voltage sensing to match the characteristics of the generator engine. Voltage regulation shall be  $\pm 0.25\%$  from no load to full rated load. It shall include adjustable overvoltage and under-voltage protection, under-frequency protection, over-excitation protection, fault detection and

identification of operation outside programmable limits, digital display, fault detection logging, and remote communication capability. Readily accessible voltage droop, voltage level and voltage gain controls shall be provided. Voltage level adjustment shall be a minimum of  $\pm 10\%$ .

- C. Permanent Magnet Generators - A permanent magnet pilot excitation system shall provide power to each voltage regulator to improve the generator motor starting ability and short circuit support. It will also isolate the voltage regulator power circuit from voltage distortions created when the generator supplies a non-linear load.
- D. Extension Terminal Box - Include an extension terminal box, mounted on the right side of each generator, to facilitate cabling to the generator.

## 2.05 COOLING SYSTEM

- A. Radiators - Provide on each unit an engine-mounted radiator with a blower-type fan shall be sized to maintain safe operation at 43°C maximum ambient temperature at the standby rating. Air flow per radiator cannot exceed 90,000 CFM with a system restriction not to exceed 0.5 in H<sub>2</sub>O. Each radiator shall be equipped with a duct adapter flange.
- B. Antifreeze - Each engine cooling system shall be filled with a solution of 50% ethylene glycol.
- C. Fuel Cooler - Provide a radiator mounted fuel cooler for each engine.

## 2.06. FUEL SYSTEM

- A. Engines - Engine mounted fuel filter, fuel pressure gauge, fuel priming pump, and flexible fuel connection shall be provided at each engine.
- B. Sub-base Tank – Provide for each unit a UL 142 listed 3500 gallon double wall sub-base fuel tank shall be provided which complies with local code and ordinances. The tank shall incorporate threaded pipe connections, fuel gauge, low fuel level alarm contact and dual wall fuel leakage contact wired to indicating lights on the generator set control panel, vent with cap, and emergency pressure relief vent. Provide a stub-up area to accommodate power wiring to the generator; however, this area is to be covered with 3/16" steel 4 way tread plate except for the conduit openings. The tank shall be installed to the generator set structural steel base by the generator set manufacturer. Overall tank dimensions are not to exceed 30'L x 10'W. The fuel fill connection is to be located on the end near the access steps. The exact location is to be identified on the shop drawings and must have the Owner's approval.

## 2.07 EXHAUST SYSTEM

Exhaust Silencers - Provide a side inlet type EM DKC2 disc type critical silencer for each engine plus a stainless steel flexible exhaust element that will bolt to the engine. Each silencer shall be mounted inside the enclosure so that its weight is not supported by the engine.

## 2.08. AUTOMATIC STARTING SYSTEM

- A. Starting Motors - Dual 24 volt DC electric starting system with positive engagement drive shall be furnished on each engine.
- B. Automatic Controls - Fully automatic generator set start/stop controls in the generator mounted control panel shall be provided. Control shall provide shut down for oil pressure, high coolant temperature, low coolant level, overspeed, overcrank and one auxiliary contact for activating accessories. Contacts shall be provided to interface with the paralleling switchgear controls.
- C. Batteries - A 24 volt lead acid storage battery set of the heavy duty diesel starting type shall be provided for each engine. The battery set shall be of sufficient capacity to provide for 1 1/2 minutes total cranking type without recharging and will be rated no less than 280 amp hours. A battery rack with necessary cables and clamps shall be provided. In addition, a redundant single set of identical batteries including a charger, as specified below, shall be provided to be used with either engine.
- D. Battery Charger - A current limiting 2 rate battery charger shall be furnished for each set of batteries to automatically recharge batteries. Charger shall float at 2.17 volts per cell and equalize at 2.33 volts per cell. It shall include overload protection, silicone diode wave rectifiers, voltage surge suppressers, DC ammeter, DC voltmeter, low DC voltage alarm relay, and fused AC input. AC input voltages shall be 120 volt single phase. Amperage output shall be no less than 20 amperes.
- E. Jacket Water Heater - Provide two unit mounted thermal circulation type water heaters on each engine, incorporating a thermostatic switch that shall be furnished to maintain engine jacket water to 90°F. in an ambient temperature of 30°F. Each shall be 480 volt, single phase, 6 kW, 60 Hz. Valves shall be installed in the inlet and outlet lines at the block to allow replacement of the lines and heater element without draining the cooling system.

## 2.09 GENERATOR CONTROL PANELS

- A. Type - Provide with each unit a generator mounted EMCP3.3 control panel, NEMA 1 type vibration isolated dead front, designed and built by the system manufacturer, in accordance with NFPA 99/110.
- B. Equipment - Each panel shall contain, but not be limited, to the following equipment:
  - 1. Digital display or analog meters for:
    - a. Voltmeter,  $\pm 1.0\%$  accuracy
    - b. Ammeter,  $\pm 1.0\%$  accuracy
    - c. Frequency meter,  $\pm 1.0\%$  accuracy
    - d. Ammeter/voltmeter selector switch
    - e. Automatic starting controls as specified above
    - f. Engine control switch for auto start/manual start, off/reset, and stop
  - 2. Safety shutdown/warning protection with LED indicators or alarm lights for:

- a. Low oil pressure – warning/shutdown
  - b. High coolant temperature - warning/shutdown
  - c. Low coolant level – warning
  - d. Low coolant temperature – warning
  - e. Low fuel pressure – warning/shutdown
  - f. High fuel pressure – warning/shutdown
  - g. Fuel pressure restriction - warning/shutdown
  - h. High fuel temperature – warning/shutdown
  - i. High lube oil temperature – warning/shutdown
  - j. Overcrank - shutdown
  - k. Overspeed – shutdown
  - l. Control switch not in auto – warning
  - m. High/low battery voltage – warning
  - n. Emergency stop activated – warning
3. Digital display or gauges for:
- a. Coolant temperature
  - b. Oil pressure
  - c. Engine hours
  - d. Engine Successful Start Counter
  - e. Engine oil temperature
  - f. Engine oil pressure
  - g. Engine coolant temperature
  - h. Engine crank attempt counter
  - i. Service maintenance intervals – (engine hours or calendar days)
  - k. Real time clock
  - l. Tachometer - engine rpm
  - m. Battery DC voltage
  - n. Generator AC voltage – 3 phase ( L-L & L-N)
  - o. Generator AC current (per phase and average)
  - p. Generator set kW (total and per phase)
  - q. Generator set kVA (total & per phase)
  - r. Generator set kVAR (total & per phase)
  - s. Generator set kW hours (total)
  - t. Generator set kVAR hours (total)
  - u. Generator % of rated (total)
  - v. Generator power factor
  - w. Generator frequency
- 4. Cooldown timer, adjustable 1-30 minutes. Factory set for five minutes.
  - 5. Programmable protective relays for over/under-voltage, over/under frequency, over-current.
  - 6. Emergency stop push button with LED indicator – red.
  - 7. Voltage adjust rheostat.
  - 8. Panel lights and on/off switch.
  - 9. Remote customer communications supported by MODBUS protocol using RS-485.

10. Digital displays for meters must be accurate through a temperature range of -20°F to 158°F and distorted wave forms and SCR load applications shall not affect instrument accuracy.
11. Provide dry contacts for remote annunciation of the following:
  - a. Generator status.
  - b. Generator alarm.
  - c. Low fuel.

## 2.10 ANNUNCIATOR PANELS

- A. One 16 light annunciator panel for each unit shall be provided for remote mounting to give audible and visual warning of fault or alarm conditions in the generator set. Each panel shall conform with the requirements of the National Electrical Code, and the National Fire Protection Association publication, NFPA99. All necessary contactors shall be provided including low fuel level in the storage tank for fault conditions as follows:

1. Low oil pressure - red
2. Low oil pressure prealarm - amber
3. Low coolant temperature - amber
4. Low fuel in main tank - amber
5. Overspeed - red
6. High coolant temperature - red
7. High coolant temperature prealarm - amber
8. Overcrank - red
9. Battery charger malfunction - red
10. Low battery voltage - red
11. System not in auto-start stop mode - amber
12. Generating - amber
13. Spare faults for local and common alarm - one red and three amber
14. Alarm acknowledge/reset switch

## 2.11. WEATHERPROOF ENGINE GENERATOR ENCLOSURES

Provide a generator set enclosure for each generator set factory fabricated and assembled so as to minimize site assembly work. The enclosure shall be of the weatherproof walk in type, and able to withstand wind tests equal to 115 mph, sustain roof loads equal to 50 lb. per square foot, and rain test equal to 4 inches per hour. The enclosure will consist of a roof, under frame, two side walls and two end walls of galvanized 12 and 14 gauge steel construction. Provide one personnel door with stainless steel handle and padlock provisions, plated three point locking mechanism safety feature allows opening from inside even when locked. Location of door to be coordinated with access platform. Refer to Drawings. Louvers will be galvanized steel construction riveted into a steel frame forming a rigid weather resistant assembly. The interior lining shall be mil finished aluminum panels and the insulation shall be 3" thermal fiberglass. Provide two inlet air motor operated louvers that are designed to spring open. The discharge air shall include a gravity type louver which can be aluminum. For summer ventilation, provide a 12" 120 volt exhaust fan with thermostat and gravity damper. Extend the coolant drain, lube oil drain and crankcase breather tube to the exterior of the enclosure. The critical exhaust system is to be mounted

inside the enclosure and the flex exhaust element is to be wrapped with insulated blankets. Provide with the enclosure a 30 kVA 480 volt/120/208 volt three phase transformer with disconnect to supply power to a 100 amp. three phase 120/208 load center. Provide four 100 watt incandescent lights with globe and guard, two light switches, two GFI duplex receptacles, and one 5 kW, 208 volt, three phase heater with thermostat. The battery charger is to be shipped to the enclosure manufacturer for installation prior to delivery to the site. This enclosure is to include a tread plate steel floor and is to be mounted to the sub-base fuel tank specified above. It shall be the Contractor's responsibility to unload the generator set including the enclosure and tank and mount to the pad; provide electrical wiring and conduit between above power panel to the generator set jacket water heater, trickle charger and generator anti-condensation heater; provide necessary cable, control wires and conduit for connection to the generator set and automatic transfer switches and paralleling switchgear.

### PART 3 – EXECUTION

#### 3.01 INSTALLATION

- A. Install unit complete and make operational.
- B. Install muffler horizontally on spring type compensating hangers as close to unit as practical.
- C. Provide one-half inch copper drain line with draincock from bottom of muffler for periodic draining of muffler.
- D. Provide vibration isolation of exhaust equipment to prevent transfer of vibration into building components enclosing the standby power system.
- E. Install vibration isolators of steel spring between rail base and inertia pad. Provide protective guards over moving parts.
- F. Make connections from new fuel lines to the engines. Provide at least 12-inch stainless steel cable flexible hose to relieve vibration stress.
- G. The generator neutral connection shall be solidly grounded to the electrical system ground. The unit frame shall be connected to the system ground.

#### 3.02 FUEL

Fuel shall be provided by the Contractor during all phases of testing and startup. Once the Engineer has determined that these procedures are acceptable, then the Contractor will fill the tank with fuel.

End of Section

SECTION 16622 – AUTOMATIC TRANSFER SWITCH AND  
PARALLELING SWITCHGEAR

1.01 WORK INCLUDED

- A. The Contractor shall secure two (2) automatic transfer switches and paralleling switchgear of the latest commercial type and design as specified herein.
- B. Unless otherwise noted, requirements contained in Section 16620 apply to the equipment specified herein.

1.02 RELATED WORK

- A. Section 16620 - Emergency Power System.
- B. Section 16621 - Standby Generator.

1.03 GENERAL

- 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 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, comprehensive system start-up and site testing.

1.04 APPLICABLE CODES AND 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 listed and labeled under the UL Standard "Circuit Breakers and Metal-Clad Switchgear over 600 Volts (DLAH)," with a bus withstand rating of 250 MVA, the time of the bid opening. Manufacturers submitting equipment line-ups without being listed and labeled under UL Standard "Circuit Breakers and Metal-Clad Switchgear over 600 Volts (DLAH)," without this withstand rating, prior to bid opening shall not be accepted.
- C. 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. ANSI/IEEE C12 – Code for Electric Metering.
  - 2. ANSI C37.04 – Standard Rating Structure for AC High Voltage Circuit Breaker Rated on a Symmetrical Current Basis.
  - 3. ANSI C37.06 – Preferred Ratings and Related Required Capabilities for AC High Voltage Circuit Breaker Rated on a Symmetrical Current Basis.

4. ANSI C37.11 – Requirements for Electrical Control for AC High Voltage Circuit Breaker Rated on a Symmetrical Current Basis or a Total Current Basis.
5. ANSI C37.12 – Guide to Specifications for AC High Voltage Circuit Breaker Rated on a Symmetrical Current Basis or a Total Current Basis.
6. ANSI C37.20 – Standard for Switchgear Assemblies Including Metal-Enclosed Bus.
7. ANSI/IEEE C39.1 - Requirements for Electrical Analog Indicating.
8. ANSI C57.13 - Requirements for Instrument Transformers.
9. ANSI/IEEE 24 – Performance Characteristics and Dimensions for Outdoor Apparatus Bushings.
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.

#### 1.05 SWITCHGEAR MANUFACTURER QUALIFICATIONS

- A. It is the intent of the owner to receive bids only from manufacturers who are adequately qualified to provide a highly reliable, fully integrated, state-of-the-art Critical Power Switchgear System that can be successfully supported by the Switchgear and Control 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 be a well-established company regularly engaged in the application, engineering, manufacturing, integration and testing of critical electrical power control switchgear systems. The manufacturer shall have at least ten years experience in the design and manufacture of generator control power systems and automatic transfer switches.
- C. The Manufacturer must have adequate 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 shall be readily available twenty-four hours a day, 365 days a year. The manufacturer may not subcontract field service 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.

#### 1.06 SYSTEM OVERVIEW

- A. The switchgear shall be arranged for fully automatic or manual operation at the discretion of the operator. Each section shall be complete and include the necessary AC instrumentation, relaying, voltage regulator equipment, generator control equipment, engine governor controls, pilot lights, selector switches, etc., and accessories, as shown on the contract drawings and as specified hereinafter.

- B. All control voltage for auxiliary relays; circuit breakers, synchronizing and other automatic equipment shall be obtained from the emergency generators, system station batteries (furnished by others) and the engine starting batteries.

#### 1.07 SEQUENCE OF OPERATION

- A. The emergency generator control and distribution switchgear shall be designed to automatically control and supply emergency generator power to the building loads. Dual programmable controllers shall control the system.
- B. When the engine selector switches and the master control switch are in their AUTO positions, the emergency generating system shall be placed on standby. Upon receipt of an engine start signal from the automatic transfer system, both engine-generators shall be start and the first to reach 90% of rated voltage and 58Hz frequency shall be connected to the emergency bus through its generator circuit breaker.
- C. The remaining generator shall be automatically synchronized and be paralleled to the emergency bus by closing its circuit breaker. When the second generator is on line, the loads shall transfer to the emergency system.
- D. A load demand-sensing program shall be provided in the master PLC to remove any excess generators from the bus when the connected load decreases. This program shall be designed to insure that an adequate spinning reserve shall be available for sudden load changes while reducing the operating hours of the system generators.
- E. The programmable controllers monitor the load on the emergency bus and shall initiate signals to add or subtract generators as required. In a normal power failure operation load demand sensing shall be, after a 0-60 minute time delay, be placed into operation. An indicating lamp on the master control cubicle shall be flashing during a 0-60 minute time delay and shall be on constantly when the system is operating in load demand mode.
- F. The engine starting and stopping sequence can be changed through the Operator Interface Panel. The start/stop sequence shall be provided to allow the operators of the system to adjust the total operating hours of each engine-generator for a planned maintenance schedule. The engine selected with a sequence register containing a value of 1 shall be the base engine, the one with a value of 2 shall be sequence position no. 2, etc.
- G. When the sequence is changed during an automatic operation, any engine on line shall remain on line. If the engine selected as the base engine is not on line, it shall be immediately started and placed on line. The engine-generator that is selected as sequence position no. 2 shall be the first to be added to the bus and the last to be subtracted. Should an engine be locked out of the system, it shall be skipped over and the next engine in sequence shall be started or stopped as required.
- H. The setpoints are field adjustable through the operator interface panel. The overload setpoint shall be adjustable from 90 to 125% of each engine's rated loading. The load increase setpoint shall be adjustable from 60 to 100% (or overload - 10% whichever is smallest) of the on line capability of the system. The load decrease setpoint shall be

adjustable from 40% to 80% (or increase - 10% whichever is smallest) of the on line capability of the system *after* the decrease.

- I. The overload and increase time delays have inverse time characteristics - the higher the loading - the shorter the time delay. The settings are programmable through the operator interface panel. The ranges are 0 to 10.0 seconds for the overload setpoint, and 0-999.99 for the increase time delay. The decrease time delay shall be adjustable from 0-999 seconds.
- J. If the load on the emergency bus decreases below the load decrease setpoint, the programmable controller shall after a time delay, signal the last engine-generator in sequence to be removed from the bus. When a single engine generator is on bus, the decrease sensing shall be inoperative.
- K. If the load on the emergency bus increases to above the increase setpoint, the programmable controller shall, after the time delay, signal the next engine-generator in sequence to automatically start and close to the bus. An increase load capacity pushbutton shall be provided on the master control cubicle to allow an operator to immediately place the next engine-generator in sequence on line.
- L. Should the load of any engine increase to above the overload setpoint, the next engine-generator in sequence shall, after the time delay, be started and placed on line. In addition to starting the next generator, nonessential loads shall be shed to relieve the load on the emergency bus.
- I. One of the registers in the Operator Interface Panel shall be provided to display the total system kilowatts.
- M. During generator operation an underfrequency or overload condition shall be result in load shed. Once the bus is restored to normal limits the shed load shall be readded. Add and shed signals for distribution breaker controls are included for all priorities and may be adjusted through the Operator Interface Panel.
- N. Should one engine fail, and the remaining generator becomes overloaded (adjustable 90-125% of any engine's rating) and after 0-10 second time delay, the lowest priority load shall be shed. (Note that priority #1 loads shall be not shed and should be within the capacity of a single engine generator). If operating in load demand the next engine in sequence shall be started. Once the bus is restored and excess generation is available the shed loads shall be readded.
- O. Upon detecting an underfrequency condition all available engines shall be started. Underfrequency load shedding shall operate the load control contacts similar to overload except at a more rapid shedding rate. This feature shall insure the greatest continuity of service to the priority #1 loads. Automatic restoration of load shall occur after the bus has returned to normal frequency and the underfrequency alarm has been cleared.
- P. An auto load shed function key shall be provided on the operator interface panel. If the load-shed function is off, this shall be allow supervised loading of the engines up to their maximum rating. Should an underfrequency condition occur, the bypass shall be defeated and load shedding shall occur, as described previously.

- Q. Non-priority one loads may be programmed for smaller steps (i.e. 2a, 2b, 2c, 3a, 3b...) while using the load add and load shed non-essential load function keys. This shall allow the operator more flexibility in loading up the generators while in the load shed bypass mode of operation.
- R. The load add function key on the operator interface panel shall be allow an operator to add lower priority distribution breakers to the emergency generator system. Each time the function key is depressed the next priority shall be added.
- S. The load shed function key on the operator interface panel shall allow immediate load shed of the next lowest priority. Each time the function key is depressed the next priority load shall be shed. This function key shall remain functional in both manual and automatic operation; however, in the automatic mode, any shed load shall be readded once the key is released, provided the bus in capable of increased load.

## PART 2 – PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

Transfer Switch/Paralleling Switchgear – Russelectric or approved equivalent.

### 2.02 CIRCUIT BREAKERS

- A. All circuit breakers shall be Square D type VRO 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:
  1. Nominal voltage rating of 5,000 volts with a withstand voltage rating of 19,000 volts and a basic impulse level of 60,000 volts.
  2. Continuous current rating of 1200 amperes elements shall be supplied, as indicated on the drawings and detailed elsewhere in this specification, with a close and latch capability of 58,000 amperes.
  3. Nominal 3 phase symmetrical interrupting capability of 250 MVA 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, which can be removed as a complete unit. The interrupters shall be designed to facilitate the following work:
  1. Replacement of the interrupter assembly through a simple alignment of the primary contacts and adjustment of contact wipe.
  2. 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.
- F. All circuit breakers shall be equipped with the following basic components:
  - 1. A minimum of four sets (a/b) of breaker auxiliary contacts with the final number required to be determined by the Switchgear Manufacturer.
  - 2. Trip and close/spring charge control power fuse blocks.
- 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 1.0" x 1.0" (minimum) back lit LED annunciators with engraved marking plates as follows:
  - 1. Circuit breaker open.
  - 2. Circuit breaker closed.
  - 3. Circuit breaker withdrawn

## 2.03 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 Sensor System: An automatic DC control sensor system shall be provided in the master control section to provide DC control voltage. DC control power shall be obtained from any one of the engine starting batteries. The sensor shall automatically select the best control voltage from the available batteries. The DC control voltage sensor shall insure a stable system control voltage, as long as any of the battery sources are available. In each generator control cubicle a DC overvoltage protection circuit and supply shall be provided to protect the system from an excessive overvoltage (110%) and undervoltage (50%) conditions, particularly during engine cranking. The protection shall extend to all circuits connected to the best battery selector.
- D. Automatic Synchronizer: All circuitry shall be housed in a rugged semi-dust-tight enclosure, suitable for switchboard mounting. The synchronizer shall contain all control adjustments and input output terminals legibly marked. The inputs shall consist of 120 volt, AC, nominal, 60-Hertz signals from the selected power sources. A separate terminal shall be provided to ground the enclosure. Automatic synchronizers

shall be provided, one for each engine generator. The outputs shall consist of a bipolar DC signal suitable for driving a governor/amplifier system and a sync contact closure. The contact closure shall enable the automatic closure of the associated power circuit breaker when the incoming voltage has the same amplitude, frequency and phase as the main switchboard bus. The synchronizer shall become operative when the incoming voltage source reaches approximately 75% of nominal. It shall assume control to match the frequency and phase of the engine generator with that of the main switchboard bus rapidly and close the selected power circuit breaker with a minimum of system disturbance. Power circuit breaker closures outside the preset limits shall not occur. Within approximately 1 second after the power circuit breaker closure, the synchronizer shall automatically relinquish control over the electronic governor and go into an idle mode. The synchronizer controls shall consist of phase offset, gain and stability control. The synchronizers shall operate over an input voltage range of 80% to 125% of nominal, indefinitely, over an ambient temperature range of -45 degrees Celsius to +70 degrees Celsius. The synchronizers shall be capable of meeting the dielectric and surge withstand capabilities, as set forth in IEEE Standard 472-1974/ANSI C37. To insure optimum compatibility with the governor control, the synchronizer shall be by the same manufacturer of the governor control system.

- E. Back-lit LED Annunciation Panel: The annunciator 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 or failure. LED indicators shall be plug in type with dual circuit design incorporating four redundant strings of LED's such that a failed LED string does not render the lamp inoperative.
- 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. Network Interface Unit: Engine interfacing will be connected to a Versamax network interface unit with power supply, chassis, and input/output cards for each engine generator. A separate network interface unit shall be furnished for each engine generator, and will reside in each generator's respective control cubicle.
- 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/Reset-Off-Auto-Run", shall be provided on each engine generator control panel cubicle door." When the selector switch is in the " stop/reset" position, the generating plants shall be locked out. Whenever the selector switch is placed in the " stop/reset" 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/reset" position. This position is to be used for testing or for manual operation.

- I. Frequency Switches: Each synchronizing breaker is provided with a keyed frequency meter switch to operate the frequency meter and provide a comparison between the line and the load side frequency. These switches have separate keyed handle (different from the synchroscope switches) that are removable in the Off position, assuring that only one respective switch is on at any time. Only one keyed handle is provided.
- J. Master "Manual-Auto" Control 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, two-position engine 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 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 /frequency meter switches on the engine generator control section door.
- K. Master Operator Interface Panel: An ETOP50 15.1" touch screen master operator interface panel shall communicate with the master control PLC and provide operator access to set points, engine sequence, and various switchgear functions. Any of the set points and the engine sequence will be viewed at any time, but changes shall be password protected to prevent tampering. Each set point shall have preprogrammed high and low limits to ensure that a chosen value is within an acceptable range. The following screens shall be furnished;

Password Screen: This screen will allow the operator must enter a password to change control set points. The system contains up to eight levels of password protection.

Date and Time Screen:

The Date and Time screen will allow an operator to change the system's date and time. The operator will enter a password and then access Date/Time screen by pressing the key.

Main Menu Screen:

This screen will index of all the pages used in the system.

System Single Line Screen:

The system single line status screen will display the system single line with breaker positions for all breakers in the system.

Generator Breaker Status Screen:

The generator breaker status screen will display actual generator power in kW, rated kW and circuit breaker open/closed status for each generator in the system.

Feeder Breaker Status Screen:

The Feeder Breaker Status screen will display the status for each feeder breaker in the system.

Engine Sequence Screen:

The Engine Sequence screen will display the engine sequence, locked out or future for each engine in the system. The operator will program the engine sequence at any time through this screen to change the starting and stopping sequence of the engines for load demand operation.

Load Demand Set Points Screen:

The load demand set points screen will display the load demand timer, decrease set point, decrease timer, increase set point and increase timer

Load Control Set Points Screen:

The load control set points screen will display the under frequency load shed timer set point, overload kW set point, overload timer set point, auto/man load control, current load step and load shed activated.

Load Control Priority Screens:

The Load Control Priority screens will allow the operator to define the set priorities of the programmable load control contacts. The operator interface panel will enable certain master control functions. The operator interface panel function keys will be assigned as follows:

F1: Load Demand (On/Off Switch Function)

The function key will provide for load demand operation. If the led for the function key is off, load demand operation will be defeated. If the LED for the function key is on, load demand operation will be enabled

F2: System No-Load Test (On/Off Switch Function)

The function key will be provided to permit supervised testing of the system. When the function key is enabled (led on), the system automatically starts all standby engine-generator sets, synchronize them, and close their breakers to the bus, but the automatic transfer switches will remain connected to the normal supply. When the function key is disabled (led off), the system shall initiate the shutdown of the engine generators, and restore all equipment to normal operation.

F3: Spare

F4: Auto Load Shed (On/Off Switch Function)

The function key will provide for load control operation. If the led for the function key is off, the overload shed control operation is defeated. If the LED for the function key is on, the overload shed control operation is enabled

F5: Spare

F6: Load Add (Pushbutton Function)

Supervised loading of the engines up to their maximum rating using the add non-essential loads function button. Each priority load may be programmed for smaller steps. And each time this button is pressed, the next priority step of load is added. If an under frequency condition occurs, the bypass is defeated, and load shedding occurs.

F7: Load Shed (Pushbutton Function)

This pushbutton allows immediate load shed of the next lowest priority. Each time the push button is pressed, the next priority is shed.

F8: Increase Load Capacity (Pushbutton Function)

This pushbutton allows an operator to immediately place the next engine-generator in sequence on line.

F9: Spare

F10: Spare

- L. 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:
1. Ammeters - 5 ampere, scale for primary current.
  2. Frequency Meter - 150v movement, 55 to 65 Hertz scale.
  3. Wattmeters – Calibrated madc movement, scale for available kilowatts.
  4. Voltmeters - 150v (3w) movement, scale for primary voltage.
- M. Meter Selector Switches: Rotary multistage snap-action type with 600 volt AC-DC silver plated contacts, engraved escutcheon plate, round, knurled, handle. An Electroschwitch series 24 selector switch rated 30A at 600 vac shall be furnished for the following switches:
1. Ammeter switch with positions OFF, 1, 2, 3.
  2. Sync/Frequency Meter switch with positions LINE, OFF, LOAD.
  3. Voltmeter switch with positions OFF, 1-2, 2-3,3-1.
- N. Potential Transformers: 120 volt single secondary, with primary and secondary fuse protection, primary/secondary ratio as required, burden and accuracy consistent with connected metering and relay devices, 60 Hertz.
- O. Reverse Power Relays: The reverse power relay shall be utility grade supplied with a draw out case. The removable chassis will permit rapid interchanging of similar relay units without requiring panel-wiring changes. Current transformer secondary shall be automatically short-circuited when the relay chassis is removed from the case. The draw out case will have a dust-tight removable cover. The monitor shall be self-contained, single phase, solid state type reverse power monitors, one for each generator, shall be furnished to detect excessive reverse power flow, caused by the motorizing of a failing generator plant. Upon detection of a true reverse power flow, the monitor shall signal the alarm circuits to immediately disconnect the generator, and to actuate the load shedding circuits. An adjustable time dial shall be provided with inverse time characteristic delay. Adjustable taps from 13 to 150 watts sensitivity. Provide a single pole, normally open output contact rated to close 30 amperes at 250 volts DC. The contact shall be made of silver with sufficient wipe to insure a positive contact. Reverse power relays not having inverse time characteristics are not acceptable.
- P. 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.
- Q. Synchroscope Switches: Each synchronizing breaker is provided with a keyed synchroscope switch that energizes the synchroscope, sync lights and the manual sync check relay. This relay will prevent breaker closure unless the two sources are within acceptable limits of synchronism. An interlock shall insure that these breakers have their sync switches on before closure is allowed. These switches have separate keyed handle (different from the frequency switches) 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.

- R. System Programmable Controller: The system shall be controlled by dual General Electric PLC 90-30 programmable controllers, each with power supplies, chassis, and input/output cards as required. All PLC programming for system operation, shall be the responsibility of the switchgear manufacturer. The programmable controllers shall be password protected.
- S. Over and Under Voltage\Frequency Relay An overvoltage (100 to 125%), undervoltage (75% to 100%), over frequency (60 to 70 HZ) and underfrequency (50 to 60 HZ) relay shall be supplied to monitor the bus voltage and provide alarms and initiate load shedding, if required, 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 operates the load control contacts similar to overload except at a more rapid shedding rate. This feature ensures the greatest continuity of service to the priority one 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.
- T. Provide dry contacts for remote annunciation of the following:
  - 1. ATS No. 1 Normal Power.
  - 2. ATS No. 1 Emergency Power.
  - 3. ATS No. 2 Normal Power.
  - 4. ATS No. 2 Emergency Power.
  - 5. Switchgear Alarm.

#### 2.04 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. All wire terminations made at terminal blocks, meters, relays and other similar devices shall be made with ring-tongue or locking-spade crimp lugs.
- C. Each internal interconnecting wire shall be identified by means of a heat embossed vinyl sleeve markers at each end. Labeling tape wire markers are not acceptable. Wire numbers shall match the Manufacturer's interconnection, schematic and wiring drawings.
- D. Terminal blocks shall be supplied and clearly marked for wiring to be installed or reconnected by the Contractor, including wiring between shipping sections.
- E. Terminal blocks shall have high-insulating barriers and be equipped with screw-type terminals, for accommodating ring-tongue or locking-spade wire terminations.

- F. All spare contacts and terminals shall be wired out to accessible terminal blocks in the auxiliary compartment.
- G. Binding head screw terminal blocks shall be provided for secondary wire terminations. A minimum of ten percent spare terminal block connections shall be provided.
- H. All current transformers shall be connected to shorting type terminal blocks. Current transformer secondary leads shall be #10 AWG. Terminations between the current transformers and the shorting type terminal blocks shall be made with ring type lugs.
- I. Control wiring shall be labeled at each terminal point, with designations keyed to wiring diagrams.

## 2.05 SWITCHGEAR CONSTRUCTION

- A. The 5kV switchgear shall be designed for operation at 4.16 kV 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 Electrical Engineer.
- C. The assembled switchgear structures shall be designed for the following insulation levels
- D. Maximum design voltage of 4.76 kV.
- E. Insulation test (60 Hz) of 19 kV.
- F. Full-wave impulse test of 60 kV BIL.
- G. 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.
- H. Enclosures: The switchgear shall be furnished as one lineup and the enclosure shall be fabricated as follows:

1. Freestanding, non-walk-in for breaker switchgear section and walk-in for control switchboard section, outdoor 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 washers of zinc-plated, rustproof 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. Front and rear cubicle doors, hinged mounted, equipped with locking-type handles.
11. Individual front doors for each power circuit breaker compartment.
12. Suitable means near the top and bottom of each switchboard to insure adequate ventilation for all equipment within the switchboard assembly.

I. Busses:

1. All busses shall be 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 1200 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 250 MVA 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, rust-proof bolts, nuts and conical compression 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.

J. 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.

K. Finish: 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.

L. 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.
4. Provide surge arresters, metal-oxide varistor type, with polymer insulators complying with ANSI/IEEE C62.11 mounted where indicated and connected between each phase and ground in each breaker cubicle.

## 2.06 EQUIPMENT DESCRIPTION

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	VOLTS	P.F.	F.L.A.	FREQ.
2	Diesel	1500	4.16 kV	0.8	261	60

B. The emergency generator switchgear shall be 3 phase, 3 wire.

C. Master Control Cubicle: The master control cubicle shall be furnished with the following basic components, and any additional equipment necessary to provide for a complete and dependable system:

1. A Synchronizing swing panel shall be mounted on in master cubicle door with the following metering:
2. One Bus AC voltmeter, scale as required
3. One Synchroscope
4. Two Synchronizing lamps
5. One Frequency meter, for station bus and generator units, dial type, 55 to 65 hertz scale

6. One solid state best battery selector system to select control power from the best engine starting battery
7. One voltmeter selector switch, wired to the bus voltmeter for reading phase to phase and phase voltage
8. Two programmable logic controllers, General Electric Series 90-30, complete with redundant analog, and digital, input/output modules, communication modules, power supplies, etc., as required
9. One MODBUS communications module wired out to a terminal strip for use by the building management system vender
10. The PLC operator interface described in this section of the specification shall be mounted on the master cubicle door.
11. A main bus over and under voltage/frequency alarm relay, with alarm indication
12. Master "auto-man" switch, with red light
13. Lamp test push button
14. A backlit annunciation panel with the following conditions:

FUNCTION	COLOR	MODE
Controls not in automatic	Red	Status
Critical control voltage failure	Red	Alarm
Alarm horn silenced	Red	Status
Start signal present	Red	Status
Load shed on	Red	Alarm
PLC failure	Red	Alarm
PLC No.1 in control	Green	Status
PLC No.2 in control	Green	Status
Operator Interface Alarm	Red	Alarm

Control wiring, fuses, fuse blocks, terminals, nameplates, etc., as required. All wiring shall be labeled at both ends .

D. Generator Control Cubicles:

Two individual generator control cubicles shall be furnished, each with the following basic components, and any additional equipment necessary to provide for a complete and dependable system:

1. One AC voltmeter, scale as required with four position selector switch, for reading phase to phase voltage
2. One AC ammeter, scale as required, with four position selector switch, for reading phase current
3. One wattmeter, scale as required
4. One Synchroscope switch with one removable keyed handle, used for manual synchronizing (key interlocked) to allow manual synchronizing of one breaker at a time
5. One frequency meter switch, with bus-off-generator nameplate (key interlocked)
6. One circuit breaker control switch, with a separate back-lit LED annunciator 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
7. One network interface unit, Versamax, complete with analog, digital, input/output modules, power supplies, etc., as required

8. One automatic synchronizer, for individual phase lock control of the engine generator
9. An engine selector switch, with "Stop/Reset-Off-Auto-Run" nameplate shall be provided to operate as described herein
10. The switchgear and controls manufacturer shall mount and wire the engine/switchgear interface module and governor load sharing module as furnished by the engine generator manufacturer
11. Lamp test push button
12. A backlit annunciation panel with the following conditions:

FUNCTION	MODE	COLOR
a) Engine Alarm	Pre-alarm	Amber
b) Control Voltage Failure	Shutdown	Red
c) Engine not available	Status	Red
d) Engine shutdown	Alarm	Red
e) Engine Running	Status	Green
f) Breaker Failure	Shutdown	Red

13. Control wiring, fuses, fuse blocks, terminals, nameplates, etc. as required. All Wiring labels shall match manufacturers drawings.

E. Generator Circuit Breaker Cubicles:

Two metal-clad, generator circuit breaker cubicles shall be furnished, each with the following basic components, and any additional equipment necessary to provide for a complete and dependable system.

1. One 5 kV, vacuum circuit breaker, 3 phase, 1200 amperes, stored energy, draw out type, arranged for operation on 48 VDC control power, with 250 MVA, 3 phase, interrupting rating.
2. One set of (2) potential transformers, roll-out type, with 4.16 kV primary and 120 volt secondary.
3. Two sets (3) current transformers, as required, for metering, relaying, etc. One set shall be dedicated for differential relaying.
4. One set current transformers, supplied loose for mounting in generator terminal box, as required, for differential relaying.
5. One three phase overcurrent with voltage control relay, type 50/51V.
6. One single phase ground overcurrent relay, type 51G.
7. One lockout relay (Device #86) Electros witch Type LOR.
8. A set of compression lugs for customer's generator connections.
9. A set of 3 phase, 1200 amperes, insulated copper bus and ground bus shall be furnished as required for main bus and breaker connections.
10. Control wiring, fuses, fuse blocks, terminals, nameplates, etc, as required. All wiring to be labeled at both ends with tubular sleeve, permanent wire markers. All fuses shall be of the blown fuse indicating type.

F. Generator Main Circuit Breaker Cubicle:

Two metal-clad, generator main circuit breaker cubicles shall be furnished with the following basic components, and any additional equipment necessary to provide for a complete and dependable system.

1. One 5 kV, vacuum circuit breaker, 3 phase, 1200 amperes, stored energy, draw out type, arranged for operation on 48 VDC control power, with 250 MVA, 3 phase, interrupting rating.
2. One set (2) potential transformers, roll-out type, with 4.16kV volt primary and 120 volt secondary.
3. One set (3) current transformers, as required, for metering, relaying, etc.
4. One three phase overcurrent relay, type 50/51.
5. One single phase residual ground overcurrent relay, type 51N.
6. One lockout relay (Device #86) Electros witch Type LOR.
7. One circuit breaker control switch, with a separate back-lit LED annunciator 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.
8. A set of compression lugs for customer's load connections.
9. A set of 3 phase, 1200 amperes, insulated copper bus and ground bus shall be furnished as required for main bus and breaker connections.
10. Control wiring, fuses, fuse blocks, terminals, nameplates, etc, as required. All wiring to be labeled at both ends with tubular sleeve, permanent wire markers. All fuses shall be of the blown fuse indicating type.

G. Utility Main Circuit Breaker Cubicle:

Two metal-clad, utility main circuit breaker cubicles shall be furnished with the following basic components, and any additional equipment necessary to provide for a complete and dependable system.

1. One 5 kV, vacuum circuit breaker, 3 phase, 1200 amperes, stored energy, draw out type, arranged for operation on 48 VDC control power, with 250 MVA, 3 phase, interrupting rating.
2. One set (2) potential transformers, roll-out type, with 4.16kV volt primary and 120 volt secondary.
3. One set (3) current transformers, as required, for metering, relaying, etc. One three phase overcurrent relay, type 50/51.
4. One single phase residual ground overcurrent relay, type 51N.
5. One voltage balance and undervoltage relay (Device #47), ASEA Brown Boveri type ABB-47.
6. One lockout relay (Device #86) Electros witch Type LOR.
7. One circuit breaker control switch, with a separate back-lit LED annunciator 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.
8. A set of compression lugs for customer's utility connections.
9. A set of 3 phase, 1200 amperes, insulated copper bus and ground bus shall be furnished as required for main bus and breaker connections.
10. Control wiring, fuses, fuse blocks, terminals, nameplates, etc, as required. All wiring to be labeled at both ends with tubular sleeve, permanent wire markers. All fuses shall be of the blown fuse indicating type.

H. Circuit Breaker Lift Truck: Provide a hand cranked, portable circuit breaker lift truck for installation and removal of medium voltage circuit breakers.

I. Station Battery and Battery Charger:

1. Station battery shall be furnished for the Critical Power Switchgear System. The station battery shall be installed on a freestanding, two tiered seismic rated, battery rack.
2. Operation shall be completely automatic with the charger maintaining the battery fully charged under all normal service conditions. Cooling shall be by convection. The wall-mounted battery charger enclosures 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.
  - d. The storage batteries shall be a nickel cadmium type, manufactured by ALCAD.
  - e. The battery shall be designed for nominal 125 volt DC switchgear service and shall be capable of delivering 100-ampere-hour capacity at the 8-hour rate.
  - f. The battery chargers 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 20 amperes and 120 volts DC. Charger shall be a LaMarche or equal.

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 Contractor during installation and checkout of the equipment.
- B. The Engine Generator Vendor will 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 Vendor 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:
  - a. 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.
  - b. Check racking mechanisms by removing and reinstalling each circuit breaker.
  - c. Check stored energy mechanism of each breaker by tripping, closing and tripping each breaker after removal of control power.
  - d. Hy-pot tests.
  - e. 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 the circuit breakers will be shipped within the switchgear.
- 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.
- E. The equipment shall be equipped for handling by crane, pallet jack and rollers.

### 3.04 INSTALLATION

- A. The 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 Contractor.
- B. The Switchgear shall be installed following the procedures set forth by the Switchgear Manufacturer. The Switchgear Manufacturer shall assist the Contractor as required in interpreting the installation instructions. The 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.

### 3.05 FIELD SERVICE STARTUP 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 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.

End of Section 16622

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