COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC APPLICATION FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY TO COSTRUCT THE U.S. 41 TANK PROJECT	**)** **)** **)** **)**	**CASE NO. 2026-00293**

VERIFIED APPLICATION

Pursuant to KRS 278.020(1) and 807 KAR 5:001, South Hopkins Water District ("South Hopkins" or "the District") applies to the Public Service Commission ("Commission") for an Order by **Wednesday, December 23, 2026**, granting the District a certificate of public convenience and necessity ("CPCN") for the U.S. 41 Water Storage Tank Project ("the U.S. 41 Tank Project" or "the Project"), which consists of the construction of approximately 400 linear feet of 8-inch PVC water line, a new 200,000 gallon elevated water storage tank, and a duplex booster pump station with pumps capable of 175 gallons-per-minute ("gpm") at 70 feet of Total Dynamic Head ("TDH") along U.S. 41 (Hopkinsville Road). The Project site is located in the eastern portion of the District's service territory and in the East Pressure Zone of the distribution system. The estimated cost to construct the Project, including engineering and administrative fees, is **$4,000,000**. The Hopkins County Fiscal Court has allocated $4,000,000 in Coal Severance Tax funds to construct the Project.

So that the District can avoid the need to re-bid the Project, the District respectfully requests that the Commission issue a decision in this matter by **Wednesday, December 23, 2026.** In support of its Application,[1] South Hopkins provides the following:

A. General Information

1. South Hopkins' full name and address are: South Hopkins Water District, 129 South Main Street, Dawson Springs, Kentucky 42408. Its web address is: www.southhopkinswater.com, and its electronic mail address is shwd5760@gmail.com.

2. Copies of all orders, pleadings and other communications related to this proceeding[2] should be directed to:

Michael Easley, Chairman
129 South Main Street
Dawson Springs, KY 42408
(270) 797-5760
shwdcommish@gmail.com

Tina C. Frederick
Stoll Keenon Ogden, PLLC
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Lexington, KY 40507-1801
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tina.frederick@skofirm.com

[1] To facilitate the Commission's initial review of this Application, South Hopkins has attached to this Application **Exhibit 1,** a "Filings Requirements List" that consists of four pages, lists each statutory and regulatory requirement for an application for a certificate of public convenience and necessity and identifies the exhibit or paragraph that satisfies the requirement.

[2] On September 25, 2026, pursuant to 807 KAR 5:001, Section 8, South Hopkins notified the Commission of its election of the use of electronic filing procedures for this proceeding.

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Stoll Keenon Ogden PLLC
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3. South Hopkins is not a corporation, limited liability company or limited partnership. It has no articles of incorporation or partnership agreements.

4. South Hopkins is a water district created under the provisions of KRS Chapter 74 by the Hopkins County Fiscal Court.

5. As of December 31, 2025, South Hopkins provided retail water service to approximately 2,837 residential, 112 commercial, and 2 industrial customers in Hopkins and Caldwell Counties, Kentucky.[3] Additionally, South Hopkins provides wholesale water service to the cities of Morton's Gap and Earlington, Kentucky.

6. South Hopkins is engaged in the distribution and sale of water. South Hopkins does not produce its own water, but rather purchases water from the City of Dawson Springs, Kentucky. The District owns and operates 7 pumping stations, 5 water storage tanks, and approximately 245 miles of water mains. The distribution system consists of three main pressure zones.

[3] *Annual Report of South Hopkins Water District to the Kentucky Public Service Commission for the Year-Ended December 31, 2025* ("2025 Annual Report") at 12 and 51.

7. On June 30, 2026, South Hopkins' Board of Commissioners adopted Resolution No. 2025-06-01, which among other things, authorized the District's Chairman to prepare, execute, verify, and submit this Application. A copy of the Resolution is attached as **Exhibit 2**.

B. U. S. 41 Water Storage Tank Project

8. **Overview of the Project.** The Project consists of the construction of approximately 400 linear feet of 8-inch PVC water line, a new 200,000-gallon elevated water storage tank, and a duplex booster pump station with pumps capable of 175 gpm at 70 feet of TDH along U.S. 41, otherwise known as Hopkinsville Road. The Project's location is in the eastern portion of the District's service territory, and in the East Pressure Zone of South Hopkins' distribution system. The Project is necessary to provide the minimum water storage capacity specified by the *Recommended Standards for Water Works* developed by the Great Lakes-Upper Mississippi River Board ("GLUMRB") to serve as a guide in the design and preparation of plans and specifications for public water supply systems. These are generally referred to as the "Ten State Standards." The estimated cost to construct the Project, including a 2.5 percent contingency, is **$4,000,000.** A breakdown of this estimate is found on page 11 of attached **Exhibit 3,** the Final Engineering Report, which was prepared, signed, sealed, and dated by an engineer registered in Kentucky**.**

9. **Location of the Project.** The Project is located in South Hopkins' East Pressure Zone, which serves the communities of Morton's Gap and Earlington, as well as the eastern portion of South Hopkins service territory. The average water usage in the East Zone is approximately 800,000 gallons per day. The East Zone has the highest average daily usage of the system's three pressure zones. South Hopkins desires to improve system pressures in its East Zone. **Exhibit 3** provides two maps of the location of the Project: (1) Figure 3, located between pages 3 and 4 of the Final Engineering Report, provides the location of the proposed U.S. 41 Tank and the proposed booster pump station situated between Central Hopkinsville Road and U.S. 41; and (2) Figure 4, located between pages 9 and 10 of the Final Engineering Report is a map of South Hopkins' service territory that depicts the location of the District's five existing water storage tanks as well as the proposed location of the U.S. 41 Tank.

C. Need for Project

10. South Hopkins District currently has approximately 900,000 gallons of storage capacity provided by five water storage tanks.[4] The Ten State Standards recommendation for minimum storage capacity is a storage capacity equal to the average daily water consumption. This recommendation is for water utilities, such as South Hopkins, that do not generally provide water storage for fire protection

[4] *See* Exhibit 3, Final Engineering Report page 3.

purposes. South Hopkins' average daily consumption is approximately 1,065,000 gallons.[5] Therefore, South Hopkins needs approximately 165,000 additional gallons of storage capacity in its system to meet the Ten State Standards minimum storage recommendation.

11. Additionally, South Hopkins' existing water storage tanks are aging. The five existing tanks were constructed between 1968 and 1995. The average age of the water storage tanks is 49.8 years, and the newest tank is now over thirty years old.[6] They are in fair condition, but they may soon need additional maintenance to remain viable assets. Maintenance and refurbishment of water storage tanks often necessitate taking them out of service for a period of time to perform repairs that must be made while the tank is empty. Given the current storage deficit, taking a tank out of service could impair the District's ability to provide adequate service during tank refurbishment.

12. The District's existing booster pump stations are also aging. Of the District's seven existing booster pump stations, only one is less than 20 years old.[7] It is expected that as these assets age, they will also require additional maintenance in the coming years. Although Hopkins County is not rapidly growing in population,

[5] *Id.*

[6] *Id.*

[7] *See* Exhibit 3, Final Engineering Report page 4.

the area is home to several poultry producers. Poultry production requires high water usage. Without additional storage, the District is unable to serve **any** additional poultry producers. The expansion of an existing producer could also present significant storage challenges, depending on the scale of the expansion, With the current storage deficit, South Hopkins would need to turn away a prospective poultry industry customer or any commercial or industrial customer with a moderately high demand for water.

13. Constructing an additional elevated water storage tank and booster pump station will: (1) provide the water storage capacity that the District needs to meet the Ten State Standards; (2) provide additional infrastructure to be utilized if an existing storage tank or booster pump station is out of service for a time; (3) and provide the storage capacity required to add additional customers to the system. The Project will also increase water pressure in the East Zone, the pressure zone with the highest usage in the system.

14. **Plans, Specification, and Drawings**. Attached as **Exhibit 4** are plans, specifications, and drawings for the Project, which are signed, sealed and dated by an engineer registered in Kentucky as required by KRS 322.340.

D. Alternatives Considered

15. **Alternatives Considered**. South Hopkins evaluated four approaches to its need for additional storage capacity and its need to address its aging

infrastructure: (1) the construction of a new 200,000-gallon elevated storage tank and a new booster pump station; (2) constructing a 500,000-gallon elevated storage tank and booster pump station; (3) constructing a 200,000-gallon ground storage tank and booster pump station; and (4) continuing to operate the system as it currently exists. For the reasons explained below and discussed on pages 6-11 of the Final Engineering Report found at **Exhibit 3**, the District elected to construct a 200,000-gallon elevated water storage tank and a booster pump station.

16. **First Alternative**. Alternative No. 1 is the construction of a new 200,000-gallon elevated water storage tank and a new booster pump station in the East Zone of South Hopkins' distribution system. This alternative ensures that the District has adequate water storage to meet the Ten State Standards' recommendation for storage capacity. It also provides additional pressure to the East Zone, the pressure zone with the greatest usage. The District's consulting engineering firm, Strand Associates, Inc. ("Strand Associates") estimated the cost to construct this option would range between $2,900,000 and $4,500,000.

17. **Second Alternative.** Alternative No. 2 involved constructing a new 500,000-gallon elevated water storage tank and a booster pump station. Although this alternative provided more storage than Alternative No. 1, current system usage would not provide adequate turnover to ensure water quality. The estimated cost to construct Alternative No.2 was also considerably more than the estimated cost to construct

Alternative No.1. Strand Associates estimated it would cost between $4,200,000 and $6,200,000 to construct Alternative No. 2.

18. **Third Alternative.** Alternative No. 3 provided for additional water storage by constructing a new 200,000-gallon ground storage tank and a booster pump station. The estimated cost to construct this option was slightly lower than the estimated cost to construct Alternative No. 1. Strand Associates estimated this option would cost between $2,800,000 and $4,300,000 to construct. However, because this option involves ground storage, not elevated storage, it operates at a lower hydraulic grade line ("HGL"). Operating at a lower HGL drops the pressure in the East Zone below 20 pounds per square inch ("psi") when demands increase. South Hopkins is required by Commission regulation 807 KAR 5:066, Section 5 to provide a minimum of 30 psi at the customer's meter under normal conditions. This Alternative is not viable because it would reduce pressure below the regulatory prescribed level.

19. **Fourth Alternative.** South Hopkins also considered maintaining the status quo and not addressing its storage deficit at this time. However, the District considers the possibility of having to deny service to **any** potential moderate to high-use customer to be too great of a risk to accept when funds are available to address its need for additional storage and to provide for additional pressure.

20. **Alternative Selected.** South Hopkins selected Alternative No. 1 because it provides for the needed water storage and has a beneficial impact on water pressure in the East Zone.

21. **Contract Specifications.** The contract specifications prepared by Strand Associates are attached to this Application as **Exhibit 5.**

E. Proposed Financing and Other Requirements

22. **Financing for Proposed Construction.** South Hopkins is not proposing to issue any evidence of indebtedness in connection with construction of the Project, nor is South Hopkins using any of its own funds to construct the Project. The Hopkins County Fiscal Court has allocated $4,000,000 in Coal Severance Tax funds to construct the Project. The District is **not** required to repay the Fiscal Court, nor will it do so. Attached as **Exhibit 6** is a letter from Hopkins County Judge Executive Jack Whitfield, Jr. confirming this funding allocation.

23. **Division of Water.** The Kentucky Division of Water ("KDOW") has reviewed the plans for the proposed U.S. 41 Tank Project and has approved them with respect to the sanitary features of design. A copy of the letter in which KDOW stated its approval is attached to this Application as **Exhibit 7.**

24. **Kentucky Department of Highways.** Because the Project is not being constructed in The Kentucky Department of Highways right-of-way, no Encroachment Permit is required.

25. **Easements.** South Hopkins obtained an easement from the property owner at 6625 Hopkinsville Road, the Hopkins County Board of Education ("the School Board"), to construct the Project on the School Board's real property. A copy of the recorded easement is attached as **Exhibit 8**. Included in **Exhibit 8** is a map, prepared by a licensed surveyor, depicting the location of the Project.

26. **Advertisement for Bids.** In accordance with provisions of KRS Chapter 424, South Hopkins caused to be published an advertisement for bids for the construction of the U.S. 41 Tank Project in the April 21, 2026 edition of *The Madisonville Messenger.* An affidavit of publication and a copy of the advertisement is attached to this Application as **Exhibit 9**.

27. **Bids Received.** The District received three (3) bids to complete the U.S. 41 Tank Project. The **$3,487,000** bid of Caldwell Tanks Inc. ("Caldwell Tanks") of Louisville, Kentucky was selected as the lowest and best bid. A copy of the certified bid tabulation is attached as **Exhibit 10.**

28. **Board Resolution.** On June 30 2026, South Hopkins' Board of Commissioners adopted Resolution No. 2025-06-01 awarding a contract to construct the Project to Caldwell Tanks contingent upon the Commission granting the District a CPCN for the Project. A copy of the Resolution is attached as **Exhibit 2.**

29. **Estimated Cost to Construct.** The estimated total cost to construct the Project is **$4,000,000** including a 2.5 percent contingency. **Exhibit 3, page 11** contains a breakdown of the estimated costs.

30. **Estimated Annual Cost to Operate.** As shown in **Exhibit 3, page 12**, Strand Associates estimates that the annual cost to operate the Project is **$35,000**.

31. **Competition with Other Public Utilities.** The proposed Project will not compete with the facilities of another public utility. There is no other water distribution system located in the area of the Project. Its construction will not result in wasteful duplication of utility facilities or inefficient investment.

32. The proposed construction will **not** require South Hopkins to seek a rate adjustment.

33. A detailed estimate of the acquired property, arranged according to the Uniform System of Accounts for Class A and B Water Districts and Associations is attached to this Application as **Exhibit 11.**

34. If South Hopkins cannot secure a CPCN to construct the Project before December 31, 2026, it may be necessary to re-bid the Project. Therefore, South Hopkins respectfully requests a decision by Wednesday**, December 23, 2026,** to permit it time to prepare the Notice of Award and for the Bidder to obtain its Payment and Performance Bonds before the end of the calendar year.

Wherefore, South Hopkins Water District requests that the Commission:

1. Place this Application at the head of the Commission's docket and issue a decision in this matter by **December 23, 2026.**

2. Grant South Hopkins a CPCN to construct the U.S. 41 Water Storage Tank Project.

3. Grant any and all such other relief to which south Hopkins may be entitled.

Dated: October 16, 2026

Respectfully submitted,

/s/ Tina C. Frederick
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Counsel for South Hopkins Water District

CERTIFICATE OF SERVICE

In accordance with the Commission's Order of July 22, 2021 in Case No. 2020-00085 (Electronic Emergency Docket Related to the Novel Coronavirus COVID-19), this is to certify that the electronic filing has been transmitted to the Commission on October 16, 2026; and that there are currently no parties in this proceeding that the Commission has excused from participation by electronic means.

/s/ Tina C. Frederick
Tina Frederick

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) **SS:**
COUNTY OF HOPKINS)

The undersigned, **Michael Easley**, being duly sworn, deposes and states that he is the Chairman of the Board of Commissioners of South Hopkins Water District, the Applicant in the above proceedings; that he has read the Application and has noted its contents; that the same is true and correct to the best of his information, knowledge, and belief.

Michael Easley

Subscribed, sworn to, and acknowledged before me, a Notary Public in and for said County and State, this 16th day of October 2026.

Notary Public

ANITA M BLACK
NOTARY PUBLIC KYNP75361
KENTUCKY STATE AT LARGE
MY COMMISSION EXPIRES AUGUST 3, 2027

Commission Number: KYNP75361

My Commission Expires: 8.3.2027

Exhibit 1

Filing Requirements

FILING REQUIREMENTS

FILING REQUIREMENTS FOR AN APPLICATION FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

U.S. 41 Water Storage Tank Project

Source Authority	Requirement	Location
807 KAR 5:001, § 14(1)	Applicant's name, mailing address and e-mail address	Page 2, Para 1
807 KAR 5:001, § 14(1)	Statutory Reference – KRS 278.020	Page 1
807 KAR 5:001, § 4(3)	Signature of Applicant's Attorney	Page 13
807 KAR 5:001, § 4(3)	Name, Address, Telephone Number, Fax Number, and e-mail address of Applicant's Attorney	Page 2-3, Para 2
807 KAR 5:001, § 14(2)	If Applicant is corporation: State and date of incorporation, attestation of good standing in state of incorporation, statement regarding authorization to transact business in Kentucky	Page 3, Para 3 **Not Applicable**
807 KAR 5:001, § 14(3)	If Applicant is a limited liability company: State and date of organization, attestation of good standing in state of incorporation, statement regarding authorization to transact business in Kentucky	Page 3, Para 3 **Not Applicable**
807 KAR 5:001, § 14(4)	If the Applicant is a limited partnership: a certified copy of limited partnership agreement and all amendments or statement identifying prior Commission proceedings in which limited partnership agreement and all amendments filed	Page 3, Para 3 **Not Applicable**
807 KAR 5:001, § 15(2)(a)	The facts relied upon to show that the public convenience and necessity requires the proposed construction	Pages 4-10, Paras 8-20 Exhibit 3
807 KAR 5:001, § 15(2)(b)	Copies of franchises or permits for the proposed construction or extension	Pages 10-11, Paras 23-25 Exhibits 7&8
807 KAR 5:001, § 15(2)(c)	A full description of the proposed location, route, or routes of the proposed construction or extension, including a description of the manner in which same will be constructed, and the names of all public utilities, corporations, or persons with whom the proposed construction or extension is likely to compete	Page 4, Para 8 Page 5, Para 9 Exhibit 3, Figures 3&4 Exhibit 4 Exhibit 8

Source Authority	Requirement	Location
807 KAR 5:001, § 15(2)(d)(1)	Maps to suitable scale showing the location or route of the proposed construction or extension, as well as the location to scale of like facilities owned by others located anywhere within the map area with adequate identification as to the ownership of the other facilities (Only one copy submitted pursuant to Commission order of July 28, 2017)	Exhibit 3, Figures 3&4 Exhibit 8
807 KAR 5:001, § 15(2)(d)(2)	Plans and specifications and drawings of the proposed plant, equipment, and facilities	Page 7 Para 14 Exhibits 4 & 5
807 KAR 5:001, § 15(2)(e)	The manner in detail in which the Applicant proposes to finance the proposed construction or extension.	Page 10, Para 22 Exhibit 6
807 KAR 5:001, § 15(2)(f)	An estimated annual cost of operation after the proposed facilities are placed into service	Page 12, Para 30
KRS 322.340	Engineering plans, specifications, drawings, plats and reports for the proposed construction or extension prepared by a registered engineer, must be signed, sealed, and dated by an engineer registered in Kentucky	Page 7, Para 13 Exhibits 3 & 4

Exhibit 2

Resolution

RESOLUTION NO. 2025-06-01

RESOLUTION OF SOUTH HOPKINS WATER DISTRICT ACCEPTING LOWEST AND BEST BID, AWARDING CONTRACT FOR THE U.S. 41 WATER STORAGE TANK AND PUMP STATION PROJECT, AND AUTHORIZING DISTRICT CHAIRMAN TO APPLY FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY TO CONSTRUCT THE PROJECT

WHEREAS, South Hopkins Water District ("the District") is a water district organized pursuant to the provisions of KRS Chapter 74;

WHEREAS, the District proposes to constrict a 200,000 gallon elevated water storage tank, 400 linear feet of 8-inch polyvinylchloride water line, and a 175 gallon-per-minute pump station ("the U.S. 41 Water Storage Tank and Pump Station Project", "the Project" or " the Contract");

WHEREAS, the District has engaged the services of Strand Associates, Inc. ("Strand") to serve as consulting engineers for the Project. Strand has designed the Project and will perform the usual and customary duties of consulting engineers, including Construction Administration and Inspection Services;

WHEREAS, the District caused to be published in the April 21, 2026 edition of *The Madisonville Messenger* an advertisement for bids for the Project in accordance with the provisions of KRS Chapter 424;

WHEREAS, three (3) firms submitted bids on the Project in accordance with the terms of the advertisements and the Bid Specifications;

WHEREAS, Caldwell Tanks, Inc. ("Caldwell Tanks") submitted the lowest of the three (3) bids with a bid of **$3,487,700** to construct the entire Project;

WHEREAS, Strand has recommended that the District award the Contract to construct the Project to Caldwell Tanks;

WHEREAS, KRS 278.015 provides that a water district is a utility and is subject to the jurisdiction of the Kentucky Public Service Commission (the "Commission") in the same manner and to the same extent as any other utility;

WHEREAS, KRS 278.020(1) prohibits any utility from commencing the construction of any plant or facility or installing any equipment to provide utility service, except for that in the ordinary course of business, until that utility has obtained a Certificate of Public Convenience and Necessity (the "CPCN") from the Commission; and

WHEREAS, the District has, or soon will have, obtained all the necessary approvals to construct the Project, except for a CPCN.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COMMISSIONERS OF SOUTH HOPKINS WATER DISTRICT AS FOLLOWS:

Section 1. The facts, recitals, and statements contained in the foregoing preamble of this Resolution are true and correct and are hereby affirmed and incorporated as a part of this Resolution.

Section 2. The Board of Commissioners hereby accepts the recommendation of Strand.

Section 3. The Board of Commissioners hereby declares the bid of Caldwell Tanks in the amount of $3,487,700 to construct the Project to be the lowest and best bid.

Section 4. Caldwell Tanks is awarded the Contract contingent upon the Commission granting a CPCN.

Section 5. The Chairman is authorized and directed as follows: (a) to execute the Notice of Award; (b) to execute the Agreement; (c) to execute the Notice to Proceed; and (d) to take any and all other actions reasonably necessary to implement the award of the Contract to Caldwell Tanks including the execution of any and all other documents necessary for such purpose; and to take any and all actions reasonably necessary to prepare, execute, and submit an application to the Commission for a CPCN to construct the Project.

Section 6. This Resolution shall take effect upon its adoption.

Adopted by the Board of Commissioners of South Hopkins Water District at a meeting held on June 30, 2026, signed by the Chairman, and attested by the Secretary.

SOUTH HOPKINS WATER DISTRICT

By: Michael Easley
Michael Easley Chairman

ATTEST:

Deborah Duncan
Deborah Duncan, Secretary

CERTIFICATION

The undersigned Secretary of South Hopkins Water District (the "District") does hereby certify that the foregoing is a true copy of a Resolution duly adopted by the District's Board of Commissioners at a meeting properly held on June 30, 2026, signed by the Chairman of the Board of Commissioners, attested by the Secretary of the Board of Commissioners, and now in full force and effect.

WITNESS my hand this 30th day of June 2026.

Deborah Duncan
Deborah Duncan, Secretary

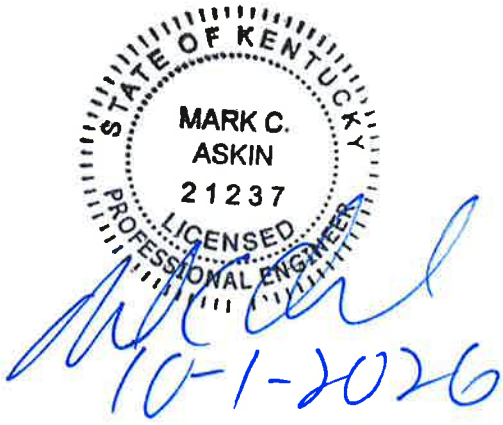
Exhibit 3

Final Engineering Report

Report for

South Hopkins Water District, Kentucky

Final Engineering Report for 2025 Water System Improvements



Prepared by:

STRAND ASSOCIATES, INC.®
325 West Main Street, Suite 710
Louisville, KY 40202
www.strand.com

October 2026

STRAND ASSOCIATES®
Excellence in Engineering℠

PROJECT PLANNING AREA

This Preliminary Engineering Report (PER) describes and evaluates proposed improvements to the South Hopkins Water District (SHWD) water system. The purpose of this PER is to present water storage and booster pump station (BPS) alternatives to improve SHWD system performance. Preliminary engineering for the project began in November 2024. Bids were received for the project on May 12, 2026.

A. Location

The project planning area is shown in Figure 1 and includes the SHWD service area, which can generally be described as the southern portion of Hopkins County, Kentucky, excluding the City of Madisonville, Kentucky (Madisonville). SHWD currently serves approximately 2,831 residential users, 112 commercial users, two industrial users, three wholesale users, and 19 public authorities according to its Kentucky Public Service Commission 2024 annual report.

B. Environmental Resources Present

The project planning area contains several environmental resources, including impaired streams, waterbodies, schools, historic properties, and endangered species; however, construction is not expected to impact the existing environmental resources. The following endangered species could be present within the project planning area:

1. Gray Bat (*Myotis grisescens*)
2. Indiana Bat (*Myotis sodalis*)
3. Northern Long-eared bat (*Myotis septentrionalis)*
4. Clubshell (*Pleurobema clava)*
5. Fanshell (*Cyprogenia stegaria*)
6. Northern Riffleshell (*Epioblasma rangiana*)
7. Pink Mucket (*Lampsilis abrupta*)

SOUTH HOPKINS, KY
PROJECT PLANNING AREA

SOUTH HOPKINS WATER DISTRICT
HOPKINS COUNTY, KY

Legend

- SHWD Boundary
- State Roads
- Local Roads

0 1 2 4 6 8 Miles

N

Aerial Source: ESRI

STRAND ASSOCIATES®

FIGURE 1
4748.002

Path: S:\LOU\4700--4799\4748\001\Drawings\GIS\Hopkins Map.mxd User: laurenb Date: 8/30/2024 Time: 10:44:29 AM

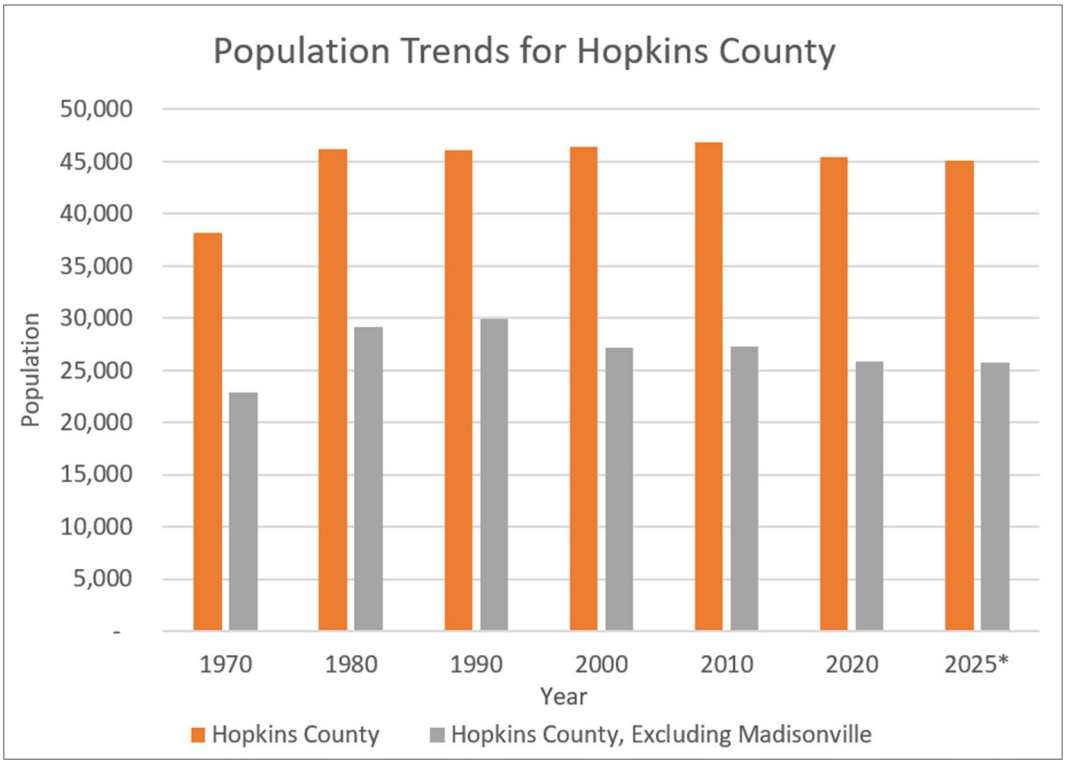
C. Population Trends

The service area population is estimated to be approximately 8,440 residents. Table 1 and Figure 2 show the population trends for Hopkins County. Slight population change has occurred in the last 40 years within Hopkins County. There are no large-scale developments expected to be built within the SHWD service area in the next several years. Based on the existing growth rate, the service area population is expected to stay at approximately 8,500 people for the next 20 years.

Year	Hopkins County Residents	Madisonville Residents	Hopkins County Residents, Excluding Madisonville
1970	38,167	15,332	22,835
1980	46,174	16,979	29,195
1990	46,095	16,200	29,895
2000	46,449	19,307	27,142
2010	46,840	19,591	27,249
2020	45,420	19,542	25,878
2025*	45,127	19,428	25,699

*Population Estimate Source: United States (U.S.) Census

Table 1 Population Trends for Hopkins County



Source: U.S. Census
*Population Estimate Source: U.S. Census

Figure 2 Population Trends for Hopkins County

D. Community Engagement

SHWD's approach to engaging the community in the project planning process is generally informal. Hopkins County consists of a small, rural community where SHWD employees interact with their neighbors and engage in conversations regarding the status of the utility system. SHWD has also met with the County Judge Executive on multiple occasions to discuss the state of the utility system and potential solutions moving forward.

EXISTING FACILITIES

A. Location

The SHWD distribution system includes five potable water storage tanks (WST), seven BPSs, and approximately 245 miles of water main. The distribution system consists of three main pressure zones. The North Zone serves the community of Beaulah, the East Zone serves the communities of Mortons Gap and Earlington, and the South Zone serves the communities of Dawson Springs, St. Charles, and Charleston. A location map of the SHWD water distribution system is shown in Figure 3. The maximum day demand for the system is approximately 1,645,000 gallons per day (gpd), and the average day demand (ADD) for the system is approximately 1,065,000 gpd. The West Zone average usage is approximately 15,000 gpd, the North Zone average usage is approximately 250,000 gpd, and the East Zone average usage is approximately 800,000 gpd. The Ten States Standards Recommended Standards for Wastewater Facilities (Ten States Standards) require that the minimum storage capacity for systems not providing fire protection shall be equal to the average daily consumption. When fire protection is to be provided, fire flows should be established with guidance available from the Insurance Service Office or National Fire Protection Association.

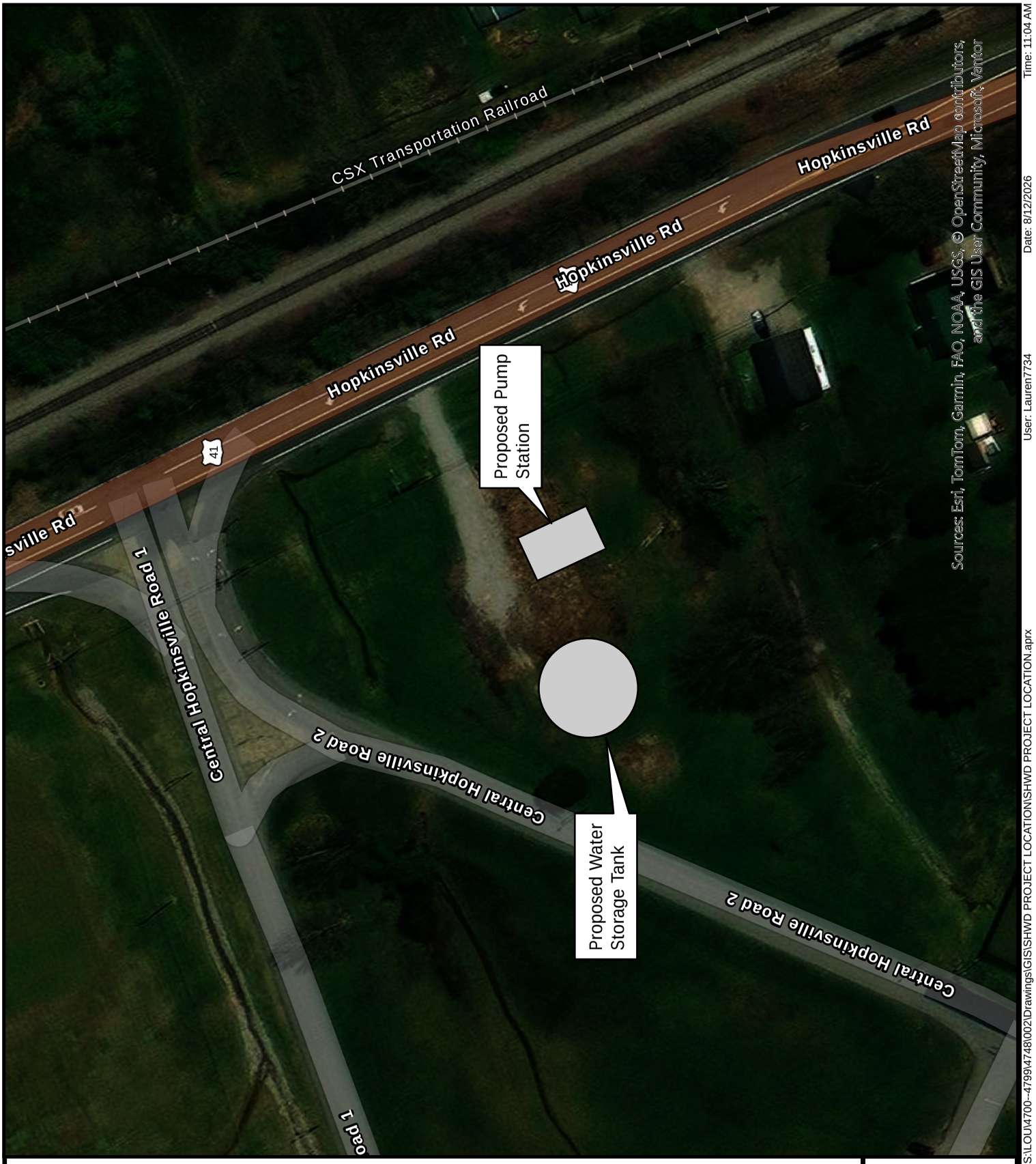
B. History

1. Potable WSTs

SHWD owns and operates five potable WSTs throughout southern Hopkins County. Table 2 provides a summary of each WST in the distribution system. The WSTs were constructed between 1968 and 1995 with an average WST age of 49.8 years. The existing system has approximately 900,000 gallons of water storage.

WST	Type	Year Constructed	Volume (gallons)	Overflow Elevation (feet)
Caldwell	Standpipe	1968	150,000	706
Charleston	Elevated	1968	150,000	706
St. Charles	Elevated	1968	150,000	670
Suthard	Standpipe	1982	400,000	671
Grapevine	Standpipe	1995	39,000	649

Table 2 Potable WST Summary



Time: 11:04 AM
Date: 8/12/2026
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PROPOSED SITE LOCATION

PRELIMINARY ENGINEERING REPORT
SOUTH HOPKINS WATER DISTRICT
HOPKINS COUNTY, KENTUCKY

STRAND ASSOCIATES®

FIGURE **3**
4748.002

2. BPSs

There are seven active BPSs in SHWD's existing water distribution system. The active BPSs operate to control the levels in the existing WSTs. Table 3 provides a summary of each active BPS in the distribution system. The average BPS age is 27 years old.

BPS	No. of Pumps	Capacity (gpm)	Status	Year Constructed
US 62 West	2	175	In Service	1997
KY109 North	2	210	In Service	1997
US 62 East	3	280	In Service	1997
Good Hope Spur Road	2	120	In Service	1997
Suthard-Carbondale	2	175	In Service	1997
Grapevine	2	240	In Service	1997
Crawley-Lanham Lane	2	240	In Service	2011

US=United States Highway
KY=Kentucky Highway
gpm=gallons per minute

Table 3 BPS Summary

3. Distribution System Water Mains

The existing distribution system contains approximately 245 miles of water mains ranging in sizes from 2 to 16 inches in diameter. The lengths of each pipe diameter and average installation year are shown in Table 4. The average age of pipe within the distribution system is 57 years old.

Diameter (inches)	Length of Pipe (miles)	Length of Pipe (feet)	Average Year Installed
2	17.9	94,700	1965
3	123.3	650,800	1972
4	29.5	155,600	1966
6	49.5	261,300	1967
8	21.2	111,800	1965
12	2.7	14,300	1965
16	0.7	3,500	1965
Total	**244.8**	**1,292,000**	**1969**

Table 4 Water Main Size Distribution Summary

C. Condition of Existing Facilities

The existing WSTs and BPSs are in fair condition; however, the average age for system WSTs is approximately 50 years old, and the average age of system BPSs is approximately 27 years old. These assets are nearing the end of their useful lives and may require additional maintenance or replacement within the next 20 years.

NEED FOR PROJECT

SHWD has highlighted several needs for the 2025 Water System Improvements project. The needs for the new elevated storage tank (EST) and BPS are outlined in the following section.

A. Health, Sanitation, and Security

The existing SHWD system does not currently provide fire protection. To comply with the Ten States Standards storage requirements without providing fire flow, the system must have storage capacity for the 24-hour ADD. With the existing storage capacity, the system does not have the capacity to remain in compliance with the Ten States Standards requirements. An additional WST is required to improve system pressures in the East Zone and store the average daily usage.

B. Aging Infrastructure

The existing WSTs and BPSs are well past their useful lives and may require additional maintenance or replacement soon. Construction of a new WST and BPS will provide flexibility if additional tanks need to be taken offline for maintenance or replacement.

C. Reasonable Growth

The existing SHWD system currently has storage capacity for up to 900,000 gallons, while the existing ADD is approximately 1,065,000 gpd. The existing system does not have adequate storage to comply with the Ten States Standards requirements. Additional storage will be required to supply any additional large industrial or commercial customers.

While the population is not expected to grow within the next 20 years, the existing system does not provide a solid foundation for additions. Several chicken houses with water demands of 63,000 gpd have inquired about the possibility of joining the SHWD system. With the existing system storage, SHWD cannot accommodate more chicken houses and will be required to turn away additional commercial and industrial customers.

ALTERNATIVES CONSIDERED

Multiple alternatives were considered as part of the 2025 Water System Improvements project. This section discusses each alternative in more depth. An Opinion of Probable Construction Cost (OPCC) was prepared for the selected alternative.

A. Description

A description of each alternative is presented in the following points.

1. Alternative No. 1–Construct a new 200,000-gallon EST and BPS.

   Alternative No. 1 involves the construction of a new 200,000-gallon EST and BPS. This EST would provide additional storage for the system to adhere to the Ten States Standards storage requirements. The EST would also provide additional system pressure in the East Zone. The OPCC of this alternative is $2.9 to $4.5 million.

2. Alternative No. 2–Construct a new 500,000-gallon EST and BPS.

   Alternative No. 2 involves the construction of a new 500,000-gallon EST and BPS. This EST would provide the same benefits as Alternative No. 1; however, it would also provide additional storage for the system. This alternative was modeled; however, the EST could not provide proper turnover because of the larger volume. As a result, this alternative was not considered for further evaluation. The OPCC of this alternative is $4.2 to $6.2 million.

3. Alternative No. 3–Construct a new 200,000-gallon ground storage tank (GST) and BPS.

   Alternative No. 3 involves the construction of a new 200,000-gallon GST and BPS. This GST would provide similar benefits to Alternative No. 1; however, it would be operating at a lower hydraulic grade line (HGL). By operating at a lower HGL, system pressures in the East Zone drop to less than 20 pounds per square inch (psi) when demands increase. By falling under 20 psi, these nodes do not comply with the Ten States Standards requirements. As a result, this alternative was not considered for further evaluation. The OPCC of this alternative is $2.8 to $4.3 million.

4. Alternative No. 4–Continue to operate the system as it currently exists.

   Alternative No. 4 is a “do nothing” alternative. This alternative will not provide additional water storage for the system. This alternative also limits the possibility for future growth in the SHWD system and may hinder system performance if additional WSTs are taken offline for maintenance or replacement.

B. Design Criteria

The following design criteria were used to evaluate each proposed alternative.

1. Cost–Includes the up-front cost associated with construction. This includes the initial design, bidding, materials, and construction costs.

2. Long-Term Operation and Maintenance (O&M)–Includes the long-term costs associated with operating and maintaining each alternative. This includes items such as electrical costs, replacement of components, and personnel required to operate systems.

3. Constructability–Indicates how difficult it would be to construct each alternative. This criterion encompasses ease of acquiring materials, consistency of contractors, and other things.

4. Completion Time–Indicates how long it would take to complete the alternative.

5. Performance–Encompasses how the water distribution system will perform after modifications have been made.

C. Map

The location of the proposed EST is included in Figure 3.

D. Environmental Impacts

The proposed alternatives are not expected to negatively impact floodplains, wetlands, endangered species, or historical or archaeological properties.

E. Land Requirements

A small area has been acquired for the proposed WST and BPS, along with an access easement for the driveway to the BPS. This property is located near 6605 Hopkinsville Road in Madisonville.

F. Potential Construction Problems

Several construction problems may arise, including soil challenges and bedrock depth. A geotechnical report is suggested before construction begins.

G. Sustainability Concerns

The proposed alternatives are not expected to have a negative impact on energy efficiency or other sustainability concerns.

H. Cost Estimates

Cost estimates for Alternative Nos. 1 and 4 are shown in Table 5.

Alternative No.	Construction Costs	Nonconstruction Costs	Total Alternative Costs	O&M Costs (per year)
1	$2.9 to $4.5 million	$200,000 to $300,000	$2.9 to $4.5 million	$35,000
4	$0	$0	$0	$0

Table 5 Cost Estimates for Considered Alternatives

SELECTION OF AN ALTERNATIVE

A. Life-Cycle Cost Analysis

The life-cycle cost analysis for Alternative Nos. 1 and 4 is shown in Table 6.

	Alternative No. 1	Alternative No. 4
Capital Cost	$3,300,000	$0
Present Worth of Capital Cost	$3,200,000	$0
Implementation Period (years)	2	N/A
Planning Period (years)	50	75
Annual Discount Rate	2%	2%
Annual O&M Cost	$35,000	$0
Present Worth of Annual O&M	$650,200	$0
Salvage Value	$70,000	$0
Present Worth of Salvage Value	$47,100	$0
Net Present Worth (2026 Dollars)	$3,897,300	$0

N/A=not applicable

Table 6 Life-Cycle Cost Analysis

B. Nonmonetary Factors

Based on the evaluation of each alternative, it is suggested that SHWD proceed with Alternative No. 1. This alternative was chosen because it should provide the system with more storage, raise water pressure in the eastern portion of the system, and provide additional storage to comply with the Ten States Standards requirements.

The selected alternative provides SHWD with the most cost-effective solutions to improve the water distribution system in accordance with its operation goals. Using Association for the Advancement of Cost Engineering (AACE) Class 3 estimates, the OPCC range for the selected alternative is $2.9 to $4.5 million.

PROPOSED PROJECT (SUGGESTED ALTERNATIVE)

A. Preliminary Project Design

This project will construct a 200,000-gallon EST and BPS. The proposed EST and BPS should benefit the system by providing solutions to hydraulic challenges and an increase in fire protection throughout Hopkins County.

1. Hydraulic Considerations

Hydraulic calculations are based on the Hazen-Williams formula, with a “C” value of 120 for polyvinyl chloride.

2. Water Supply

No impacts to the water supply are expected from the new EST.

3. Treatment

Drinking water will continue to be purchased from Dawson Springs. No new water treatment infrastructure will be constructed as part of the proposed project.

4. Storage

New water storage will be constructed as part of this project. Water will continue to be stored at the existing WSTs shown in Figure 3.

5. BPSs

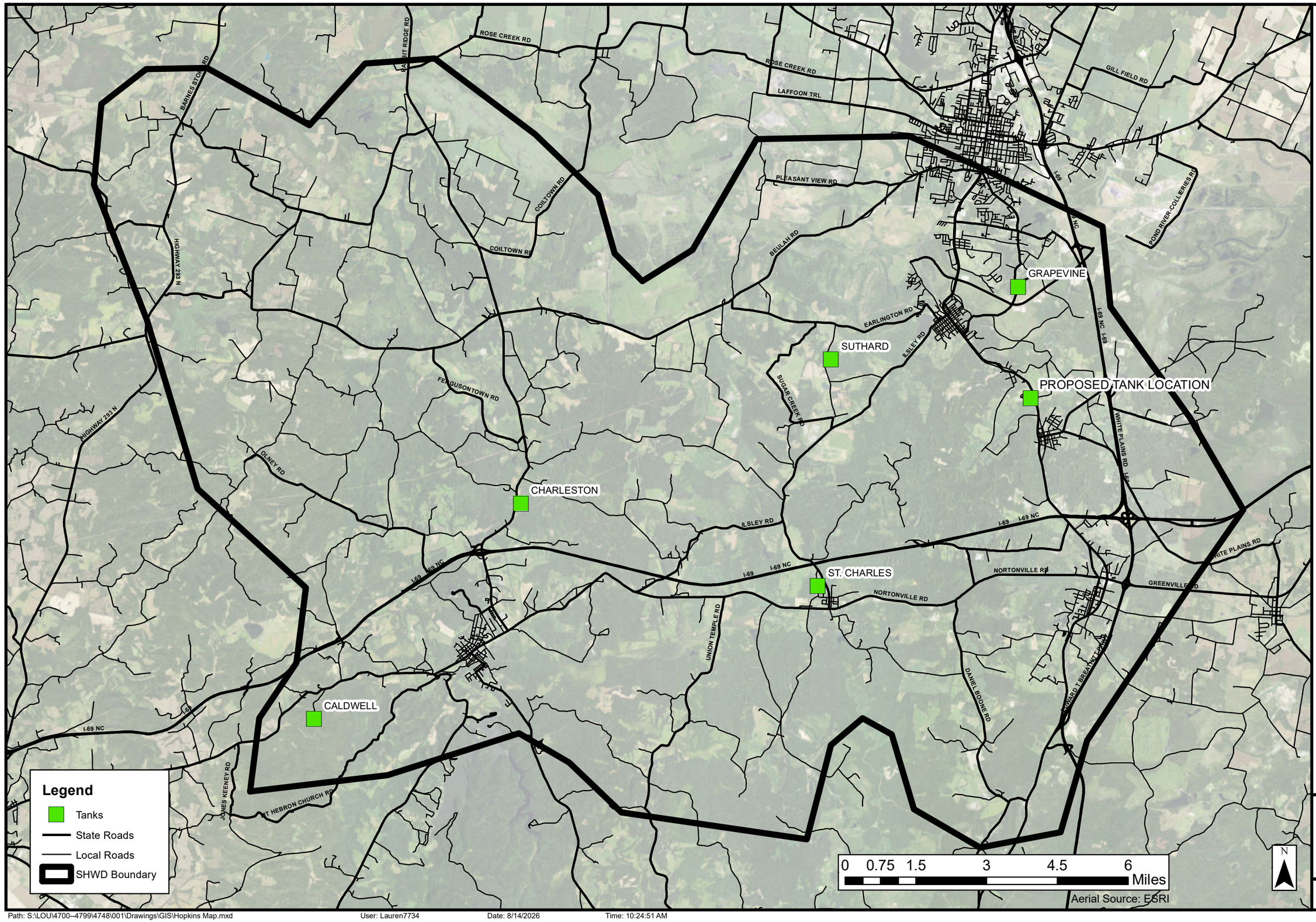
New pumps and BPSs will be placed in the locations shown in Figure 4, as previously described.

6. Distribution Layout

No new water distribution mains will be installed as part of this project.

B. Project Schedule

A preliminary project schedule is shown in Table 7.



SOUTH HOPKINS, KY
EXISTING SYSTEM LIMITS AND TANK LOCATIONS

SOUTH HOPKINS WASTER DISTRICT
HOPKINS COUNTY, KY

STRAND ASSOCIATES®

FIGURE 4
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Table 7 Preliminary Project Schedule

Month	June 2026	July 2026	August 2026	September 2026	October 2026	November 2026	December 2026	January 2027	February 2027	March 2027	April 2027	May 2027
Design												
Bidding												
Contract Award												
Initiation of Construction												
Construction												
Substantial Completion												
Final Completion												
Initiation of Operation												

C. Permit Requirements

The permits that will be necessary for this project include the following:

1. Kentucky Division of Water (KDOW)–Water Quality Certification
2. KDOW–Construction Permit

D. Project Cost Based on Project Bid

The project cost based on project bid is shown in Table 8.

Description	Value
Bonds and Insurance	$69,740
Engineering Drawings and Calculations–Foundation	$139,480
Engineering Drawings and Calculations–Tank	$209,220
Tank Foundation Installation	$429,300
Fabricated Tank Material (Delivered)	$858,960
Field Tank Erection	$492,000
Field Tank Painting	$269,000
BPS	$503,900
BPS Crane	$10,700
Generator	$277,100
Electrical	$28,000
SCADA	$137,600
Site Work, Yard Piping, Fence	$62,000
Total	**$3,487,000**
Geotechnical Services	$14,075
Design Services	$130,000
Bidding Services	$16,000
Preliminary Engineering	$25,000
Construction-Related Services	$31,500
Resident Project Representative (Part Time–Strand)	$85,000
Wet or Dry Resident Project Representative	$85,000
Legal	$25,000
Contingencies	$101,425
Total	**$4,000,000**

SCADA=supervisory control and data acquisition
Strand=Strand Associates, Inc.®

Table 8 Project Cost

The project bid tab is included in Appendix A.

E. Project Funding

A summary of the proposed project funding is as follows:

1. Hopkins County Fiscal Court Coal Severance Funds–$4,000,000
2. Total Estimated Project Funding–$4,000,000

This funding has been obtained.

ANNUAL OPERATING BUDGET

A. Income (Proposed Rate Schedule)

The project is not expected to add new customers; therefore, it should not affect current user rates. SHWD's revenues include charges for services, service line and meter installation, and other miscellaneous activities. SHWD's total revenue for the 2024 fiscal year was $1,533,152. Refer to Appendix B for SHWD's accounting information and Appendix C for SHWD's current user rates.

B. Equivalent Dwelling Units and Flow Data

SHWD purchases water from Dawson Springs. In 2024, SHWD purchased approximately 379,235,000 gallons from Dawson Springs that was then distributed across 2,967 connections. The average use is approximately 350 gallons per customer per day, including water loss, fire protection, and system flushing.

C. O&M Costs

SHWD's 2024 annual O&M cost was $1,815,276. The proposed annual O&M costs for the new EST and BPS are $35,000 annually.

D. Debt Repayment

As of December 31, 2024, SHWD had $863,648 in long-term outstanding debt, with an annual debt payment of $67,053. SHWD is expected to receive $4 million in grant funding from the Hopkins County Fiscal Court Coal Severance Funds.

E. Reserves

1. Debt Service

Table 9 shows SHWD's ability to make payments on its loan obligations for the existing and proposed systems. The Operating Revenue line item in Table 9 is the estimated income based on the current SHWD rates. Without the insurance recoveries, SHWD pays $28,305 per year in nonoperating expenses. Based on projections for operating revenue and expenses, debt repayment, and depreciation, SHWD is projected to have a deficit with its current rate structure. To find new customer rates to remain revenue-neutral, the average monthly water usage was

used and distributed evenly between the number of customers to create an average monthly bill. Currently, SHWD has 2,967 customers and averages approximately 5,231 gallons per user per month. The debt service analysis anticipates that no new customers will be added, and the monthly water usage will stay the same.

	2024 (Existing)	2028 (Projected)
Operating Revenue	$1,815,369	$1,983,703
Operating Expenses	$1,815,267	$1,983,601
Nonoperating Income (Expenses)	($28,398)	($31,031)
Debt Repayment	$27,100	$27,100
Required Coverage at 10 Percent	$0	$0
Depreciation	($142,304)	($155,499)
Surplus (Deficit)	($197,709)	($216,042)
Number of Customers	2,967	2,967
Average Monthly Customer Usage (gallons)	5,694	5,694
Average Customer Monthly Bill	**$49.44**	**$54.43**

Table 9 Debt Service Analysis

Currently, the average customer bill is estimated at $49.44 per month. Although the suggested project should be funded through the Hopkins County Fiscal Court Coal Severance Funds and should not require additional funding through the existing customer base, the existing rate structure will still need to be modified for SHWD to remain revenue-neutral. For SHWD to be net revenue-neutral after the proposed projects are implemented, the average customer bill will need to be increased to $54.43 per month.

2. Short-Lived Asset Reserve

Table 10 provides information regarding SHWD's short-lived assets, the expected year of replacement, and the anticipated cost of each associated with the proposed alternative.

Asset	Expected Replacement Year	Anticipated Cost
BPS Equipment	2046	$200,000
Electrical and Instrumentation Equipment	2056	$40,000

Table 10 Short-Lived Assets, Expected Replacement Year, and Anticipated Cost

CONCLUSIONS

It is recommended that SHWD proceed with the construction of the new EST and BPS as noted in the Selection of an Alternative section. The alternative has been reviewed, and the proposed alternative provides a cost-effective approach to meet SHWD's goals for this project. This project will add needed storage and provide capacity for future development. Hopkins County Fiscal Court Coal Severance Funds will be used to construct the new EST and BPS, which allows the project to be constructed without affecting current user rates.

This recommendation is pending approval by the Kentucky Public Service Commission.

APPENDIX A
PROJECT BID

Elevated Storage Tank and Pump Station Project, Contract 1-2026, South Hopkins Water District (#10127611)
Owner: South Hopkins Water District
Solicitor: Strand Associates, Inc.
05/12/2026 11:00 AM CDT

						Caldwell Tanks, Inc.		Maguire Iron, Inc.		Pittsburg Tank & Tower Co. Inc	
Section Title	Line Item	Item Code	Item Description	UofM	Quantity	Unit Price	Extension	Unit Price	Extension	Unit Price	Extension
Elevated Storage Tank and Pump Station Project							$3,487,000.00		$3,719,000.00		$4,140,800.00
	1	BASE-1	200,000-GAL Multi-Leg Storage Tank and Appurtenances, INCL Tideflex Mixing System, to be Installed by CONTRACTOR and OWNER Will Provide All Valves and Orifices. CONTRACTOR to Provide All Piping.	LS	1	$1,874,487.00	$1,874,487.00	$2,458,000.00	$2,458,000.00	$2,515,800.00	$2,515,800.00
	2	BASE-2	175-GAL per Minute Premanufactured Pump Station Delivered and Installed, INCL Portable Generator.	LS	1	$957,113.00	$957,113.00	$475,000.00	$475,000.00	$1,050,000.00	$1,050,000.00
	3	BASE-3	Site Prep. (Grading, Foundations, Fencing, Gates, Pavement, DR 14 C900 PVC Piping, Tieing into Exist. System, Etc). Valves & Fire Hydrants to be Supplied by OWNER, Installed by CONTRACTOR.	LS	1	$655,400.00	$655,400.00	$786,000.00	$786,000.00	$575,000.00	$575,000.00
Base Bid Total:							$3,487,000.00		$3,719,000.00		$4,140,800.00

APPENDIX B
2024 SHWD AUDIT

Report

of

South Hopkins Water District
Dawson Springs, Kentucky

For The Years Ended December 31, 2025 and 2024

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INDEPENDENT AUDITORS' REPORT

To the Commissioners
South Hopkins Water District
Dawson Springs, Kentucky

Report on the Audit of the Financial Statements

Opinions

We have audited the accompanying financial statements of South Hopkins Water District as of and for the years ended December 31, 2025 and 2024, and the related notes to the financial statements, as listed in the table of contents.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of South Hopkins Water District as of December 31, 2025 and 2024, and the changes in financial position and cash flows thereof for the years then ended in accordance with accounting principles generally accepted in the United States of America.

Basis for Opinions

We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States. Our responsibilities under those standards are further described in the Auditors' Responsibilities for the Audit of the Financial Statements section of our report. We are required to be independent of the South Hopkins Water District and to meet our other ethical responsibilities, in accordance with the relevant ethical requirements relating to our audit. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

Responsibilities of Management for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with accounting principles generally accepted in the United States of America, and for the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is required to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the South Hopkins Water District's ability to continue as a going concern for twelve months beyond the financial statement date, including any currently known information that may raise substantial doubt shortly thereafter.

Auditors' Responsibilities for the Audit of the Financial Statments

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinions. Reasonable assurance is a high level of assurance but is not absolute assurance and therefore is not a guarantee that an audit conducted in accordance with genrally accepted auditing standards and *Government Auditing Standards* will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional ommissions, misrepresentations, or the override of internal control. Misstatements are considered material if there is a substantial likelihood that, individually or in the aggregate, they would influence the judgement made by a reasonable user based on the financial statements.

In performing an audit in accordance with generally accepted auditing standards and *Government Auditing Standards,* we:

- Exercise professional judgement and maintain professional skepticism throughout the audit.

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examing, on a test basis, evidence regarding the amounts and disclosures in the financial statements.

- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the South Hopkins Water District's internal control. Accordingly, no such opinion is expressed.

- Evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluate the overall presentation of the financial statements.

- Conclude whether, in our judgment, there are conditions or events, considered in the aggregate, that raise substantial doubt about the South Hopkins Water District's ability to continue as a going concern for a reasonable period of time.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit, significant audit findings, and certain internal control-related matters that we identified during the audit.

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the management's discussion and analysis on pages 4-8 and pension and OPEB schedules on pages 30-33 be presented to supplement the basic financial statements. Such information is the responsibility of management and, although not part of the basic financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards*, we have also issued our report dated May 18, 2026, on our consideration of South Hopkins Water District's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is solely to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of South Hopkins Water District's internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering South Hopkins Water District's internal control over financial reporting and compliance.

Knight Wagner, PLLC

Madisonville, Kentucky
May 18, 2026

SOUTH HOPKINS WATER DISTRICT
Management's Discussion and Analysis
December 31, 2025 and 2024

The discussion and analysis of the South Hopkins Water District's financial performance provides an overview and analysis of the District's financial activities for the years ended December 31, 2025 and 2024. It should be read in conjunction with the accompanying basic financial statements.

Financial Highlights for the Year 2025

* The District's change in net position was a decrease of $22.1 thousand for the year ended December 31, 2025.

Overview Of The Financial Statements

This report consists of this management's discussion and analysis, basic financial statements, and notes to the financial statements. The basic financial statements are reported using the full accrual basis of accounting.

Basic financial statements:

The Statements of Net Position include information on the District's assets, deferred outflows of resources, liabilities, and deferred inflows of resources and provide information about the nature and amounts of investments in resources (assets) and the obligations to District creditors (liabilities). In simple terms, this statement presents a snapshot view of the assets the District owns, the liabilities it owes and the net difference. The net difference is further separated into amounts restricted for specific purposes and unrestricted amounts.

The Statements of Revenues, Expenses, and Changes in Net Position include the District's revenues and expenses for the years ended December 31, 2025 and 2024. This statement provides information on the District's operations and can be used to determine whether the District has recovered all of its actual and projected costs through user fees and other charges.

The Statements of Cash Flows include information on the District's cash receipts and payments and the changes in cash balances resulting from operating activities, investing activities, and financing activities.

The notes to the financial statements provide additional disclosures required by governmental accounting standards and provide information to assist the reader in understanding the District's financial condition.

District Financial Analysis

A summary of the District's Statements of Net Position is presented below.

Table 1
Condensed Statements of Net Position
(in thousands)

	2025	2024	dollar change	percent change	2023	dollar change	percent change
Current assets	$ 323.8	$ 400.7	($ 76.9)	(19.2%)	$ 446.5	($ 45.8)	(10.3%)
Capital assets	2,807.9	2,786.5	21.4	0.8%	2,574.7	211.8	8.2%
Other noncurrent assets	239.9	214.9	25.0	11.6%	139.2	75.7	54.4%
Total assets	3,371.6	3,402.1	(30.5)	(0.9%)	3,160.4	241.7	7.6%
Total deferred outflows of resources	148.7	167.1	(18.4)	(11.0%)	208.8	(41.7)	(20.0%)
Current liabilities	296.0	170.4	125.6	73.7%	184.4	(14.0)	(7.6%)
Long-term liabilities	1,499.8	1,557.7	(57.9)	(3.7%)	1,627.8	(70.1)	(4.3%)
Total liabilities	1,795.8	1,728.1	67.7	3.9%	1,812.2	(84.1)	(4.6%)
Total deferred inflows of resources	213.5	308.0	(94.5)	(30.7%)	428.5	(120.5)	(28.1%)
Net investment in capital assets	1,999.9	1,922.7	77.2	4.0%	1,659.0	263.7	15.9%
Net position restricted for water loss prevention	238.8	181.1	57.7	31.9%	76.8	104.3	135.8%
for debt service	0.0	1.8	(1.8)	(100.0%)	4.1	(2.3)	(56.1%)
for capital projects	0.0	1.6	(1.6)	(100.0%)	9.3	(7.7)	(82.8%)
Unrestricted net position	(727.7)	(574.1)	(153.6)	(26.8%)	(620.7)	46.6	7.5%
Total net position	$1,511.0	$ 1,533.1	($ 22.1)	(1.4%)	$1,128.5	$ 404.6	35.9%

Net position may serve over time as a useful indicator of a government's financial position. In the case of the District, assets and deferred outflows of resources exceeded liabilities and deferred inflows of resources by $1.511 million at the close of the current year.

2024 to 2025

As shown in table 1, the District's total assets decreased $30,500 when compared to the prior year. Current assets decreased $76,900. Cash and cash equivalents decreased $76,200. Capital assets increased $21,400 as new additions outpaced depreciation expense for the year. Other noncurrent assets increased $25,000 as restricted cash increased $43,000 due to increases in the water surcharge account and a $18,000 decrease in net OPEB asset.

Deferred outflows of resources decreased $18,400 due to changes in the District's proportional share of the County Employee Retirement System (CERS) valuation measurements for pensions and OPEB.

The District's total liabilities increased $67,800. Current liabilities increased $125,600 as accounts payable increased $126,000. Negative unrestricted cash flow due to high water loss caused past due difficulties at current year end with the District's purchased water supplier. Long-term liabilities decreased $57,800. Net pension liability, the District's proportional share as determined by valuations of the County Employee Retirement System, decreased $22,000. Bonds/loans payable decreased $55,700 as the District paid as scheduled.

Deferred inflows of resources decreased $94,500 due to changes in the District's proportional share of the County Employee Retirement System valuation measurements for pensions and OPEB.

The District's total net position decreased $22,100, which results from the net effect of the increases/decreases in total assets, deferred outflows of resources, total liabilities, and deferred inflows of resources referred to above.

2023 to 2024

As shown in table 1, the District's total assets increased $241,700 when compared to the prior year. Current assets decreased $45,700. Cash and cash equivalents increased $25,000 and inventory decreased $18,000 as the District carried less inventory on hand at current year end. Capital assets increased $212,000 as new additions outpaced depreciation expense for the year. Other noncurrent assets increased $75,600 as restricted cash increased $72,000 due to increases in the water surcharge account and $4,000 increase in net OPEB asset.

Deferred outflows of resources decreased $42,000 due to changes in the District's proportional share of the County Employee Retirement System (CERS) valuation measurements for pensions and OPEB.

The District's total liabilities decreased $84,000. Current liabilities decreased $14,000 as accounts payable decreased $17,000. Long-term liabilities decreased $70,000. Net pension liability, the District's proportional share as determined by valuations of the County Employee Retirement System, decreased $25,000. Bonds/loans payable decreased $53,500 as the District paid as scheduled.

Deferred inflows of resources decreased $120,500 due to changes in the District's proportional share of the County Employee Retirement System valuation measurements for pensions and OPEB.

The District's total net position increased $404,600, which results from the net effect of the increases/decreases in total assets, deferred outflows of resources, total liabilities, and deferred inflows of resources referred to above.

A summary of the District's Statements of Revenues, Expenses and Changes in Net Position is presented below.

Table 2
Condensed Statements of Revenues, Expenses and Changes in Net Position
(in thousands)

	2025	2024	dollar change	percent change	2023	dollar change	percent change
Operating revenues	$1,932.3	$1,815.4	$ 116.9	6.4%	$1,743.4	$ 72.0	4.1%
Nonoperating revenues	7.8	3.6	4.2	116.7%	2.9	0.7	24.1%
Total revenues	1,940.1	1,819.0	121.1	6.7%	1,746.3	72.7	4.2%
Operating expenses	2,150.7	1,815.3	335.4	18.5%	1,565.0	250.3	16.0%
Nonoperating expenses	29.3	32.0	(2.7)	(8.4%)	32.4	(0.4)	(1.2%)
Total expenses	2,180.0	1,847.3	332.7	18.0%	1,597.4	249.9	15.6%
Income before capital contributions	(239.9)	(28.3)	(211.6)	(747.7%)	148.9	(177.2)	(119.0%)
Capital contributions	217.8	432.9	(215.1)	(49.7%)	156.0	276.9	177.5%
Changes in net position	(22.1)	404.6	(426.7)	(105.5%)	304.9	99.7	32.7%
Beginning net position	1,533.2	1,128.6	404.6	35.8%	823.7	304.9	37.0%
Ending net position	$1,511.1	$1,533.2	($ 22.1)	(1.4%)	$1,128.6	$ 404.6	35.8%

2024 to 2025
The District's total revenues increased $121,100 or 6.7%. Water sales increased $132,800 as the District had an increase is sales due to a purchaced water adjustment approved during the year.

The District's operating expenses increased $335,500. Water purchases increased $275,300. The District's two water suppliers increased rates during the year which is the reason for the purchased water adjustment. The District continually suffers from high water loss which was 42.86% for the year. Salaries and wages increased $35,000. Materials and supplies expenditures decreased $53,900 during the current year.

Capital contributions decreased $215,100 from the prior year. The District received $192,400 less grant monies from the Kentucky Infrastucture Authority during the current year.

Changes in net position decreased $22,100 due to the net effect of the increased total revenues and increased total expenses mentioned above.

2023 to 2024
The District's total revenues increased $72,000 or 4.2%. Water sales increased $70,600 as more water was sold during the year.

The District's operating expenses increased $250,000. Water purchases increased $130,000 indicating the District still struggles with significant water loss. Salaries and wages increased $18,000. Materials and supplies expenditures increased $50,000 during the current year.

Capital contributions increased $276,900 from the prior year. Customer contributions increased in the current year as the Kentucky Public Service Commission ordered the establishment of a water surcharge account which is restricted to the improvement of water loss. The District also received grant monies from the Kentucky Infrastucture Authority.

Changes in net position increased $404,600 due to the net effect of the increased total revenues and increased total expenses mentioned above.

Capital Assets and Debt Administration

Capital Assets

At December 31, 2025, the District had $2,807,920 invested in capital assets, net of accumulated depreciation, including land, structures, improvements and water system, office furniture and equipment, vehicles, and machinery and equipment. This amount represents a net increase (additions, retirements, depreciation) of $22,551 from the prior year as new additions outpaced depreciation expense.

Significant additions during the year included $35,280 for meters/installation, $17,851 for line upgrades, and $15,500 for software upgrades.

At December 31, 2024, the District had $2,786,469 invested in capital assets, net of accumulated depreciation, including land, structures, improvements and water system, office furniture and equipment, vehicles, and machinery and equipment. This amount represents a net increase (additions, retirements, depreciation) of $210,688 from the prior year as new additions outpaced depreciation expense.

Significant additions during the year included $134,500 for a backhoe/loader, $54,602 for a truck, $40,347 for meters/installation, and $32,729 for pumping equipment renovation.

A comparison of the District's capital assets over the past three years is presented in Note E of the financial statements.

Long-Term Debt

At December 31, 2025, the District had $321,500 in revenue bonds outstanding which was a decrease of $28,600 from the prior year balance of $350,100. Both of the District's bond issues were paid as scheduled. At December 31, 2025, the District had $486,449 in a loan outstanding which was a decrease of $27,099 from the prior year balance of $513,548. The District's loan was paid as scheduled.

At December 31, 2024, the District had $350,100 in revenue bonds outstanding which was a decrease of $26,400 from the prior year balance of $376,500. Both of the District's bond issues were paid as scheduled. At December 31, 2024, the District had $513,548 in a loan outstanding which was a decrease of $26,632 from the prior year balance of $540,180. The District's loan was paid as scheduled.

Additional information on the District's long-term debt can be found in Note F of the financial statements.

Currently Known Facts, Decisions, or Conditions

There are no currently known facts, decisions, or conditions that District management expects to have a significant effect on financial position or results of operations.

Requests For Information

This financial report is designed to provide a general overview of the District's finances for all those with an interest in the government's finances. Questions concerning any of the information provided in this report or requests for additional information should be addressed to the South Hopkins Water District, 129 South Main Street, Dawson Springs, Kentucky 42408.

South Hopkins Water District
Statement of Net Position
December 31, 2025 and 2024

	2025	2024
Assets		
Current assets		
Cash and cash equivalents	$ 25,272	$ 101,438
Accounts receivable	198,002	188,501
Material and parts inventory	91,920	101,663
Prepaid expenses	8,651	9,142
Total current assets	323,845	400,744
Noncurrent assets		
Restricted cash and cash equivalents	239,897	196,838
Net OPEB asset	0	18,080
Capital assets:		
Nondepreciable	194,891	116,613
Depreciable, net of accumulated depreciation	2,613,029	2,669,846
Total noncurrent assets	3,047,817	3,001,377
Total assets	3,371,662	3,402,121
Deferred outflows of resources		
Deferred outflows of resources-pensions	94,357	120,765
Deferred outflows of resources-OPEB	54,382	46,296
Total deferred outflows of resources	148,739	167,061
Liabilities		
Current liabilities payable from current assets		
Accounts payable	218,458	92,210
Accrued taxes and other payables	10,879	10,394
Accumulated compensated absences	28,158	25,524
	257,495	128,128
Current liabilities payable from restricted assets		
Accrued interest payable	709	709
Loan payable	27,576	27,100
Customer deposits	10,179	14,429
	38,464	42,238
Total current liabilities	295,959	170,366
Long-term liabilities		
Loan payable	458,873	486,448
Bonds payable	321,500	350,100
Net pension liability	602,701	624,476
Net OPEB liablility	10,409	0
Customer deposits	106,381	96,671
Total long-term liabilities	1,499,864	1,557,695
Total liabilities	1,795,823	1,728,061
Deferred inflows of resources		
Deferred inflows of resources-pensions	82,509	111,252
Deferred inflows of resources-OPEB	131,021	196,717
Total deferred inflows of resources	213,530	307,969
Net Position		
Net investment in capital assets	1,999,971	1,922,811
Restricted for:		
Water loss prevention	238,794	181,059
Debt service	8	1,750
Capital projects	2	1,630
Unrestricted	(727,727)	(574,098)
Total net position	$1,511,048	$1,533,152

The accompanying notes are an integral part of these statements.

South Hopkins Water District
Statement of Revenues, Expenses and Changes in Fund Net Position
Years Ended December 31, 2025 and 2024

	2025	2024
Operating revenues		
Water sales	$1,892,957	$1,760,169
Other operating revenues	39,321	55,200
Total operating revenues	1,932,278	1,815,369
Operating expenses		
Purchased water	1,181,206	905,861
Salaries and wages	372,027	336,702
Depreciation	138,159	116,882
Employee benefits	99,321	75,149
Transportation	24,399	19,333
Contract services	27,012	27,676
Taxes	37,445	35,925
Purchased power	79,640	76,375
Materials and supplies	98,051	151,961
Insurance	44,016	41,615
Penalties	23,476	0
Miscellaneous	25,994	27,797
Total operating expenses	2,150,746	1,815,276
Operating income (loss)	(218,468)	93
Nonoperating revenues (expenses)		
Insurance recoveries	7,338	3,120
Interest income	462	452
Interest expense	(29,272)	(31,970)
Total nonoperating revenues (expenses)	(21,472)	(28,398)
Income (loss) before contributions and grants	(239,940)	(28,305)
Capital contributions-customers	124,677	125,115
Capital contributions-grants	76,506	268,915
Capital contributions-tap fees	16,653	38,869
Change in net position	(22,104)	404,594
Total net position – beginning	1,533,152	1,128,558
Total net position - ending	$1,511,048	$1,533,152

The accompanying notes are an integral part of these statements.

South Hopkins Water District
Statement of Cash Flows
Years Ended December 31, 2025 and 2024

	2025	2024
Cash flows from operating activities		
Cash received from customers	$1,871,920	$1,753,030
Cash payments to suppliers for goods and services	(1,569,769)	(1,436,953)
Cash payments to employees for services	(372,027)	(336,702)
Other operating revenues	39,321	55,200
Net cash provided (used) by operating activities	(30,555)	34,575
Cash flows from capital and related financing activities		
Insurance recoveries received	7,338	3,120
Grant proceeds received	76,506	268,915
Acquisition and construction of capital assets	(143,217)	(339,590)
Principal paid on bond maturities	(28,600)	(26,400)
Interest paid on bonds/loans	(24,624)	(26,280)
Interest paid on customer deposits	(4,648)	(5,769)
Principal paid on loans	(27,099)	(26,632)
Capital contributions received from customers	141,330	163,984
Net cash provided (used) for capital and related financing activities	(3,014)	11,348
Cash flows from investing activities		
Interest earned on bank deposits	462	452
Net cash provided (used) by investing activities	462	452
Net increase (decrease) in cash and cash equivalents	(33,107)	46,375
Cash and cash equivalents at beginning of year	298,276	251,901
Cash and cash equivalents at end of year	$ 265,169	$ 298,276
Reconciliation of operating income to net cash provided (used) by operating activities		
Operating income (loss)	($ 218,468)	$ 93
Adjustments to reconcile operating income to net cash provided by operating activities:		
Depreciation	138,159	116,337
Change in assets, outflows, liabilities, and inflows:		
(Increase) decrease in accounts receivable	(9,501)	2,967
(Increase) decrease in inventory	9,743	18,354
(Increase) decrease in prepaid expenses	491	(750)
(Increase) decrease in net OPEB asset	18,080	(4,102)
(Increase) decrease in deferred outflows-pensions	26,408	23,818
(Increase) decrease in deferred outflows-OPEB	(8,086)	17,898
Increase (decrease) in accounts payable	109,845	(5,089)
Increase (decrease) in taxes and other payables	485	(2,080)
Increase (decrease) in net pension liability	(21,775)	(25,131)
Increase (decrease) in net OPEB liability	10,409	0
Increase (decrease) in customer deposits	5,460	4,970
Increase (decrease) in accumulated compensated absences	2,634	7,822
Increase (decrease) in deferred inflows-pensions	(28,743)	(52,215)
Increase (decrease) in deferred inflows-OPEB	(65,696)	(68,317)
Total adjustments	187,913	34,482
Net cash provided (used) by operating activities	($ 30,555)	$ 34,575

The accompanying notes are an integral part of these statements.

South Hopkins Water District
Notes to Financial Statements
December 31, 2025 and 2024

NOTE A - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

The accounting policies of the South Hopkins Water District (the "District") conform to Generally Accepted Accounting Principles (GAAP) as applicable to governments. The District's reporting entity applies all relevant Governmental Accounting Standard Board (GASB) pronouncements. The following is a summary of the more significant policies:

The Financial Reporting Entity

South Hopkins Water District (the "District") was created on May 6, 1965, under the provisions of chapter 74 of the Kentucky Revised Statutes of the Commonwealth of Kentucky. The principal office of the District is located at 129 South Main Street, Dawson Springs, Kentucky. The District is composed of three commissioners who are appointed by the Hopkins County Judge Executive and provides water to its members in and around southern Hopkins County, Kentucky.

In evaluating how to define the government, for financial reporting purposes, management has considered all potential component units. The decision to include a potential component unit in the reporting entity was made by applying the criteria set forth in GASB Statements No. 14 and 61. The District has no component units.

Basis of Presentation, Measurement Focus, and Basis of Accounting

The accounts of the District are organized in accordance with the uniform system of accounts adopted by the Public Service Commission of Kentucky. Those accounts are organized on the basis of a proprietary fund type, specifically an enterprise fund. Enterprise Funds account for activities 1) that are financed with debt that is secured solely by a pledge of the net revenues from fees and charges of the activity; or 2) that are required by laws or regulations that the activities costs of providing services, including capital costs (such as depreciation or debt service), be recovered with fees and charges, rather than with taxes or similar revenues; or 3) that the pricing policies of the activity establish fees and charges designed to recover its costs, including capital costs (such as depreciation or debt service).

The transactions of the District are accounted for on a flow of economic resources measurement focus. With this measurement focus, all assets and all liabilities are included on the statement of net position. Net position is required to be displayed in three components: 1) net investment in capital assets, 2) restricted, and 3) unrestricted. Net investment in capital assets is capital assets net of accumulated depreciation and reduced by outstanding balances of any bonds, mortgages, notes or other borrowings that are attributable to the acquisition, construction, or improvement of those assets. Restricted net assets are those with constraints placed on their use by either: 1) externally imposed by creditors (such as through debt covenants), grantors, contributors, or laws or regulations of other governments, or 2) imposed by law through constitutional provisions or enabling legislation. Net position not otherwise classified as restricted, is shown as unrestricted. The statements of revenue, expenses, and changes in fund net position present increases (revenues) and decreases (expenses) in net position.

Basis of accounting refers to when revenues and expenses are recognized in the accounts and reported in the financial statements. The accounts of the District are maintained on the accrual basis of accounting. Its revenues are recognized when they are earned, and its expenses are recognized when they are incurred.

NOTE A - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES continued

Proprietary funds distinguish operating revenues and expenses from nonoperating items. Operating revenues and expenses generally result from providing services and producing and delivering goods in connection with a proprietary fund's principal ongoing operations. The principal operating revenues and expenses of the District's enterprise fund are charges to customers for sales and services, administrative expenses, and depreciation on capital assets. All revenues and expenses not meeting this definition are reported as non-operating revenues and expenses.

Unbilled water receivables for utility services provided through December 31 are included in the financial statements.

When both restricted and unrestricted resources are available for use, the District generally first uses restricted resources, then unrestricted resources as they are needed.

Cash and Cash Equivalents
All cash except for a small amount kept "on hand" is deposited in financial institutions. Deposits include interest bearing checking accounts and certificates of deposit. Unrestricted cash is available to be expended for normal operating expenses. Restricted cash is limited to payments of bond principal and interest, emergency capital improvements, and other designated purposes. Cash and cash equivalents are defined as being all monies on deposit in banks and investments with a maturity of 90 days or less. The District does not have a formal deposit and investment policy for credit risk, custodial credit risk, or limitations on deposits and investments.

Inventory
Inventory consists primarily of replacement parts and supplies. Inventory is stated at the lower of cost or market. Cost is determined primarily by the first-in, first-out method.

Capital Assets
Capital assets, which include property, plant, and equipment, are recorded at historical cost or estimated historical cost if actual historical cost is not available. Donated capital assets are recorded at estimated fair market value at the date of donation. The cost of normal maintenance and repairs that do not add to the value of the asset or materially extend asset lives are not capitalized.

Major outlays for capital assets and improvements are capitalized as projects are constructed.

Capital assets of the District are depreciated using a straight-line method over the following estimated useful lives:

Structures, improvements and water system	10 to 65 years
Furniture, machinery and equipment	3 to 20 years
Vehicles	5 to 7 years

NOTE A - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES continued

Restricted Net Position
Restricted net position is cash set aside for the repayment of debt in compliance with bond covenants and cash restricted for future operations in compliance with escrow reserve agreements.

Long-Term Liabilities
Long-term debt and other long-term obligations are reported as liabilities in the statement of net position. Long-term debt is reported at face value plus applicable issuance premiums and net of applicable discounts and deferred amounts on refunding. Discounts on debt issuances and amounts deferred on refunding are deferred and amortized as interest expense over the remaining life of the old bonds, or the life of the new bonds, whichever is shorter. Premiums on debt issuances are deferred and amortized as a reduction of interest expense over the life of the bonds.

Deferred Outflows/Inflows of Resources
In addition to assets, the statement of net position will sometimes report a separate section for the deferred outflow of resources. This separate financial statement element, *deferred outflows of resources,* represents a consumption of net position that applies to a future period(s) and so will not be recognized as an outflow of resources (expense) until then.

In addition to liabilities, the statement of net position will sometimes report a separate section for deferred inflows of resources. This separate financial statement element, *deferred inflows of resources*, represent an acquisition of net position that applies to a future period(s) and so will not be recognized as a inflow of resources (revenue) until that time.

Pensions
For purposes of measuring the net pension liability, deferred outflows of resources and deferred inflows of resources, and pension expense, information about the fiduciary net position of the County Employees Retirement System Non-Hazardous (CERS) and additions to/deductions from CERS's fiduciary net postion have been determined on the same basis as they are reported by CERS. For this purpose, benefit payments (including refunds of employee contributions) are recognized when due and payable in accordance with the benefit terms. Investments are reported at fair value.

Uncollectible Accounts
Accounts receivable are presented net of noncollectible accounts. The allowance for uncollectible accounts was $10,421 at December 31, 2025 and $9,921 at December 31, 2024.

Use of Estimates
The preparation of financial statements in accordance with accounting principles generally accepted in the United States requires management to make estimates that affect amounts reported in the financial statements during the reporting period. Actual results could differ from those estimates.

NOTE B - DEPOSITS

The District maintains deposits with depository institutions insured by the Federal Deposit Insurance Corporation (FDIC). According to law, the depository institution should pledge sufficient securities as collateral which, together with FDIC insurance, equals or exceeds the amount on deposit at all times. In order to be valid against the FDIC in the event of failure or insolvency of the depository institution, this pledge of securities should be evidenced by an agreement that is (1) in writing, (2) approved by the board of directors of the depository institution or its loan committee, which approval must be reflected in the minutes of the board or committee, and (3) an official record of the depository institution. This agreement, signed by both parties, must be sufficient to create an enforceable and perfected security interest in the collateral under Kentucky law.

Also by Kentucky law, the District is allowed to invest as specified in KRS 66.480 which includes U. S. Treasury and its Obligations, certain federal investments, repurchase agreements, commercial banks' certificates of deposits, and savings and loan deposits.

Deposits are categorized to give an indication of risk assumed by the District at the end of the year. Category 1 includes deposits that are insured, Category 2 includes collateralized deposits held by the pledging institution's trust department or agent in the District's name, and Category 3 includes uncollateralized and uninsured deposits.

On December 31, 2025 the reconciled balance of the District's deposits totaled $265,169 and the bank balances were $266,619. Of the bank balances $250,008 was covered by federal depository insurance (category 1). Also of the bank balances, $16,611 was collateralized by additional securities held by the pledging depository institution's trust department or agent in the District's name (category 2).

On December 31, 2024 the reconciled balance of the District's deposits totaled $298,276 and the bank balances were $342,023. Of the bank balances $286,621 was covered by federal depository insurance (category 1). Also of the bank balances, $55,402 remained uncollateralized.

NOTE C - PREPAID EXPENSES

Prepaid expenses include prepaid insurance which represents the amount of unexpired insurance which the District had previously paid for at the balance sheet date and prepaid employee benefits which represents the amount of employee health insurance for the one month subsequent to the balance sheet date but paid by the District as of the balance sheet date.

At December 31, 2025, the District's prepaid expenses consisted of $1,572 of insurance and $7,079 of employee benefits. At December 31, 2024, the District's prepaid expenses consisted of $1,582 of insurance and $7,560 of employee benefits.

South Hopkins Water District
Notes to Financial Statements
December 31, 2025 and 2024

NOTE D - RESTRICTED CASH AND CASH EQUIVALENTS

The District has cash set aside for the repayment of debt in compliance with bond covenants, cash restricted for future operations in compliance with escrow reserve agreements, cash set aside for future capital assets, and cash set aside for repayment of customer deposits.

Restricted balances as of December 31 are as follows:

	2025	2024
Bond and interest redemption fund	$ 8	$ 1,750
Bond depreciation fund	2	1,631
Water loss surcharge fund	238,794	181,059
Meter deposit fund	1,093	12,398
Totals	$ 239,897	$ 196,838

NOTE E - CAPITAL ASSETS

Capital asset activities for the years ended December 31, 2025 and 2024, were as follows:

	Balances 12/31/23	Transfers/ Additions	Transfers/ Retirements	Balances 12/13/24	Transfers/ Additions	Transfers/ Retirements	Balances 12/31/25
Business-type activities:							
Capital assets not being depreciated							
Land & land rights	$ 31,915	$ 0	$ 0	$ 31,915	$ 0	$ 0	$ 31,915
Construction in progress	45,900	48,510	9,712	84,698	94,713	16,435	162,976
Total	77,815	48,510	9,712	116,613	94,713	16,435	194,891
Capital assets being depreciated							
Structures, improvements, & water system	5,934,942	73,076	0	6,008,018	58,095	0	6,066,113
Office furniture & equipment	63,743	12,697	0	76,440	21,832	0	98,272
Vehicles & equipment	119,215	54,620	0	173,835	0	0	173,835
Machinery & equipment	265,971	148,924	0	414,895	1,415	0	416,310
Total	6,383,871	289,317	0	6,673,188	81,342	0	6,754,530
Total capital assets	6,461,686	337,827	9,712	6,789,801	176,055	16,435	6,949,421
Less accumulated depreciation for:							
Structures, improvements, & water system	3,516,537	96,188	545	3,612,180	98,182	0	3,710,362
Office furniture & equipment	60,600	3,219	0	63,819	6,564	0	70,383
Vehicles & equipment	119,214	3,641	0	122,855	10,924	0	133,779
Machinery & equipment	190,654	13,834	0	204,488	22,489	0	226,977
Total accumulated depreciation	3,887,005	116,882	545	4,003,342	138,159	0	4,141,501
Total business-type activities capital assets, net	$2,574,681	$ 220,945	$ 9,167	$2,786,459	$ 37,896	$ 16,435	$2,807,920

South Hopkins Water District
Notes to Financial Statements
December 31, 2025 and 2024

NOTE F - LONG-TERM LIABILITIES

Long-term liability activity

Long-term liability activity for the years ended December 31, 2025 and 2024, were as follows:

	Balances 12/31/23	Additions	Net Change	Reductions	Balances 12/31/24	Additions	Net Change	Reductions	Balances 12/31/25	Amounts Due Within One Year
Loan:										
KIA Fund B	$ 540,180	$ 0	$ 0	$ 26,632	$ 513,548	$ 0	$ 0	$ 27,099	$ 486,449	$ 27,576
Revenue Bonds:										
Series 1994A	329,000	0	0	23,000	306,000	0	0	25,000	281,000	0
Series 1994B	47,500	0	0	3,400	44,100	0	0	3,600	40,500	0
Total Bonds/Loans	916,680	0	0	53,032	863,648	0	0	55,699	807,949	27,576
Customer Deposits	106,130	13,865	0	8,895	111,100	11,520	0	6,060	116,560	10,179
Accumulated Compensated Absences	17,702	0	7,822	0	25,524	0	2,634	0	28,158	28,158
Business-type Activities Long-Term Liabilities	$1,040,512	$ 13,865	$ 7,822	$ 61,927	$1,000,272	$ 11,520	$ 2,634	$ 61,759	$ 952,667	$ 65,913

Description of debt

Waterworks Revenue Bonds, 1994 Series A and B

A bond resolution dated November 29, 1994 authorized issuance of $670,000 (Series A) and $100,000 (Series B) of waterworks revenue bonds maturing in annual installments through year 2035. Interest is payable semi-annually on January 1 and July 1 at 4.5% per annum and principal is payable annually on January 1.

The 1994 Series Bonds were issued and sold to the United States Department of Agriculture/Rural Development (formerly Rural Economic and Community Development). The bond resolutions provide for all revenue receipts to be deposited into a Water Revenue Fund with transfers to the following funds:

a) Waterworks Bond and Interest Sinking Fund - Prorata monthly transfers of an amount equal to the next principal and/or interest payments.
b) Depreciation Fund - Monthly transfers of $380 until the fund equals at least $45,600.
c) Operation and Maintenance Fund - Monthly transfers of an amount equal to the monthly expense disbursement of the District.
d) After meeting all the requirements of a) through c) above, the balance remaining in the Revenue Fund is to be transferred to the Depreciation Fund.

Withdrawals from the Depreciation Fund can be authorized by the commissioners for the cost of unusual or extraordinary maintenance, repairs, renewals, and replacements, including extensions and additions, not included in the annual budget of current expenses.

NOTE F - LONG-TERM LIABILITIES continued

KIA "Fund B" Loan

The District entered an assistance agreement dated December 1, 2017 with the Kentucky Infrastucture Authority for a $765,000 loan to renovate water tanks. Principal will be payable semi-annually on June 1 and December 1 of each year. Principal payments began December 1, 2021 and will be payable June 1 and December 1 each year. Interest is payable semi-annually on June 1 and December 1 at 1.75% per annum. At December 31, 2025, the District has drawn $604,132 of the loan.

The assistance agreement provides that the following fund be created:
a) Replacement Reserve Account - Annual transfers of $1,900 until the fund equals at least $38,000.

Debt Maturity

Annual debt service requirements at December 31, 2025 are as follows:

Year Ended December 31	Business-type Activities Principal	Interest
2026	$ 27,576	$ 8,393
2027	56,761	22,376
2028	59,454	20,591
2029	61,156	18,698
2030	63,766	16,743
2031-2035	351,412	51,229
2036-2040	169,996	9,848
2041	17,828	156
Totals	$ 807,949	$ 148,034

NOTE G - ACCUMULATED COMPENSATED ABSENCES

It is the District's policy to permit employees to accumulate a limited amount of earned but unused sick leave.

NOTE H - EMPLOYEES' PENSION PLAN

General Information about the Pension Plan
Plan Description. The District and covered employees contribute to the County Employers Retirement System (CERS), a cost-sharing, multiple-employer defined benefit plan administered by the Board of Trustees of the Kentucky Public Pensions Authority (KPPA). The KPPA is the successor to Kentucky Retirement Systems and was created by state statute under Kentucky Revised Statute Section 61.645 as amended by House Bill 484 and House Bill 9 of the 2020 and 2021 regular sessions, respectively, of the Kentucky General Assembly. These amendments transferred governance of the CERS to a separate nine member board of trustees. The CERS Board of Trustees is reponsible for the proper operation and administration of the CERS. The KPPA issues a

NOTE H - EMPLOYEES' PENSION PLAN continued

publicly available financial report that can be obtained by writing to Kentucky Public Pensions Authority, Perimeter Park West 1260 Louisville Road, Frankfort, Kentucky 40601 or by calling (502) 564-4646.

Benefits provided. Kentucky Revised Statue Section 61.645 establishes the benefit terms and can be amended only by the Kentucky General Assembly. The plan provides for retirement, disability, and death benefits to plan members. Retirement benefits may be extended to beneficiaries of plan members under circumstances. Cost-of-living adjustments are provided at the discretion of the State legislature. There are currently three benefit tiers. Tier 1 members are those participating in the plan before 9/1/2008, Tier 2 members are those that began participation 9/1/2008 through 12/31/2013, and Tier 3 are those members that began participation on or after 1/1/2014.

Benefits provided-non hazardous. Tier 1 non-hazardous members are eligible to retire with an unreduced benefit at age 65 with four years of service credit or after 27 years of service credit regardless of age. Benefits are determined by a formula using the member's highest five consecutive year average compensation, which must contain at least 48 months. Reduced benefits for early retirement are available prior to age 65 with at least 25 but less than 27 years of service credit and at age 55 with at least 5 years of service credit. Members vest with five years of service credit. Service related disability benefits are provided after five years of service. Tier 2 non-hazardous members are eligible to retire based on the rule of 87: the member must be at least age 57 and age + earned service must equal 87 years at retirement or at age 65 with five years of service credit. Benefits are determined by a formula using the member's highest five consecutive year average compensation, which must be 60 months. Reduced benefits for early retirement are available at age 60 with 10 years of service. Tier 3 non-hazardous members are also eligible to retire based on the rule of 87. Benefits are determined by a life annuity calculated in accordance with actuarial assumptions and methods adopted by the KPPA board based on a member's accumulated account balance. Tier 3 members are not eligible for reduced retirement benefits.

Contributions. Contributions for employees are established in the statutes governing the KPPA and may only be changed by the Kentucky General Assembly. Non-Hazardous employees contribute 5% of salary if they were plan members prior to September 1, 2008. Non-Hazardous employees that entered the plan after September 1, 2008, are required to contribute 6% of their annual creditable compensation. The District is required to contribute at an actuarial determined rate. The District was required to contribute 18.62% or $33,908 of each employee's creditable compensation for the last six months of the year ended December 31, 2025. Of the 18.62%, 18.62% or $33,908 was comprised of amounts for pensions. The District was required to contribute 19.71% or $71,110 of each employee's creditable compensation for the first six months of the year ended December 31, 2025 and for the final six months of the year ended December 31, 2024. Of the 19.71%, 19.71% or $71,110 was comprised of amounts for pensions. The District was required to contribute 23.34% or $76,513 of each employee's creditable compensation for the first six months of the year ended December 31, 2024 and for the final six months of the year ended December 31, 2023. Of the 23.34%, 23.34% or $76,513 was comprised of amounts for pensions. The District was required to contribute 26.79% or $39,002 of each employee's creditable compensation for the first six months of the year ended December 31, 2023. Of the 26.79%, 23.40% or $34,066 was comprised of amounts for pensions. The District's payable to the plan at December 31, 2025 and 2024 was $6,570 and $7,451, respectively, which consisted of employees' withholdings and legally required contributions for the month of December.

NOTE H - EMPLOYEES' PENSION PLAN continued

Pension Liabilities, Pension Expense, and Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions

At December 31, 2025, the District reported a liability of $602,701 for its proportionate share of the net pension liability. For financial reporting, the actuarial valution as of June 30, 2025, was performed by Gabriel Roeder Smith (GRS). The total pension liability, net pension liability, and sensitivity information as of June 30, 2025 were based on an actuarial valuation as of June 30, 2024. The total pension liability was rolled-forward from the valuation date (June 30, 2024) to the plan's fiscal year ending June 30, 2025, using generally accepted accuarial principles. At December 31, 2024, the District reported a liability of $624,476 for its proportionate share of the net pension liability. For financial reporting, the actuarial valution as of June 30, 2024, was performed by Gabriel Roeder Smith (GRS). The total pension liability, net pension liability, and sensitivity information as of June 30, 2024 were based on an actuarial valuation as of June 30, 2023. The total pension liability was rolled-forward from the valuation date (June 30, 2023) to the plan's fiscal year ending June 30, 2024, using generally accepted accuarial principles.

For the year ended December 31, 2025, the District recognized pension expense of $45,636. For the year ended December 31, 2024, the District recognized pension expense of $19,942. At December 31, 2025 and 2024, the District reported deferred outflows of resources and deferred inflows of resources related to pensions from the following sources:

	12/31/2025		12/31/2024	
	Deferred Outflows of Resources	Deferred Inflows of Resources	Deferred Outflows of Resources	Deferred Inflows of Resources
Net difference between projected and actual earnings on pension plan investments	$ 19,981	$ -	$ 42,887	$ 83,038
Net difference between expected and actual experience	22,243	82,509	30,226	-
Changes in proportional and differences between employer contributions and proportional share of contributions	18,225	-	12,379	-
Change of assumptions	-	-	-	28,214
District contributions subsequent to the measurement date	33,908	-	35,273	-
Total	$ 94,357	$ 82,509	$ 120,765	$ 111,252

$33,908 reported as deferred outflows of resources related to pensions resulting from District contributions subsequent to the measurement date will be recognized as a reduction of the net pension liability in the year ended December 31, 2026. Other amounts reported as deferred outflows of resources and deferred inflows of resources related to pensions will be recognized in pension expense as follows:

Year ended December 31:	
2026	$ 23,376
2027	(15,551)
2028	(19,584)
2029	(10,301)

NOTE H - EMPLOYEES' PENSION PLAN continued

Actuarial assumptions. There have been no actuarial assumption or method changes since June 30, 2024. The assumptions based on June 30, 2024 are:

2024	
Inflation	2.50%
Salary increases	3.30% to 10.30%, varies by service
Investment rate of return	6.50%
Payroll growth rate	2.00%

During the 2018 legislation session, House Bill 185 was recommended, which updated the benefit provisions for active members who die in the line of duty. Benefits paid to the spouses of deceased members have been increased from 25% of the member's final rate of pay to 75% of the member's average pay. If the member does not have a surviving spouse, benefits paid to surviving dependent children have been increased from the 10% of the member's final pay to 50% of average pay for one child, 65% of average pay for two children, or 75% of average pay for three children.

Senate Bill 249 passed during the 2020 legislation session changed the funding period for the amortization of the unfunded liability to 30 years as of June 30, 2019. Gains and losses incurred in future years will be amortized over separate 20-year amortization bases. This change does not impact the calculation of the Total Pension Liability and only impacts the calculation of the contribution rates that would be payable starting July 1, 2020. There were no other material plan provision changes.

The mortality table used for active members was a 2020 system-specific mortality table projected with the ultimate rates from the MP-2020 mortality improvement scale using a base year of 2023. The mortality table used for healthy retired members was a system specific mortality table based on mortality experience from 2013-2022, projected with the ultimate rates from MP-2020 mortality improvement scale using a base year of 2023. The mortality table used for the disabled members was a system-specific mortality table based on mortality experience from the 2013-2022 projected with the ultimate rates from the MP-2020 mortality improvement scale using a base year of 2023.

The long-term expected rate of return was determined by using a building-block method in which best-estimate ranges of expected future real rate of returns are developed for each asset class. The ranges are combined by weighting the expected future real rate of return by the target asset allocation percentage.

South Hopkins Water District
Notes to Financial Statements
December 31, 2025 and 2024

NOTE H - EMPLOYEES' PENSION PLAN continued

The target asset allocation and best estimates of arithmetic real rates of return for each major asset class are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return
Equity		
Public Equity	45.00%	4.15%
Priviate Equity	8.00%	7.90%
Fixed Income		
Core Fixed Income	13.00%	2.70%
Specialty Credit	20.00%	3.83%
Cash	2.00%	1.25%
Inflation Protected		
Real Estate	5.00%	4.75%
Real Return	7.00%	5.20%
Expected real return	100.00%	4.24%
Long term inflation assumption		2.50%
Expected nominal return for porfolio		6.74%

Discount rate. For CERS, the discount rate used to measure the total pension liability was 6.50%. The projection of cash flows used to determine the discount rate assumed that local employers would contribute the required employee contributions each future year, as determined by the current funding policy established in statute as last amended by House Bill 8 (passed in 2021). The discount rate does not use a municipal bond rate. The target asset allocation and best estimates of arithmetic nominal real rates of return for each major asset class are summarized in the KPPA financial report.

Sensitivity of the District's proportionate share of the net pension liability to changes in the discount rate. The following presents the District's proportionate share of the net pension liability calculated using the discount rate of 6.50% for June 30, 2025 and 6.50% for June 30, 2024, as well as what the District's proportionate share of the net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (5.50% and 5.50%) or 1-percentage-point higher (7.50% amd 7.50%) than the current rate.

	1% Decrease (5.50%)	Discount Rate (6.50%)	1% Increase (7.50%)
District's 2025 proportionate share of the net pension liability	$ 796,810	$ 602,701	$ 442,555

	1% Decrease (5.50%)	Discount Rate (6.50%)	1% Increase (7.50%)
District's 2024 proportionate share of the net pension liability	$ 805,051	$ 624,476	$ 474,646

Pension plan fiduciary net position. Detailed information about the pension plan's fiduciary net position is available in the separately issued financial report of CERS.

NOTE I – OTHER POST EMPLOYMENT BENEFITS (OPEB)

General Information about the OPEB Plan

Plan Description. Employees of the District are provided hospital and medical insurance through the Kentucky Public Pensions Authority's County Employees' Retirement Insurance Fund (Insurance Fund), a cost-sharing, multi-employer defined benefit OPEB plan. The KPPA was created by State stutute under the Kentucky Revised Statute Section 61.645. The CERS Board of Trustees is responsible for the proper operation and administration of the CERS. The KPPA issues a publicly available financial report that can be obtained by writing to Kentucky Public Pension Authority, Perimeter Park West 1260 Louisville Road, Frankfort, Kentucky 40601 or by calling (502) 564-4646.

Benefits provided. The Insurance Fund pays a prescribed contribution for whole or partial payment of required premiums to purchase hospital and medical insurance. As a result of House Bill 290 (2004 Kentucky General Assembly), medical insurance benefits are calculated differently for members who began participating on, or after, July 1, 2003. Once members reach a minimum vesting period of 10 years, non-hazardous employees whose participation began on, or after, July 1, 2003, earn $10 per month for insurance benefits at retirement for every year of earned service without regard to a maximum dollar amount.

Contributions. Contribution requirements of the participating employers are established and may be amended by the CERS Board of Trustees. Employees that entered the plan prior to September 1, 2008, are not required to contribute to the Insurance Fund. Employees that entered the plan after September 1, 2008, are required to contribute 1% of their annual creditable compensation which is deposited to an account created for the payment of health insurance benefits under 26 USC Section 401(h) in the Pension Fund. The District is required to contribute at an actuarial determined rate. The District was required to contribute 18.62% or $33,908 of each employee's creditable compensation for the last six months of the year ended December 31, 2025. Of the 18.62%, 0.00% or $0 was comprised of amounts for insurance. The District was required to contribute 19.71% or $71,110 of each employee's creditable compensation for the first six months of the year ended December 31, 2025 and for the final six months of the year ended December 31, 2024. Of the 19.71%, 0% or $0 was comprised of amounts for insurance. The District was required to contribute 23.34% or $76,513 of each employee's creditable compensation for the first six months of the year ended December 31, 2024 and for the final six months of the year ended December 31, 2023. Of the 23.34%, 0% or $0 was comprised of amounts for insurance. The District was required to contribute 26.79% or $39,002 of each employee's creditable compensation for the first six months of the year ended December 31, 2023. Of the 26.79%, 3.39% or $4,935 was comprised of amounts for insurance. The District's payable to the plan at December 31, 2025 and 2024 was $6,570 and $7,451, respectively, which consisted of employees' withholdings and legally required contributions for the month of December.

OPEB Liabilities, OPEB Expense, and Deferred Outflows of Resources and Deferred Inflows of Resources Related to OPEB

At December 31, 2025, the District reported a liability of $10,409 for its proportionate share of the net OPEB asset/liability. For financial reporting, the actuarial valuation as of June 30, 2025, was performed by Gabriel Roeder Smith (GRS). The total OPEB expense, net OPEB asset/liability, and sensitivity information as of June 30, 2025 were based on an actuarial valuation date as of June 30, 2024. The total OPEB liability was rolled-forward from the valuation date (June 30, 2024) to the plan's fiscal year ending June 30, 2025 using generally accepted accruarial principles. At December 31, 2024, the District reported an asset of $18,080 for its proportionate share of the net OPEB asset/liability. For financial reporting, the actuarial valuation as of June 30, 2024, was performed by Gabriel Roeder Smith (GRS). The total OPEB expense, net OPEB asset/liability,

NOTE I – OTHER POST EMPLOYMENT BENEFITS (OPEB) continued

and sensitivity information as of June 30, 2024 were based on an actuarial valuation date as of June 30, 2023. The total OPEB liability was rolled-forward from the valuation date (June 30, 2023) to the plan's fiscal year ending June 30, 2024 using generally accepted accruarial principles.

For the year ended December 31, 2025, the District recognized OPEB expense of ($40,247). For the year ended December 31, 2024, the District recognized OPEB expense of ($49,603). At December 31, 2025 and 2024, the District reported deferred outflows of resources and deferred inflows of resources related to OPEB from the following sources:

	12/31/2025		12/31/2024	
	Deferred Outflows of Resources	Deferred Inflows of Resources	Defered Outflows of Resources	Deferred Inflows of Resources
Net difference between projected and actual earnings on OPEB plan investments	$ 33,760	$ 89,488	$ 15,893	$ 32,392
Net difference between expected and actual experience	8,240	31,813	10,031	142,253
Changes in proportional and differences between employer contributions and proportional share of contributions	5,439	3,760	3,989	9,315
Change of assumptions	6,943	5,960	16,383	12,757
District contributions subsequent to the measurement date	-	-	-	-
Total	$ 54,382	$ 131,021	$ 46,296	$ 196,717

$0 reported as deferred outflows of resources related to OPEB resulting from District contributions subsequent to the measurement date will be recognized as a reduction of the net OPEB liability in the year ended December 31, 2026. Other amounts reported as deferred outflows of resources and deferred inflows of resources related to OPEB will be recognized in OPEB expense as follows:

Year ended December 31:	
2026	($ 45,404)
2027	(35,945)
2028	3,034
2029	1,676

Actuarial assumptions.
Actuarial assumptions as of December 31, 2025 and 2024 were determined using the following updated assumptions:

2024	
Payroll growth rate	2.00%
Inflation	2.50%
Salary increases	3.30% to 10.30%, varies by service
Investment rate of return	6.50%
Healthcare cost trend rates (pre-65)	Initial trend starting at 6.80% and gradually decreasing to an ultimate trend rate of 4.05% over a period of 13 years
Healthcare cost trend rates (post-65)	Initial trend starting at 8.50% and gradually decreasing to an ultimate trend rate of 4.05% over a period of 11 years

NOTE I – OTHER POST EMPLOYMENT BENEFITS (OPEB) continued

Senate Bill 10 passed during the 2025 legislation session increased the insurance benefits for members who began participation on or after July 1, 2003 to $40 a month for non-hazardous CERS service effective January 1, 2026. These increases are only payable when a member is not eligible for Medicare benefits and only if they have met certain service thresholds at retirement.

Senate Bill 209 passed during the 2022 legislation session and increased the insurance dollar contribution for members hired on or after July 1, 2003 by $5 for each year of service a member attains over certain thresholds, depending on a member's retirement eligibility requirement. This increase in the insurance dollar contribution does not increase by 1.5% annuallly and is only payable for non-Medicare retirees. Additionally, it is only payable when the member's applicable insurance fund is at least 90% funded. The increase is first payable January 1, 2023. Senate Bill 209 also allows members receiving the insurance dollar contribution to participate in a medical insurance reimbursement plan that would provide the reimbursement of premiums for health plans other than those administered by KPPA.

Senate Bill 169 passed during the 2021 legislative session changed the disability benefits for certain qualifying members who become "totally and permanently disabled" in the line of duty or as a result of a duty-related disability. The total OPEB liability as of June 30, 2021, is determined using the updated benefit provisions. There were no other material plan provision changes.

The mortality table used for active members was a system-specific mortality table for the Non-Hazardous System, projected with the ultimate rates from the MP-2020 mortality improvement scale using a base year of 2023. The mortality table used for healthy retired members was a system specific mortality table based on mortality experience projected with the ultimate rates from MP-2020 mortality improvement scale using a base year of 2023. The mortality table used for the disabled members was projected with the ultimate rates from the MP-2020 mortality improvement scale using a base year of 2023.

The long-term expected rate of return was determined by using a building-block method in which best-estimate ranges of expected future real rate of returns are developed for each asset class. The ranges are combined by weighting the expected future real rate of return by the target asset allocation percentage.

NOTE I – OTHER POST EMPLOYMENT BENEFITS (OPEB) continued

The target asset allocation and best estimates of arithmetic real rates of return for each major asset class are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return
Equity		
Public Equity	45.00%	4.15%
Priviate Equity	8.00%	7.90%
Fixed Income		
Core Fixed Income	13.00%	2.70%
Specialty Credit	20.00%	3.83%
Cash	2.00%	1.25%
Inflation Protected		
Real Estate	5.00%	4.75%
Real Return	7.00%	5.20%
Expected real return	100.00%	4.24%
Long term inflation assumption	=========	2.50%
Expected nominal return for porfolio		6.74%

For 2025 and 2024, the discount rate used to measure the total OPEB liability was 6.26% and 5.99%, respectively. The discount rate is based on the expected rate of return on OPEB plan investments of 6.50% and 6.50%, respoectively, and a municipal bond rate of 5.20% and 3.97%, respectively, as reported in Fidelity Index's "20-year Municipal GO AA Index" as of June 30, 2025 and June 30, 2024. Based on the stated assumptions and the projection of cash flows as of each fiscal year ending, the plan's fiduciary net position and future contributions were projected to be sufficient to finance future benefit payments of current plan members. Therefore, the long-term expected rate of return on insurance plan investments was applied to all periods of the projected benefit payments paid from the plan.

However, the cost associated with the implicit employer subsidy was not included in the calculation of the plan's actuarial determined contributions, and any cost associated with the implicit subsidy will not be paid out of the plan's trusts. Therefore, the municipal bond rate was applied to future expected benefit payments associated with the implicit subsidy.

The projection of cash flows used to determine the single discount rate must include an assumption regarding actual employer contributions made each future year. Future contributions are projected assuming that each participating employer in each insurance plan contributes the actuarially determined employer contributions each future year calculated in accordance with the current funding policy, as most recently revised by House Bill 8, passed during the 2021 legislative session. The assumed future employer contributions reflect the provisions of House Bill 362 (passed during the 2018 legislative session) which limit the increases to the employer contribution rates to 12% over the fiscal year through June 30, 2028.

Discount rate. For CERS, the discount rate used to measure the total OPEB liability was 6.26% for 2025 and 5.99% for 2024.

NOTE I – OTHER POST EMPLOYMENT BENEFITS (OPEB) continued

Sensitivity of the District's proportionate share of the net OPEB liability to changes in the discount rate. The following presents the District's proportionate share of the net OPEB (asset)/liability calculated using the discount rate of 6.26% for June 30, 2025 and 5.99% for June 30, 2024 as well as what the District's proportionate share of the net OPEB liability would be if it were calculated using a discount rate that is 1-percentage-point lower (5.26% and 4.99%) or 1-percentage-point higher (7.26% and 6.99%) than the current rate.

	1% Decrease (5.26%)	Discount Rate (6.26%)	1% Increase (7.26%)
District's 2025 proportionate share of the net OPEB liability	$ 62,458	$ 10,409	($ 33,398)

	1% Decrease (4.99%)	Discount Rate (5.99%)	1% Increase (6.99%)
District's 2024 proportionate share of the net OPEB liability	$ 24,446	($ 18,080)	($ 53,836)

Sensitivity of the District's proportionate share of the net OPEB liability to changes in the healthcare cost trend rate. The following presents the District's proportionate share of the net OPEB (asset)/liability calculated using the healthcare cost trend rate, as well as what the District's proportionate share of the net OPEB (asset)/liability would be if it were calculated using a healthcare cost trend that is 1-percentage-point lower or 1-percentage-point higher than the current rate.

	1% Decrease (5.8% & 7.5% decreasing to 3.05%)	Discount Rate (6.8% & 8.5% decreasing to 4.05%)	1% Increase (7.8% & 9.5% decreasing to 5.05%)
District's 2025 proportionate share of the net OPEB liability	($ 24,055)	$ 10,409	$ 50,755

	1% Decrease (5.2% & 8.0% decreasing to 3.05%)	Discount Rate (6.2% & 9.0% decreasing to 4.05%)	1% Increase (7.2% & 10.0% decreasing to 5.05%)
District's 2024 proportionate share of the net OPEB liability	($ 43,498)	($ 18,080)	$ 11,530

OPEB plan fiduciary net position. Detailed information about the OPEB plan's fiduciary net position is available in the separately issued financial report of CERS.

NOTE J - RISK MANAGEMENT

The District is exposed to various risks of losses related to torts; theft of, damage to, and destruction of assets; errors and omissions; and injuries to employees. The District purchases commercial insurance for all risks of losses. Settlements resulting from these risks have not exceeded commercial insurance coverage in any of the past three fiscal years.

NOTE K - MAJOR SUPPLIER

The District purchases 98% of water resold from the City of Dawson Springs, Kentucky.

NOTE L – GRANTS

During the year ended December 31, 2025, the District received $76,506 from the Kentucky Infrastucture Authority's Kentucky Cleaner Water Program (CWP). The CWP was provided through the Federal American Rescue Plan Act of 2021, Coronavirus State Fiscal Recovery Fund. The grant monies were expended on equipment and project costs.

During the year ended December 31, 2024, the District received $268,915 from the Kentucky Infrastucture Authority's Kentucky Cleaner Water Program (CWP). The CWP was provided through the Federal American Rescue Plan Act of 2021, Coronavirus State Fiscal Recovery Fund. The grant monies were expended on equipment and project costs.

NOTE M – WATER LOSS, PENALTIES, AND NEGATIVE CASH FLOW

The District's unaccounted for water loss has steadily risen over the past few years primarily due to aging infrastucture and storage facilities. The average water loss for 2025 was 42.86%. Negative cash flow caused by the high water loss has led to incurring late payment penalties with the District's primary water supplier. $23,476 of late payment penalties were incurred in 2025.

Beginning in 2023, the Kentucky Public Service Commission (PSC) ordered assessment of a monthly Water Loss Reduction Surcharge per active meter. These amounts are separated into an account to only be used (with PSC approval) for water loss detection and prevention. PSC also ordered establishment of a Comprehensive Corrective Action Plan focused on improving and replacing infrastucture and increasing the operational loss reduction capacity. Major items of work include replacement of oldest service lines, replacement of meters with radio-read meters, hiring of staff or contractors for leak detection, purhase of listening devices, and purchase of equipment needed to maintain daily operations and reduce repair times.

Required Supplementary Information

South Hopkins Water District
Schedule of Proportionate Share of the Net Pension Liability
December 31, 2025 and 2024

	Last 10 Fiscal Years (Dollar amounts in thousands)									
	2025	2024	2023	2022	2021	2020	2019	2018	2017	2016
Total net pension liability for County Employees' Retirement System	$7,967,788	$8,552,429	$9,112,465	$10,280,470	$9,037,944	$10,684,945	$9,795,340	$8,508,762	$8,090,586	$6,639,560
District's proportionate share of the net pension liability (asset)	0.010831%	0.010442%	0.010124%	0.010046%	0.011121%	0.011107%	0.011036%	0.012127%	0.013056%	0.013280%
District's proportionate share of the net pension liability (asset)	$603	$624	$650	$726	$709	$852	$776	$739	$764	$654
District's covered-employer payroll	$364	$343	$310	$280	$280	$292	$279	$295	$304	$317
District's proportionate share of the net pension liability (asset) as a percentage of its covered-employer payroll	165.66%	181.92%	209.73%	259.62%	253.21%	291.78%	278.09%	250.28%	251.50%	206.52%
Total pension plan's fiduciary net position	$14,286,594	$13,013,141	$11,707,789	$10,681,820	$11,480,060	$9,407,031	$9,573,629	$9,367,300	$8,905,233	$8,151,568
Total pension plan's pension liability	$22,254,382	$21,565,570	$20,820,254	$20,962,290	$20,518,004	$20,091,976	$19,368,969	$17,876,062	$16,995,819	$14,791,128
Total pension plan's fiduciary net position as a percentage of the total pension liability	64.20%	60.34%	56.23%	50.96%	55.95%	46.82%	49.43%	52.40%	52.40%	55.11%

Note: This schedule is intended to present a 10-year trend per GASB 68.

The accompanying notes are an integral part of these financial statements.

South Hopkins Water District
Schedule of District Contributions-Pension Plan
December 31, 2025 and 2024

	2025	2024	2023	2022	2021	2020	2019	2018	2017	2016
Actuarially determined contribution	$69,745	$76,513	$72,381	$64,642	$56,715	$56,382	$49,717	$45,227	$43,522	$44,091
Contributions in relation to the actuarially determined contribution	69,745	76,513	72,381	64,642	56,715	56,382	49,717	45,227	43,522	44,091
Contribution deficiency (excess)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
District's covered-employee payroll	$363,928	$342,619	$309,742	$279,732	$279,585	$292,133	$279,111	$295,095	$303,864	$316,629
Contributions as a percentage of covered-employee payroll	19.16%	22.33%	23.37%	23.11%	20.29%	19.30%	17.81%	15.33%	14.32%	13.93%

Note: This schedule is intended to present a 10-year trend per GASB 68.

The County Employees Retirement System measurement date is 6 months prior to the District's Financial Statements; the 2025 measurement date is 06/30/2025.

The accompanying notes are an integral part of these financial statements.

South Hopkins Water District
Schedule of Proportionate Share of the Net OPEB Liability
December 31, 2025 and 2024

	Last 10 Fiscal Years (Dollar amounts in thousands)								
	2025	2024	2023	2022	2021	2020	2019	2018	2017
Total net OPEB liability (asset) for County Employees' Retirement System	$378,706	-$51,677	-$1,244	$2,825,300	$2,723,009	$3,338,801	$2,421,815	$2,488,439	$2,837,014
District's proportionate share of the net OPEB liability (asset)	0.010831%	0.010442%	0.010124%	0.010045%	0.011121%	0.011104%	0.011036%	0.012127%	0.013056%
District's proportionate share of the net OPEB liability (asset)	$10	-$18	-$14	$198	$213	$268	$186	$215	$262
District's covered-employer payroll	$364	$343	$310	$280	$280	$292	$279	$295	$304
District's proportionate share of the net OPEB liability (asset) as a percentage of its covered-employer payroll	2.75%	-5.25%	-4.51%	70.87%	76.07%	91.78%	66.49%	72.96%	86.38%
Total OPEB plan's fiduciary net position	$5,873,320	$5,459,643	$5,032,567	$4,602,655	$4,874,625	$3,902,730	$3,910,225	$3,695,108	$3,401,537
Total OPEB plan's OPEB liability	$6,252,026	$5,407,966	$5,031,323	$7,427,955	$7,597,634	$7,241,531	$6,332,040	$6,183,547	$6,238,551
Total OPEB plan's fiduciary net position as a percentage of the total OPEB liability	93.94%	100.96%	100.02%	61.96%	64.16%	53.89%	61.75%	59.76%	55.42%

Note: This schedule is intended to present a 10-year trend per GASB 75. Additional years will be reported as incurred.

The accompanying notes are an integral part of these financial statements.

South Hopkins Water District
Schedule of District Contributions-OPEB Plan
December 31, 2025 and 2024

	2025	2024	2023	2022	2021	2020	2019	2018	2017
Actuarially determined contribution	$0	$0	$4,935	$10,508	$14,811	$13,906	$13,960	$14,673	$14,328
Contributions in relation to the actuarially determined contribution	0	0	4,935	10,508	14,811	13,906	13,960	14,673	14,328
Contribution deficiency (excess)	$0	$0	$0	$0	$0	$0	$0	$0	$0
District's covered-employee payroll	$363,928	$342,619	$309,742	$279,732	$279,585	$292,133	$279,111	$295,095	$303,864
Contributions as a percentage of covered-employee payroll	0.00%	0.00%	1.59%	3.76%	5.30%	4.76%	5.00%	4.97%	4.72%

Note: This schedule is intended to present a 10-year trend per GASB 75. Additional years will be reported as incurred.

The County Employees Retirement System measurement date is 6 months prior to the District's Financial Statements; the 2025 measurement date is 06/30/2025.

The accompanying notes are an integral part of these financial statements.

South Hopkins Water District
Notes to Required Supplementary Information (RSI) on Pension and OPEB Schedules
December 31, 2025 and 2024

NOTE A – COUNTY EMPLOYEES' RETIREMENT SYSTEM (CERS) PENSION PLAN AND OTHER POSTEMPLOYMENT BENEFITS (OPEB) PLAN

Pension Plan

Changes of benefit terms: During the 2018 legislative session, House Bill 185 was enacted, which updated the benefit provisions for active members who die in the line of duty. Benefits paid to the spouses of deceased members have been increased from 25% of the member's final pay to 75% of the member's average pay. If the member does not have a surviving spouse, benefits paid to surviving dependent children have been increased from 10% of member's final pay to 50% of average pay for one child, 65% over average pay for two children, of 75% of average pay for three children. The Total Pension Liability beginning June 30, 2018 is determined using these updated benefit provisions.

Changes of assumptions: In the June 30, 2020, 2019, 2017, and 2015 actuarial valuations, the following changes in actuarial assumptions were made:

	June 30, 2024	June 30, 2019	June 30, 2017	June 30, 2015	June 30, 2014
Inflation	2.30%	2.30%	2.30%	3.25%	3.50%
Payroll Growth	2.00%	2.00%	0.75%	0.75%	1.00%
Salary Increases			3.05%		
Non-hazardous	3.30% to 10.30%	3.30% to 10.30%			
Investment Rate of Return	6.50%	6.25%	6.25%	7.50%	7.75%

In the June 30, 2019 actuarial valuation, the mortality table used for active members was a Pub-2010 General Mortality table, for the Non-Hazardous System, projected with the ultimate rates from MP-2014 mortality improvement scale using a base year of 2010. The mortality table used for healthy retired members was a system specific mortality table based on mortality experience from 2013-2018, projected with the ultimate rates from MP-2014 mortality improvement scale using a base year of 2019. The mortality table used for the disabled members was PUB-2010 Disabled Mortality table, with a 4-year set-forward for both male and female rates, projected with the ultimate rates from the MP-2014 mortality improvement scale using a base year of 2010.

Beginning with the June 30, 2015 actuarial valuation, the mortality table used for active members is RP-2000 Combined Mortality Table projected with Scale BB to 2013 (multiplied by 50% for males and 30% for females). For healthy retired members and beneficiaries, the mortality table used is the RP-2000 Combined Mortality Table projected with Scale BB to 2013 (set back one year for females). For disabled members, the RP-2000 Combined Disabled Mortality Table projected with Scale BB to 2013 (set back four years for males) is used for the period after disability retirment.

For periods prior to the June 30, 2015 actuarial valuation, the rates of mortality for the period after service retirement are according to the 1983 Group Annuity Mortality Table for all retired members and beneficiaries as of June 30, 2006 and the 1994 Group Annuity Mortality Table for all other members. The Group Annuity Mortality Table set forward five years was used for the period after disability retirement.

Other Postemployment Benefits Plan

Changes in benefit terms: During the 2018 legislative session, House Bill 185 was enacted, which updated the benefit provisions for active members who die in the line of duty. The system shall now pay 100% of the

NOTE A – COUNTY EMPLOYEES' RETIREMENT SYSTEM (CERS) PENSION PLAN AND OTHER POSTEMPLOYMENT BENEFITS (OPEB) PLAN continued

insurance premium for spouses and children of all active members who die in the line of duty. The Total OPEB Liability beginning June 30, 2018 is determined using these updated benefit provisions.

Changes in Assumptions: In the June 30, 2023, 2019, 2017 actuarial valuation, the following changes in actuarial assumptions were made:

	June 30, 2023	June 30, 2019	June 30, 2017
Inflation	2.30%	2.30%	2.30%
Payroll Growth	2.00%	2.00%	0.75%
Salary Increases			3.05%
Non-hazardous	3.30 to 10.30%	3.30% to 10.30%	
Investment Rate of Return	6.50%	6.25%	6.25%

Senate Bill 10 passed during the 2025 legislation session increased the insurance benefits for members who began participation on or after July 1, 2003 to $40 a month for non-hazardous CERS service effective January 1, 2026. These increases are only payable when a member is not eligible for Medicare benefits and only if they have met certain service thresholds at retirement.

The mortality table used for active members was a system-specific mortality table for the Non-Hazardous System, projected with the ultimate rates from the MP-2020 mortality improvement scale using a base year of 2023. The mortality table used for healthy retired members was a system specific mortality table based on mortality experience projected with the ultimate rates from MP-2020 mortality improvement scale using a base year of 2023. The mortality table used for the disabled members was projected with the ultimate rates from the MP-2020 mortality improvement scale using a base year of 2023.

In the June 30, 2019 actuarial valuation, the mortality table used for active members was a Pub-2010 General Mortality table, for the Non-Hazardous System, projected with the ultimate rates from MP-2014 mortality improvement scale using a base year of 2010. The mortality table used for healthy retired members was a system specific mortality table based on mortality experience from 2013-2018, projected with the ultimate rates from MP-2014 mortality improvement scale using a base year of 2019. The mortality table used for the disabled members was PUB-2010 Disabled Mortality table, with a 4-year set-forward for both male and female rates, projected with the ultimate rates from the MP-2014 mortality improvement scale using a base year of 2010.

Beginning with the June 30, 2017 actuarial valuation, the mortality table used for active members is RP-2000 Combined Mortality Table projected with Scale BB to 2013 (multiplied by 50% for males and 30% for females). For healthy retired members and beneficiaries, the mortality table used is the RP-2000 Combined Mortality Table projected with Scale BB to 2013 (set back one year for females).

For disabled members, the RP-2000 Combined Disabled Mortality Table projected with Scale BB to 2013 (set back four years for males) is used for the period after disability retirement.

Knight Wagner PLLC

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Madisonville, Kentucky 42431
(270) 821-4824
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Anthony Knight, CPA
Daniel S. Wagner, CPA

Members
American Institute of Certified Public Accountants
Kentucky Society of Certified Public Accountants

INDEPENDENT AUDITORS' REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING AND ON COMPLIANCE AND OTHER MATTERS BASED ON AN AUDIT OF FINANCIAL STATEMENTS PERFORMED IN ACCORDANCE WITH *GOVERNMENT AUDITING STANDARDS*

To The Commissioners
South Hopkins Water District
Dawson Springs, Kentucky

We have audited, in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States, the financial statements of South Hopkins Water District as of and for the years ended December 31, 2025 and 2024, and the related notes to the financial statements, and have issued our report thereon dated May 18, 2026.

Report on Internal Control over Financial Reporting

In planning and performing our audit of the financial statements, we considered South Hopkins Water District's internal control over financial reporting (internal control) as a basis for designing audit procedures that are appropriate in the circumstances for the purpose of expressing our opinions on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of South Hopkins Water District's internal control. Accordingly, we do not express an opinion on the effectiveness of South Hopkins Water District's internal control.

A *deficiency in internal control* exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A *material weakness* is a deficiency, or a combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected, on a timely basis. A *significant deficiency* is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies and therefore, material weaknesses or significant deficiencies may exist that were not identified. Given these limitations, during our audit we did not identify any deficiencies in internal control that we consider to be material weaknesses. We identified certain deficiencies in internal control, as discussed below, as items that we consider to be significant deficiencies.

2025-1 Segregation of Duties

Condition: The internal control relating to receipts and disbursements is inadequate due to a lack of segregation of duties.
Criteria: Adequate segregation of duties is essential to an adequate internal control over financial reporting by allocating various duties among employees.
Effect: The lack of proper segregation of duties may permit errors or irregularities to go undetected.
Cause: There is a small number of accounting personnel. The cost versus benefit relationship prevents the District from hiring enough accounting personnel to properly segregate key accounting functions.
Recommendation: While the small number of employees that exist will never provide proper segregation of duties, the District should continually review job responsibilities for better accounting controls.
Response: The District concurs with the recommendation and will continually review job responsibilities to improve accounting controls when possible.

2025-2 Lack of Financial Reporting Expertise

Condition: The District lacks personnel with the expertise to apply generally accepted accounting principles in preparing its financial statements including note disclosures. Management engaged the auditor to prepare draft financial statements, including the related notes to the financial statements. Management reviewed, approved and accepted responsibility for the financial statements prior to their issuance.
Criteria: The District is required to have internal controls in place that enable it to prepare complete financial statements, including note disclosures, in compliance with generally accepted accounting principles.
Effect: The absence of such controls may allow errors to go undetected.
Cause: There is a lack of personnel who possess the required knowledge.
Recommendation: We recommend management review the costs and benefits involved to retain a consultant with the required expertise to prepare the financial statements or review the financial statements as prepared by the auditor for compliance with generally accepted accounting principles.
Response: Management has determined that it is more cost effective to continue to engage the auditor to draft the financial statements and related notes.

Report on Compliance and Other Matters

As part of obtaining reasonable assurance about whether South Hopkins Water District's financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the financial statements. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards*.

South Hopkins Water District's Response to Findings

Government Auditing Standards require the auditor to perform limited procedures on South Hopkins Water District's response to the findings identified in our audit is described above. South Hopkins Water District's response was not subjected to the other auditing procedures applied in the audit of the financial statements and, accordingly, we express no opinion on the response.

Purpose of this Report

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the entity's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the entity's internal control and compliance. Accordingly, this communication is not suitable for any other purposes.

Knight Wagner, PLLC

Madisonville, Kentucky
May 18, 2026

APPENDIX C
CURRENT SHWD USER RATES

FOR: Dawson Springs, KY
Community, Town, or City

P.S.C. KY. NO. 2

3rd Revised SHEET NO. 4

South Hopkins Water District
(Name of Utility)

CANCELLING P.S.C. KY. NO. 2

2nd Revised SHEET NO. 4

RATES AND CHARGES

A. MONTHLY RATES:

5/8-Inch x ¾-Inch Meter			
First 1,000 Gallons	$14.52	Minimum Bill	(I)
Next 9,000 Gallons	0.00853	per gallon	
Next 10,000 Gallons	0.00804	per gallon	
Next 30,000 Gallons	0.00755	per gallon	
Over 50,000 Gallons	0.00664	per gallon	
1-Inch Meter			
First 10,000 Gallons	$91.26	Minimum Bill	
Next 10,000 Gallons	0.00804	per gallon	
Next 30,000 Gallons	0.00755	per gallon	
Over 50,000 Gallons	0.00664	per gallon	
2-Inch Meter			
First 20,000 Gallons	$171.58	Minimum Bill	
Next 30,000 Gallons	0.00755	per gallon	
Over 50,000 Gallons	0.00664	per gallon	
3-Inch Meter			
First 50,000 Gallons	$398.13	Minimum Bill	
Over 50,000 Gallons	0.00664	per gallon	
Wholesale Rates			
All	0.00446	per gallon	
Monthly water loss reduction surcharge To be collected over 48 months or until $500,668 has been assessed, whichever Occurs first.	$3.50	per customer	

DATE OF ISSUE July 25, 2025
Month / Date / Year

DATE EFFECTIVE August 15, 2025
Month / Date / Year

ISSUED BY /s/Michael Easley
(Signature of Officer)

TITLE Chairman

BY AUTHORITY OF ORDER OF THE PUBLIC SERVICE COMMISSION
IN CASE NO. 2025-00251 DATED August 28, 2025

KENTUCKY
PUBLIC SERVICE COMMISSION
Linda C. Bridwell
Executive Director
Linda C. Bridwell
EFFECTIVE
8/15/2025
PURSUANT TO 807 KAR 5:011 SECTION 9 (1)

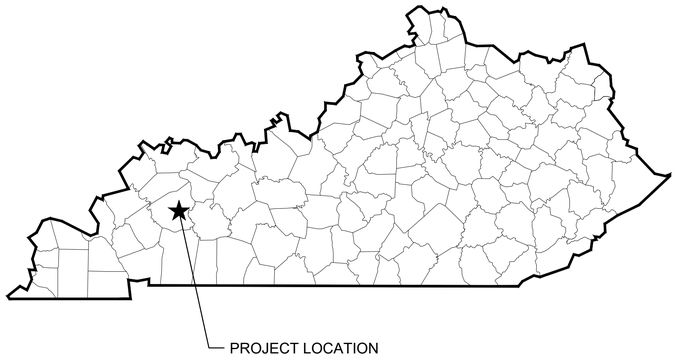
Exhibit 4

Engineering Plans & Drawings

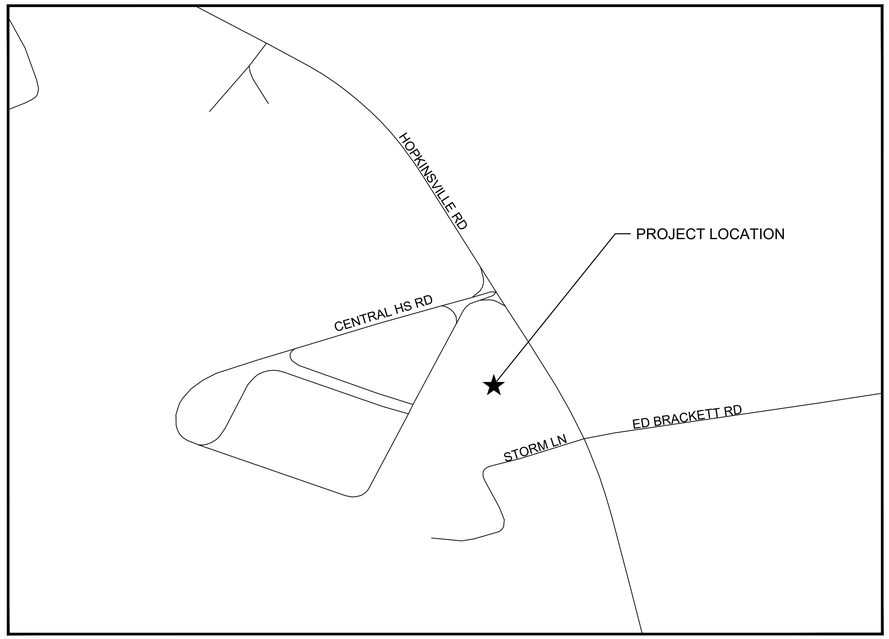
ELEVATED STORAGE TANK AND PUMP STATION PROJECT

FOR THE

SOUTH HOPKINS WATER DISTRICT
HOPKINS COUNTY, KENTUCKY
APRIL 2026



AREA MAP
NO SCALE



PROJECT LOCATION MAP
NO SCALE

DRAWING LIST	
SHEET NO.	SHEET TITLE
1	TITLE
2	SITE PLAN
3-4	TANK DETAILS
5-6	STANDARD DETAILS
7	BOOSTER PUMP STATION FOUNDATION PLAN
8	BOOSTER PUMP STATION ELEVATION VIEWS
9	BOOSTER PUMP STATION SECTIONS
10	BOOSTER PUMP STATION FLOOR PLAN
11	PUMP STATION DETAILS

For Buried Line/Cable Locations
** Contact Two Business Days Before **

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Suite 710
Louisville, KY 40202
502-583-7020
www.strand.com

STATE OF KENTUCKY
MARK C. ASKIN
21237
LICENSED PROFESSIONAL ENGINEER
4-2-2026

STRAND ASSOCIATES®

CONTRACT 1-2025

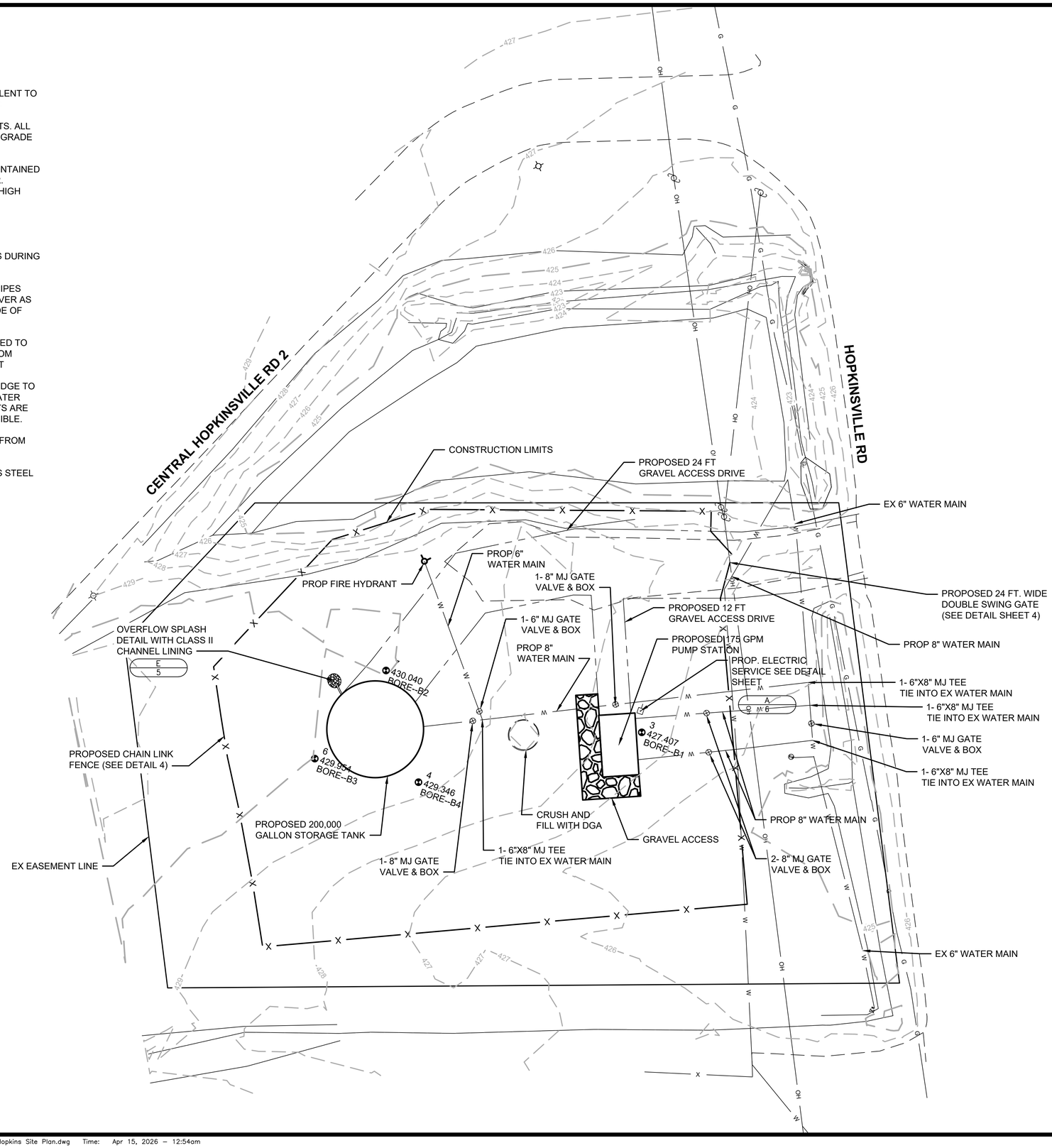
ISSUED FOR BID - APRIL 21, 2026

SHEET 1

File: S:\LOU\4700--4799\4748\002\Drawings\CAD\Civil 3d\SheetsPlan\Title.dwg Time: Apr 15, 2026 - 12:54am

GENERAL NOTES:

1. SITE SHALL BE RESTORED TO CONDITIONS EQUIVALENT TO THOSE FOUND PRIOR TO PROJECT. THIS INCLUDES REPAIRS, GRASS AREAS, AS NEEDED. REFER TO SPECIFICATIONS FOR RESTORATION REQUIREMENTS. ALL ANCHORAGE SHALL BE GROUND DOWN TO BELOW GRADE IN THE DRIVEWAY AND THE SURFACE PATCHED.
2. ACCESS INTO THE SITE FOR OTHERS SHALL BE MAINTAINED AT ALL TIMES UNLESS COORDINATED WITH OWNER. MAINTAIN ACCESS TO HOPKINS COUNTY CENTRAL HIGH SCHOOL AT ALL TIMES.
3. SEE SHEET 6 FOR ADDITIONAL ELECTRICAL REQUIREMENTS.
4. CONTRACTOR TO PROTECT ALL EXISTING UTILITIES DURING CONSTRUCTION.
5. COVER: UNLESS OTHERWISE NOTED, ALL BURIED PIPES SHALL HAVE A MINIMUM OF THIRTY (30) INCHES COVER AS MEASURED FROM FINISHED GRADE TO THE OUTSIDE OF THE PIPE.
6. WATER LINES ON THIS PROJECT SHALL BE INSTALLED TO PROVIDE A MINIMUM HORIZONTAL SEPARATION FROM SANITARY SEWER LINES OF AT LEAST TEN (10) FEET OUTSIDE TO OUTSIDE AND A MINIMUM VERTICAL SEPARATION OF AT LEAST EIGHTEEN (18) INCHES EDGE TO EDGE. AT CROSSINGS, ONE (1) FULL LENGTH OF WATER LINE PIPE SHALL BE LOCATED SO THAT BOTH JOINTS ARE AS FAR FROM THE SANITARY SEWER LINE AS POSSIBLE.
7. CONTRACTOR SHALL GRADE SITE TO DRAIN AWAY FROM ALL STRUCTURES.
8. ALL UNDERGROUND FITTINGS SHALL BE STAINLESS STEEL TYPE 316/316L.



STATE OF KENTUCKY
MARK C. ASKIN
21237
LICENSED PROFESSIONAL ENGINEER
4-2-2026

NO.	REVISIONS	DATE:

SITE PLAN

ELEVATED STORAGE TANK AND PUMP STATION PROJECT
SOUTH HOPKINS WATER DISTRICT
HOPKINS COUNTY, KENTUCKY

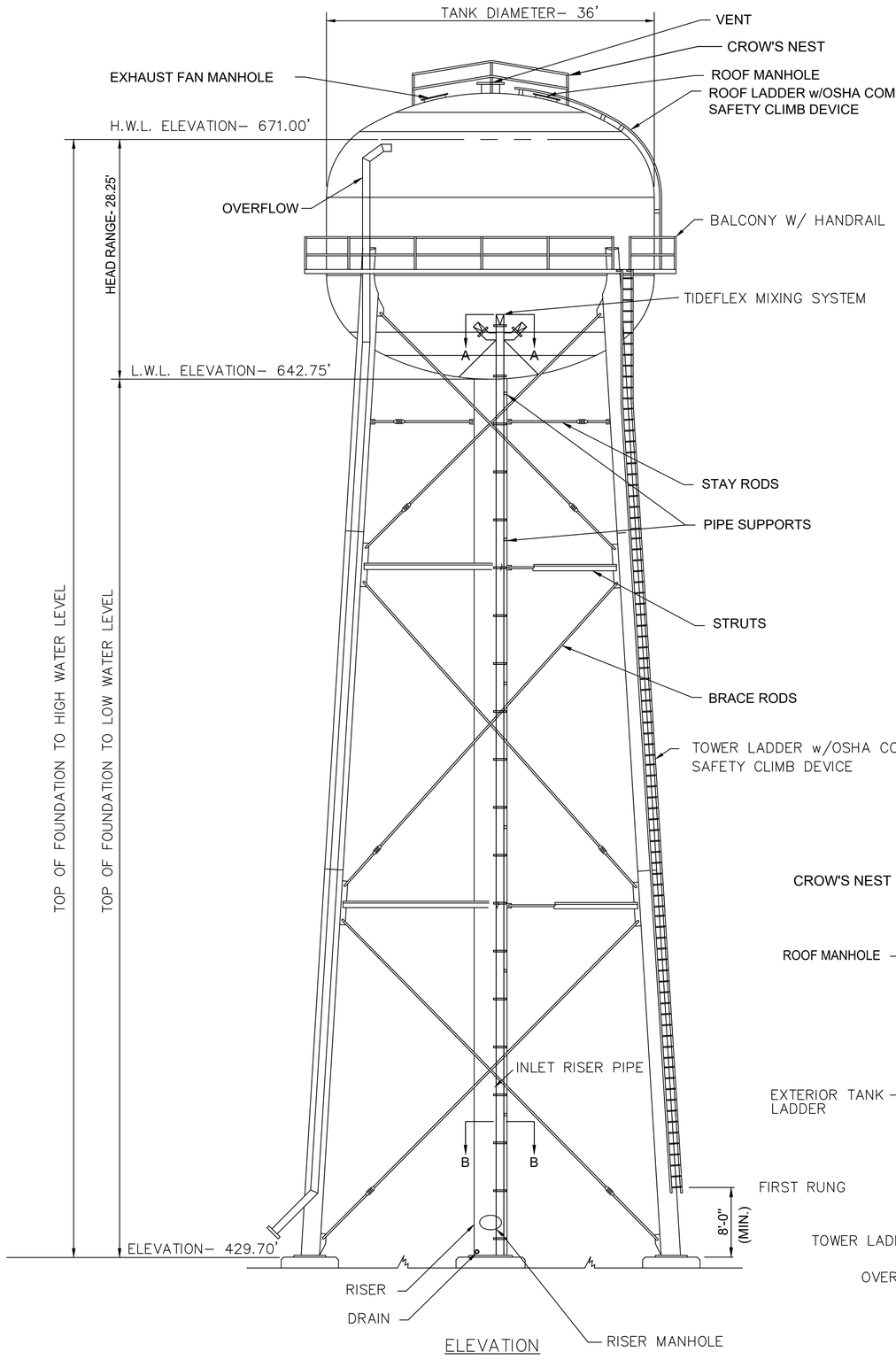
JOB NO. 4748.002

PROJECT MGR. MARK ASKIN, P.E.

STRAND ASSOCIATES®

SHEET 2

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ELEVATION

NOTES:

DESIGN:

TANK AND TOWER SHALL BE DESIGNATED, FABRICATED, AND ERECTED IN ACCORDANCE WITH AWWA D100-21 AND PROJECT SPECIFICATIONS.

WIND LOAD: PER ASCE 7-16
SNOW LOAD: PER ASCE 7-16
SEISMIC ZONE: 2A

MATERIALS:

STEEL PLATE: ASTM A36
STRUCTURAL STEEL SHAPES: ASTM A36
BRACE RODS AND STAY RODS: ASTM A36
LADDER RUNGS: ASTM A706

GENERAL:

- ACCESSORIES SHOWN ON ELEVATION DRAWINGS ARE ROTATED FOR CLARITY
- ALL HANDRAILS, PLATFORM LANDINGS, WALKWAYS, LADDERS, AND SAFETY CLIMB DEVICES SHALL CONFORM WITH CURRENT OSHA STANDARDS
- SEE PROJECT SPECIFICATIONS FOR SHOP AND FIELD PAINT REQUIREMENTS
- STERILIZE TANK IN ACCORDANCE WITH AWWA C652-92 AND PROJECT SPECIFICATIONS

MIXING SYSTEM:

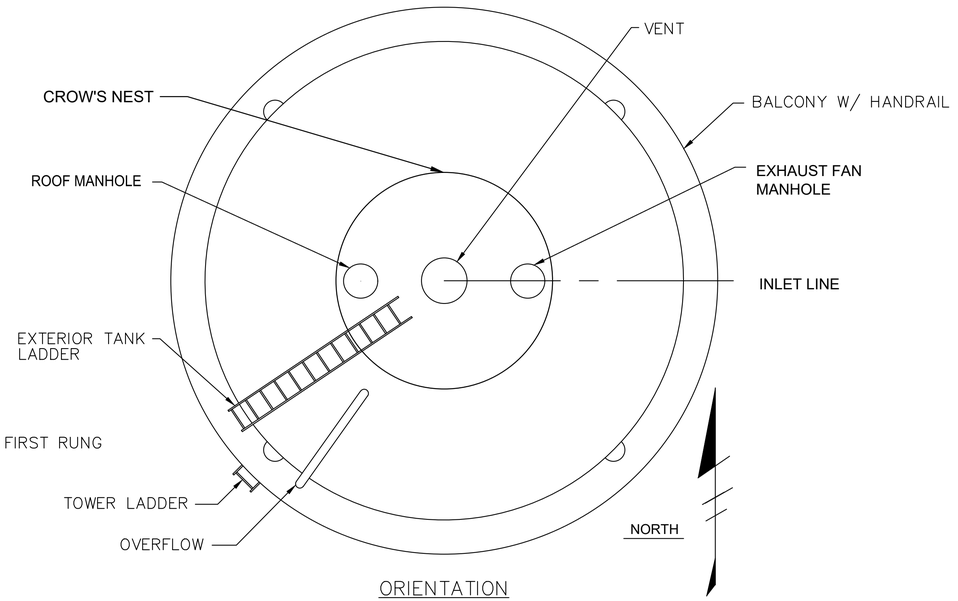
PROPOSED INLET PIPING AND VALVES SHALL BE SUPPORTED IN SUCH A MANNER AS TO NOT DAMAGE OR OVERSTRESS THE EXISTING STRUCTURE AND ITS FOUNDATION. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.

CONTRACTOR SHALL VERIFY EXISTING DIAMETER SIZES, INCLUDING WET RISER, PRIOR TO INSTALLATION.

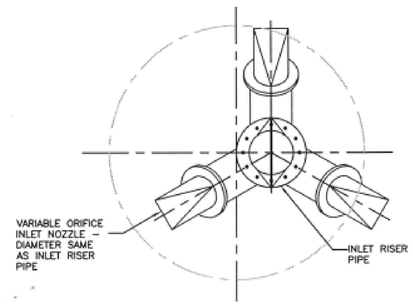
*- DENOTES VARIABLE VALUES- FOR SPECIFIC VALUES CORRESPONDING TO EACH TANK, SEE THE TABLE BELOW.

**- DENOTES VARIABLE VALUES- FOR APPROXIMATE VALUES CORRESPONDING TO EACH TANK, SEE THE TABLE BELOW. COMPLETE SYSTEM CONFIGURATION, WHICH INCLUDES ELEVATIONS, LOCATIONS, ANGLES, SIZE, AND NUMBER OF INLETS AND OUTLET CHECK VALVES FOR TOTAL MIXING AND ALL SUPPORTING CALCULATIONS TO BE SUPPLIED BY MANUFACTURER.

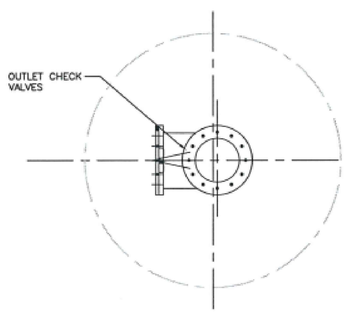
STORAGE TANK NAME	TOP OF FOUNDATION ELEVATION	HIGH WATER ELEVATION	OPERATIONAL HEAD RANGE	BOWL BOTTOM ELEVATION	TANK INSIDE DIAMETER	INLET RISER DIAMETER	INLET ELEVATION
HIGH SCHOOL TANK	429.70	671	28.25	642.75	36'-0"	0'-8"	



ORIENTATION



A A INLET PIPE DETAIL
NO SCALE



B B OUTLET PIPE DETAIL
NO SCALE

STATE OF KENTUCKY
MARK C. ASKIN
21237
LICENSED PROFESSIONAL ENGINEER
4-2-2026

DATE:
REVISIONS
NO.

ELEVATED STORAGE TANK AND PUMP STATION PROJECT
SOUTH HOPKINS WATER DISTRICT
HOPKINS COUNTY, KENTUCKY

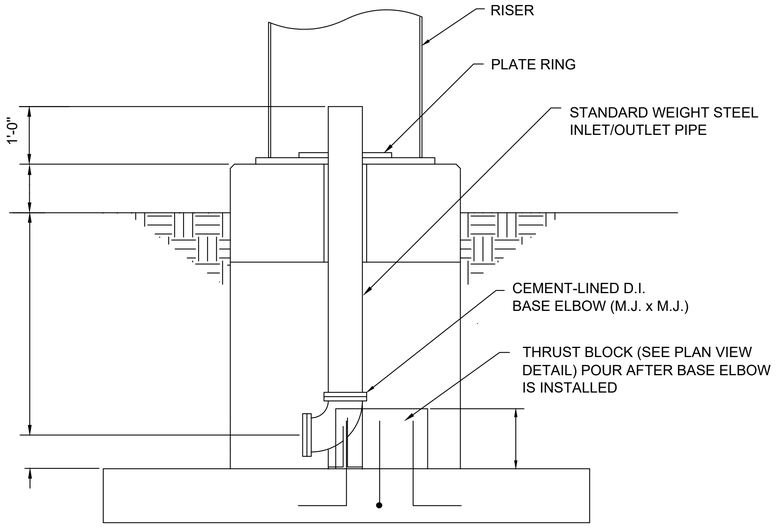
TANK DETAILS

JOB NO. 4748.002
PROJECT MGR. MARK ASKIN, P.E.

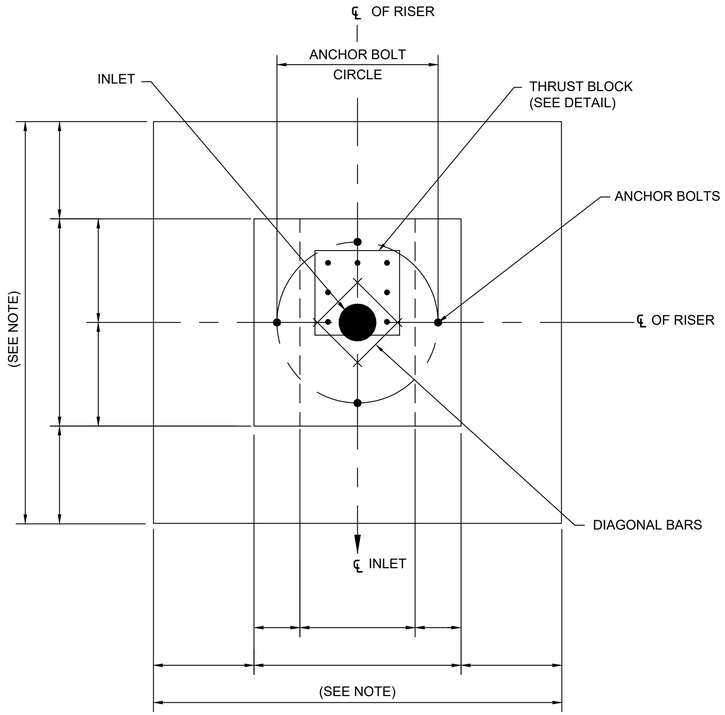
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SHEET 3

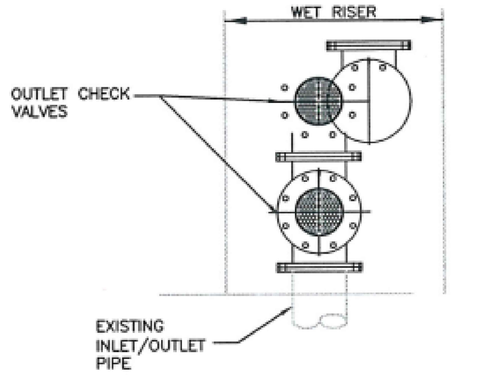
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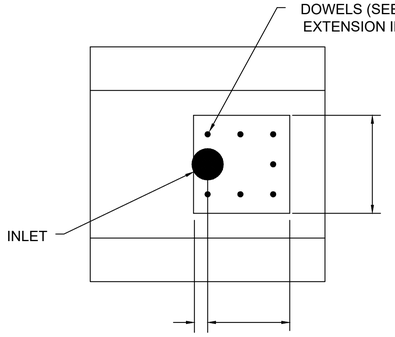
INLET/OUTLET PIPE



CENTER PIER PLAN

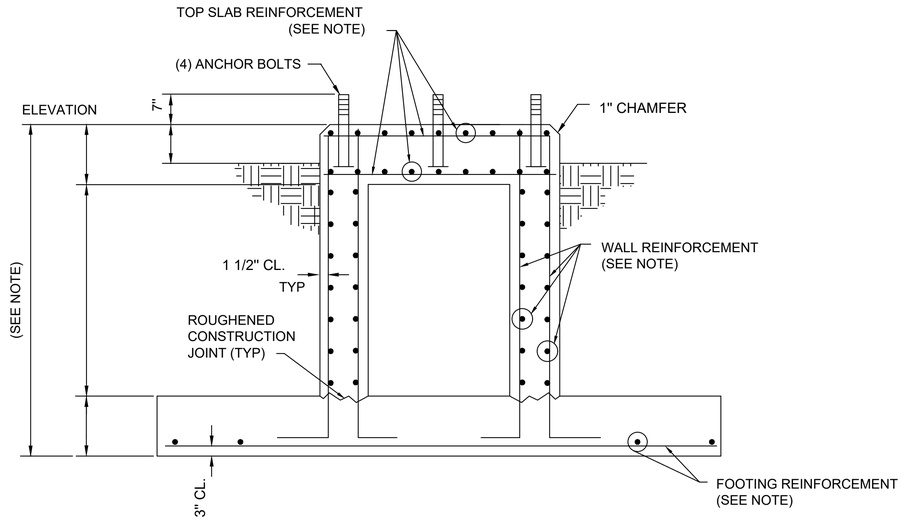


ELEVATION – OUTLETS
NO SCALE

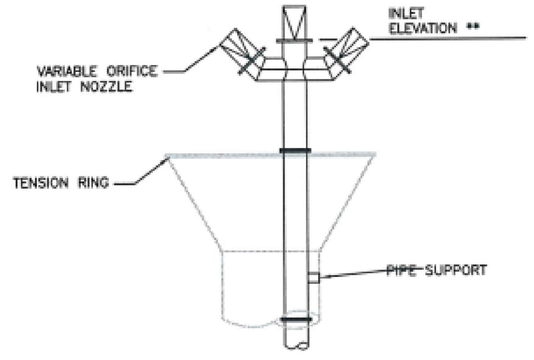


PLAN VIEW DETAIL
OF THRUST BLOCKING

NOTE:
CENTER PIER FOUNDATION DIMENSIONS AND CONCRETE REINFORCEMENT REQUIREMENTS SHALL BE DETERMINED BY TANK CONTRACTOR.



SECTION THRU CENTER PIER
(PIPING NOT SHOWN)



ELEVATION – INLETS
NO SCALE

STATE OF KENTUCKY
MARK C. ASKIN
21237
LICENSED
PROFESSIONAL ENGINEER
4-2-2026

NO.	REVISIONS	DATE:

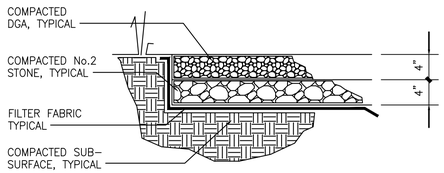
TANK DETAILS

ELEVATED STORAGE TANK AND PUMP STATION PROJECT
SOUTH HOPKINS WATER DISTRICT
HOPKINS COUNTY, KENTUCKY

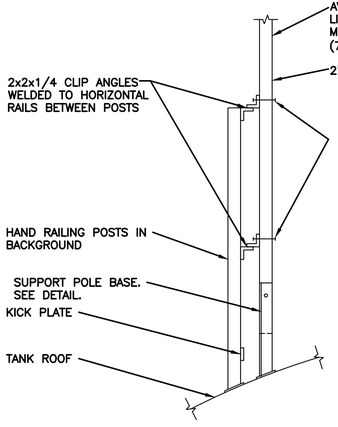
JOB NO. 4748.002
PROJECT MGR. MARK ASKIN, P.E.

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SHEET 4

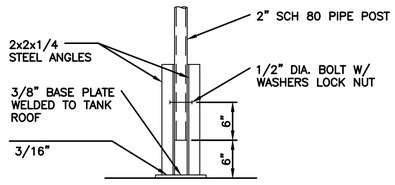


A/5 TYPICAL ACCESS ROAD AND TURNAROUND DETAIL
NO SCALE



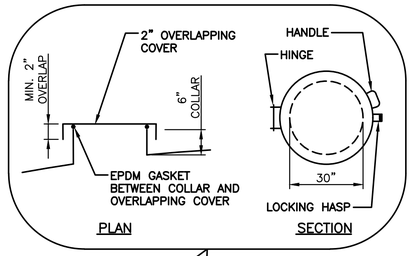
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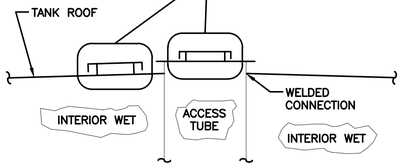
1. PROVIDE SEPARATE MOUNTING STRUCTURES FOR SCADA ANTENNA AND AVIATION OBSTRUCTION LIGHT.
2. SCADA ANTENNA SHALL BE SECURED TO THE EXTERIOR OF MAST PIPE.
3. ALL HARDWARE SHALL BE STAINLESS STEEL.
4. ALL MATERIALS, EXCEPT HARDWARE AS NOTED, SHALL BE PAINTED STEEL.



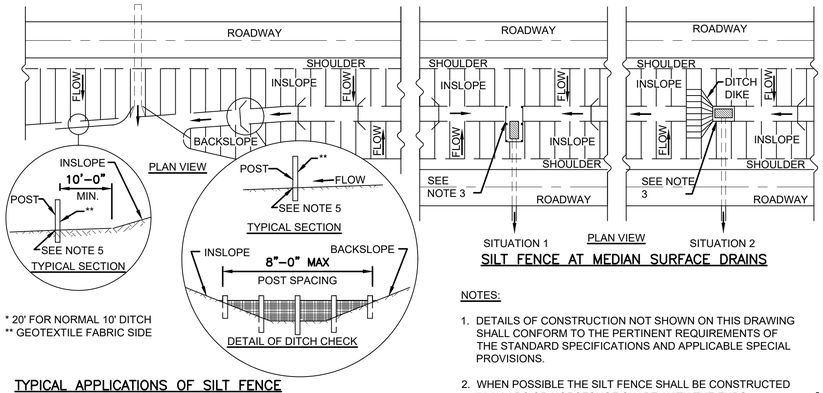
POLE BASE DETAIL

B/5 HANDRAIL MOUNTING DETAIL
NO SCALE





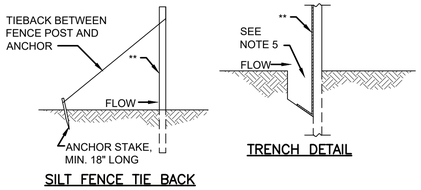
C/5 RAINPROOF TANK ROOF HATCHES
NO SCALE



* 20' FOR NORMAL 10' DITCH
** GEOTEXTILE FABRIC SIDE

SILT FENCE AT MEDIAN SURFACE DRAINS

TYPICAL APPLICATIONS OF SILT FENCE

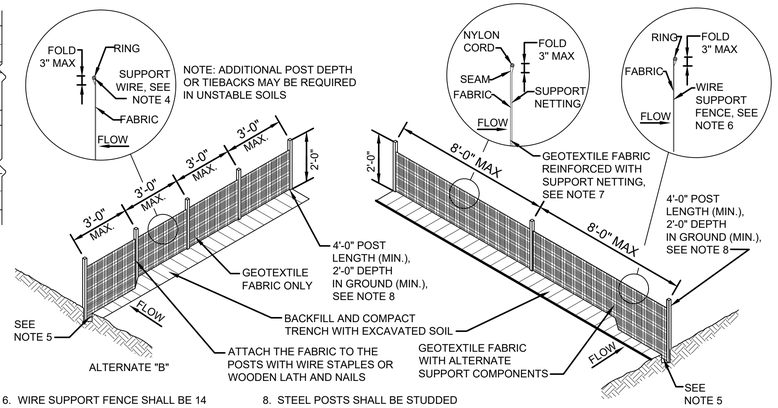


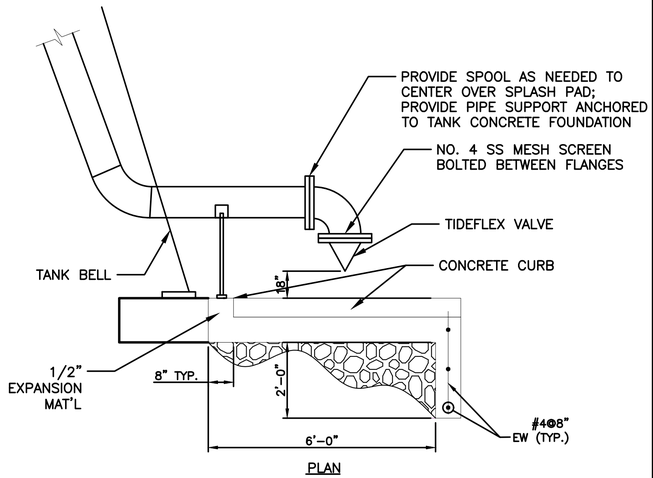
SILT FENCE TIE BACK

NOTES:

1. DETAILS OF CONSTRUCTION NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND APPLICABLE SPECIAL PROVISIONS.
2. WHEN POSSIBLE THE SILT FENCE SHALL BE CONSTRUCTED IN AN ARC OR HORSESHOE SHAPE, WITH THE ENDS POINTING UPSLOPE TO MAXIMIZE BOTH STRENGTH AND EFFECTIVENESS.
3. CROSS BRACE WITH 2"x4" WOODEN FRAME OR EQUIVALENT AT TOP OF POSTS.
4. MINIMUM 14 GAGE WIRE REQUIRED, FOLD FABRIC 3" OVER THE WIRE AND STAPLE OR PLACE WIRE RINGS ON 12" C-C.
5. EXCAVATE TRENCH A MINIMUM OF 4" WIDE AND 6" DEEP TO BURY AND ANCHOR THE GEOTEXTILE FABRIC, FOLD MATERIAL TO FIT TRENCH AND BACKFILL AND COMPACT TRENCH WITH EXCAVATED SOIL.
6. WIRE SUPPORT FENCE SHALL BE 14 GAGE MINIMUM WOVEN WIRE WITH A MAXIMUM MESH SPACING OF 6". SECURE TOP OF GEOTEXTILE FABRIC TO TOP OF FENCE WITH STAPLES OR WIRE RINGS AT 12" C TO C.
7. GEOTEXTILE FABRIC SHALL BE REINFORCED WITH AN INDUSTRIAL POLYPROPYLENE NETTING WITH A MAXIMUM MESH SPACING OF 1/4" OR EQUAL. A HEAVY DUTY NYLON TOP SUPPORT CORD OR EQUIVALENT IS REQUIRED.
8. STEEL POSTS SHALL BE STUDDED "TEE" OR "U" TYPE WITH A MINIMUM WEIGHT OF 1.2 LBS/LINEAR FOOT WITHOUT ANCHORS, OR ANCHORS SUFFICIENT TO RESIST POST MOVEMENT ARE REQUIRED. WOOD POSTS SHALL BE A MINIMUM SIZE OF 4" DIAMETER, OR 2 1/2"x3 1/2", EXCEPT WOOD POSTS FOR GEOTEXTILE FABRIC REINFORCED WITH NETTING SHALL BE A MINIMUM SIZE OF 1 1/8"x1 1/8" OAK OR HICKORY.
9. ALTERNATES "A" AND "B" ARE EQUAL AND EITHER MAY BE USED

D/5 SILT FENCE
NO SCALE





E/5 OVERFLOW PIPE SPLASH PAD
NO SCALE

STATE OF KENTUCKY
MARK C. ASKIN
21237
LICENSED PROFESSIONAL ENGINEER
4-2-2026

DATE:
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NO.

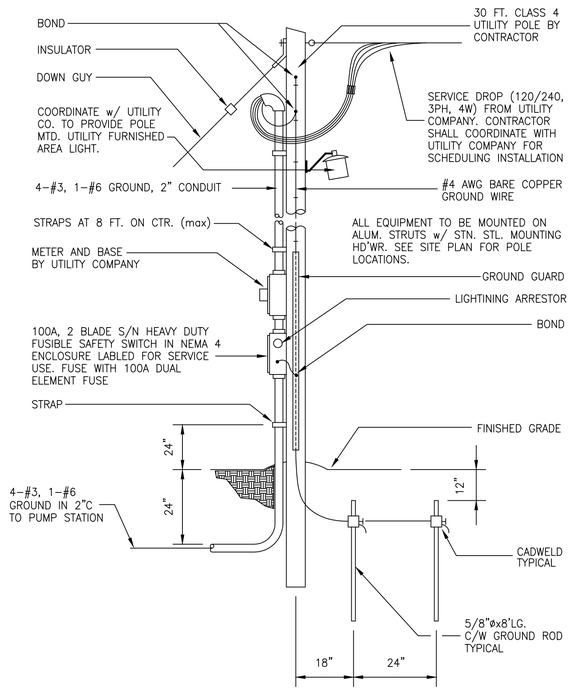
STANDARD DETAILS

ELEVATED STORAGE TANK AND PUMP STATION PROJECT
SOUTH HOPKINS WATER DISTRICT
HOPKINS COUNTY, KENTUCKY

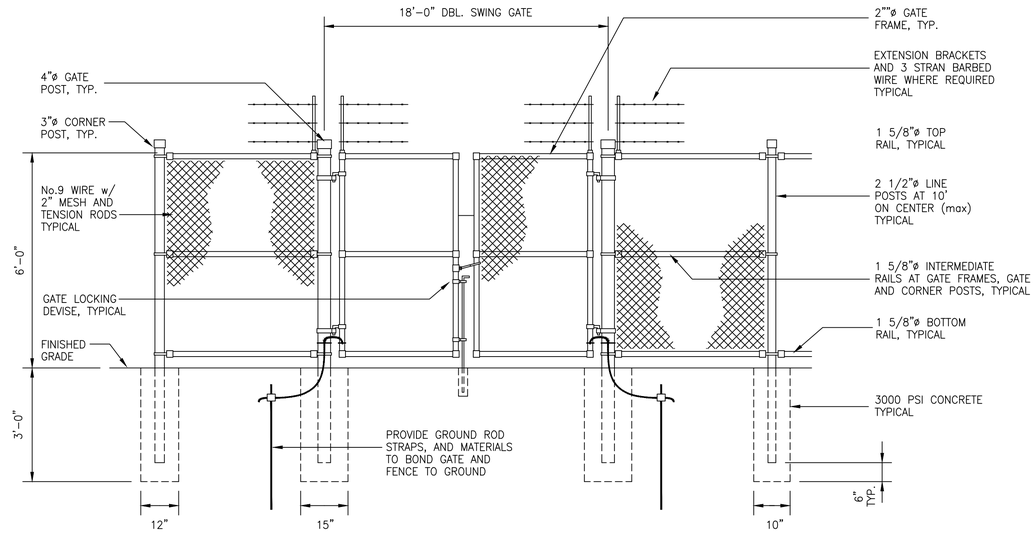
JOB NO. 4748.002
PROJECT MGR. MARK ASKIN, P.E.

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SHEET 5



A/6 ELECTRICAL SERVICE POLE DETAIL
NO SCALE



B/6 TYPICAL CHAIN LINK FENCE DETAIL
NO SCALE

STATE OF KENTUCKY
MARK C. ASKIN
21237
LICENSED PROFESSIONAL ENGINEER
(1-2-2026

NO.	REVISIONS	DATE:

STANDARD DETAILS

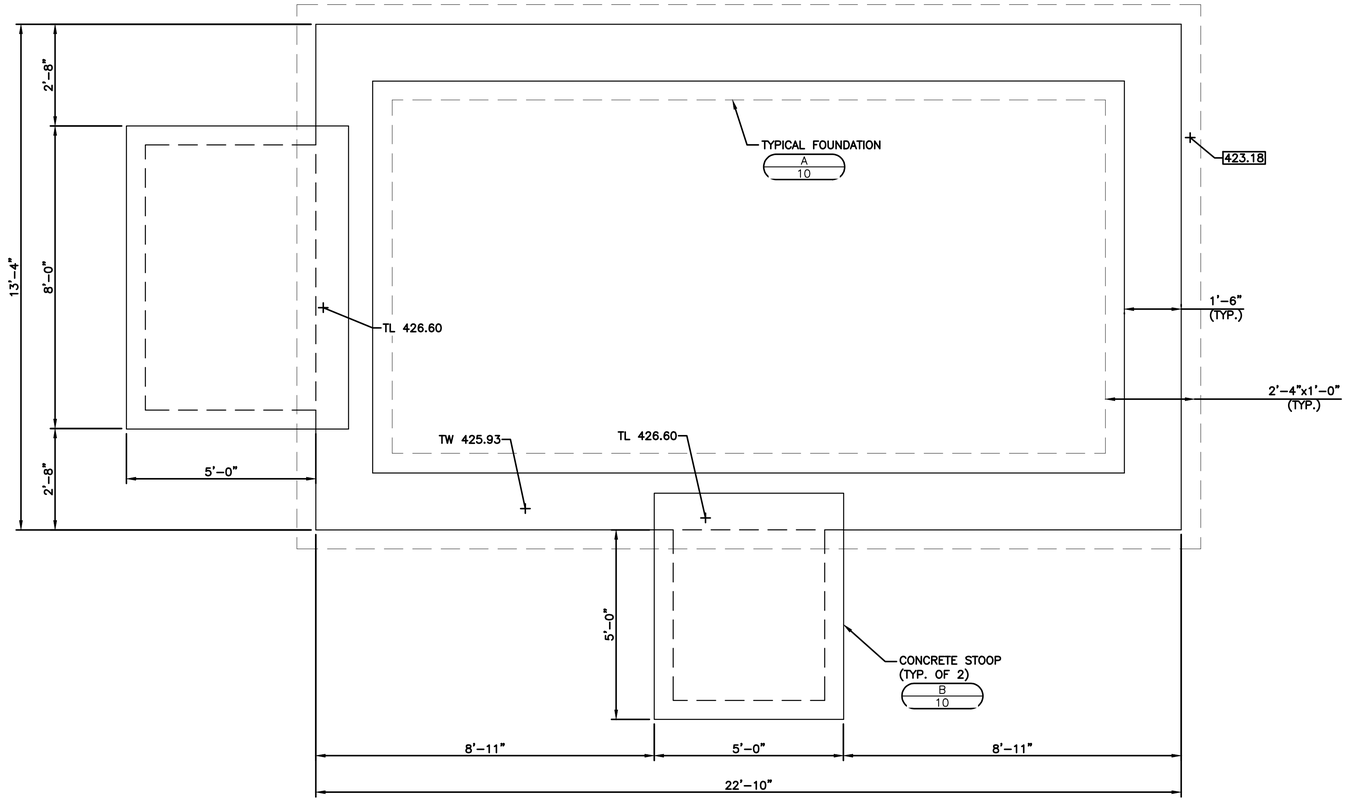
ELEVATED STORAGE TANK AND PUMP STATION PROJECT
SOUTH HOPKINS WATER DISTRICT
HOPKINS COUNTY, KENTUCKY

JOB NO. 4748.002

PROJECT MGR. MARK ASKIN, P.E.

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SHEET 6



BOOSTER STATION FOUNDATION PLAN

0 1' 2' 4'

STATE OF KENTUCKY
MARK C. ASKIN
21237
LICENSED PROFESSIONAL ENGINEER
4-2-2026

NO.	REVISIONS	DATE:

BOOSTER PUMP STATION FOUNDATION PLAN

ELEVATED STORAGE TANK AND PUMP STATION PROJECT
SOUTH HOPKINS WATER DISTRICT
HOPKINS COUNTY, KENTUCKY

JOB NO. 4748.002

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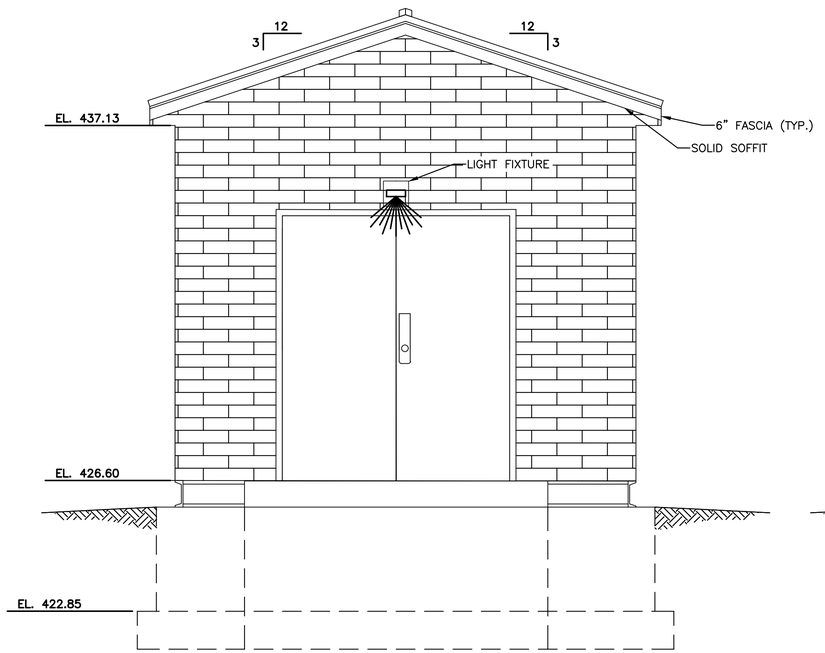
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SHEET 7

GENERAL NOTES:

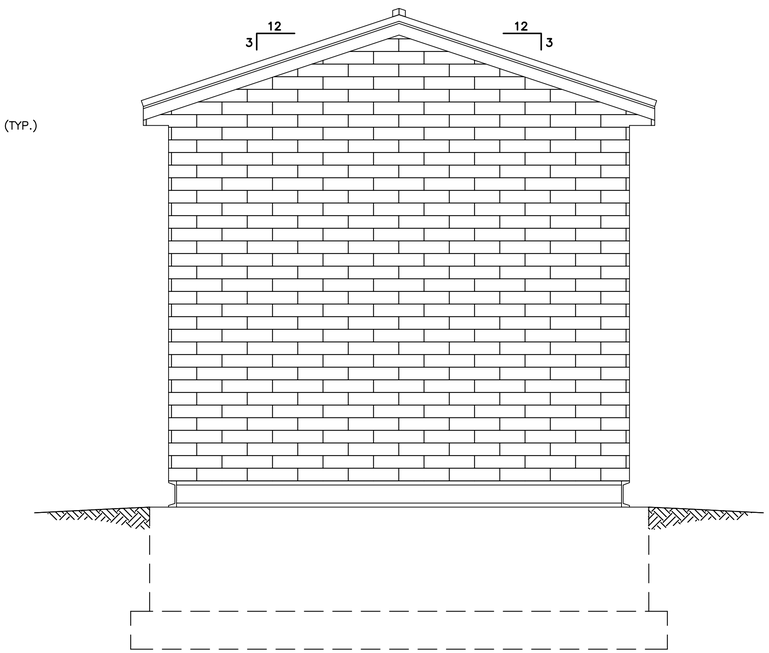
1. BUILDING SYSTEM INCLUDING WALLS, FLOORS, ROOFS, DOORS, WINDOWS, HVAC, LIGHTING, AND RECEPTACLES TO BE PROVIDED BY PREMANUFACTURED BUILDING SUPPLIER. STRUCTURAL, ELECTRICAL, AND MECHANICAL DESIGN OF THESE SYSTEMS ARE THE RESPONSIBILITY OF THE SYSTEM BUILDING SUPPLIER. DIMENSIONS, SIZING, AND LOCATIONS OF THEIR SYSTEMS ARE FOR REFERENCE ONLY.

2. DIMENSIONS TO BE CONFIRMED BY SUPPLIER.



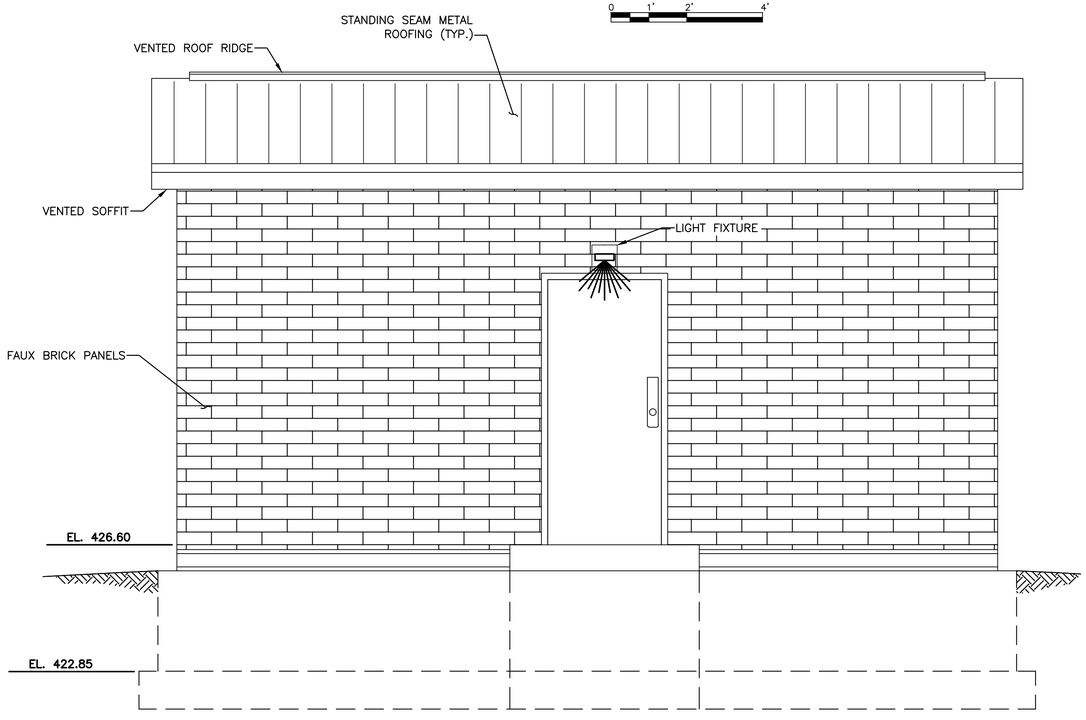
NORTH ELEVATION

0 1' 2' 4'



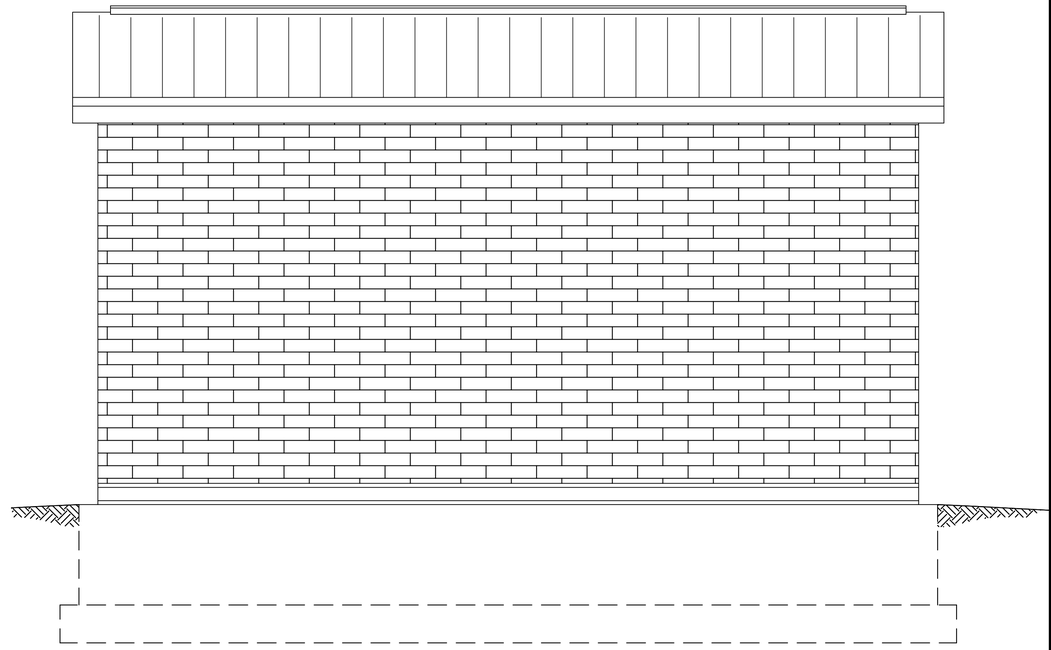
SOUTH ELEVATION

0 1' 2' 4'



WEST ELEVATION

0 1' 2' 4'



EAST ELEVATION

0 1' 2' 4'

STATE OF KENTUCKY
MARK C. ASKIN
21237
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4-2-2026

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BOOSTER PUMP STATION ELEVATION VIEWS

ELEVATED STORAGE TANK AND PUMP STATION PROJECT
SOUTH HOPKINS WATER DISTRICT
HOPKINS COUNTY, KENTUCKY

JOB NO. 4748.002

PROJECT MGR. MARK ASKIN, P.E.

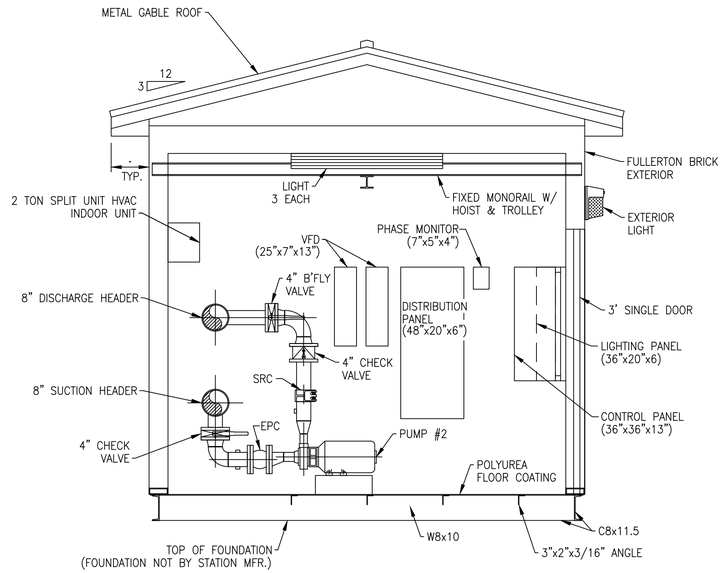
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SHEET 8

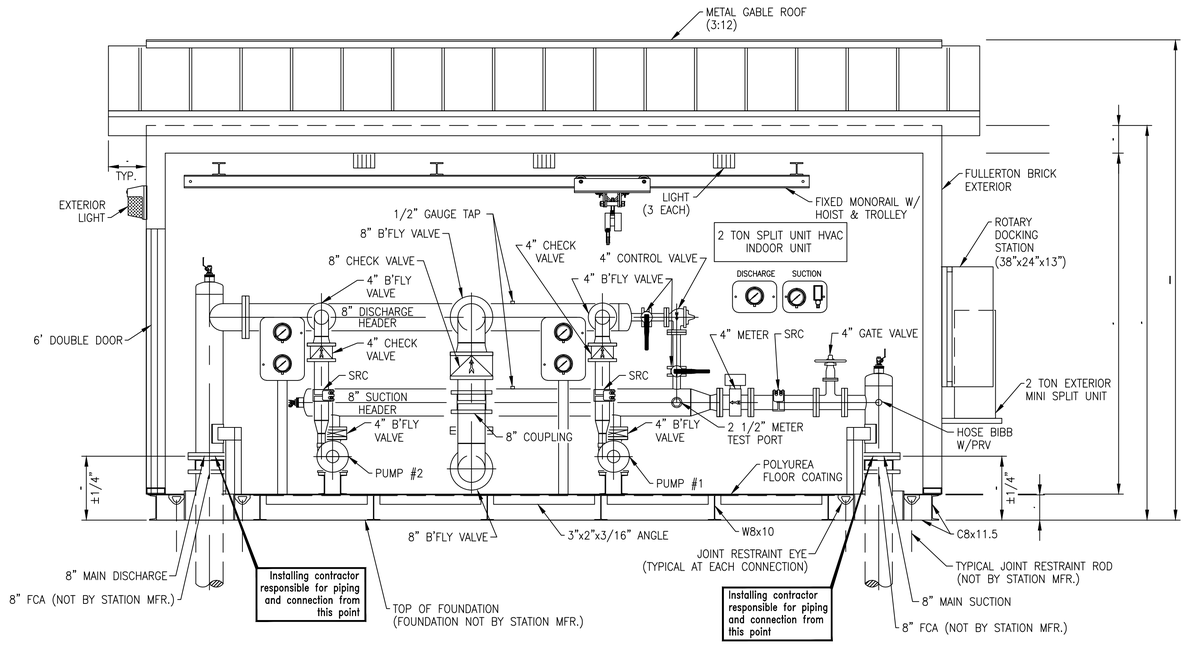
GENERAL NOTES:

1. EXCEPT FOR PIPE END SUPPORTS, WHICH ARE SHOWN, VERTICAL AND ANGLE PIPE BRACES ARE NOT SHOWN FOR DRAWING CLARITY.

FCA - FLANGED COUPLING ADAPTER
EPC - ELASTOMER PIPE CONNECTION

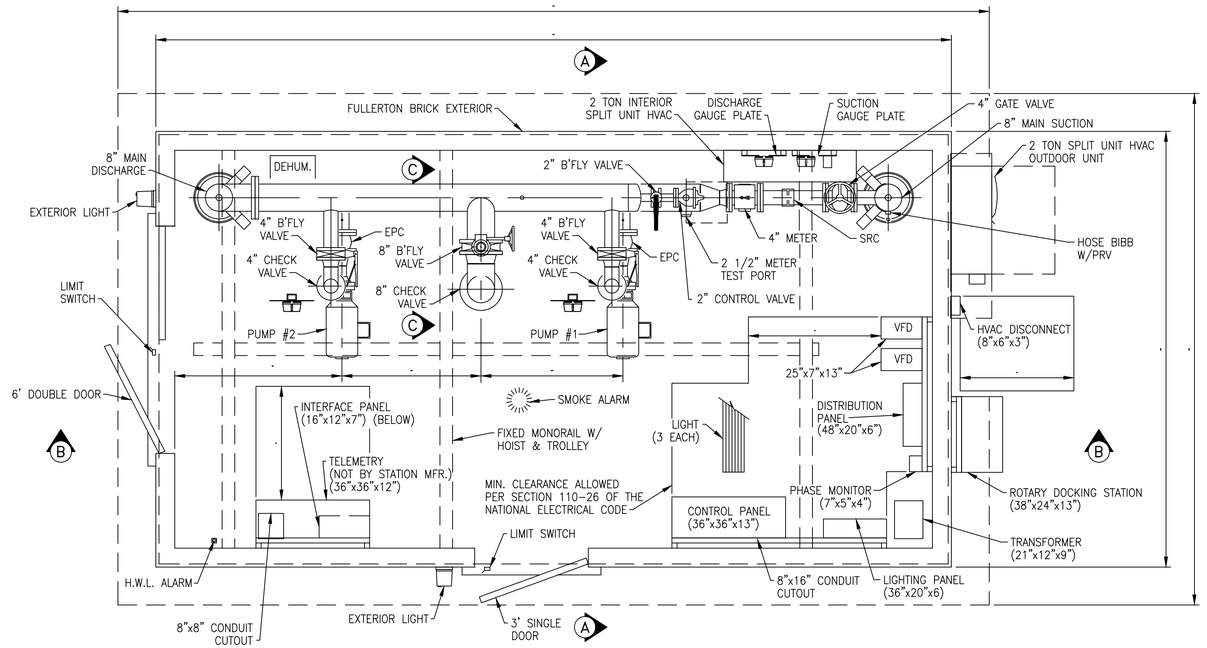


SECTION A–A

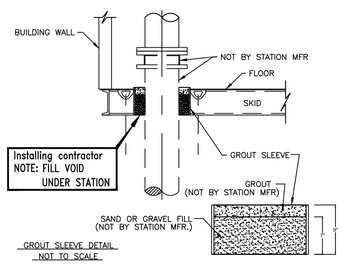


SECTION B–B

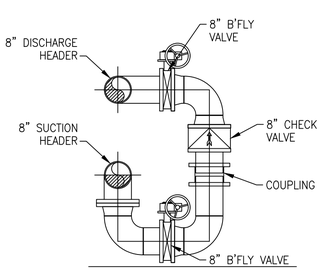
NOTE: CONNECTION BETWEEN STATION PIPING AND MAIN PIPING MUST BE RESTRAINED



FLOOR PLAN



TYPICAL GROUT DETAIL



SECTION C–C

DESIGN CRITERIA

Controls TELEMETRY (NOT BY STATION MFR.)
Power Service: 240 Volts, 3 Phase, 60 Cycle

PUMP DATA

Type: HORIZ., CLOSE CPLD., END SUCTION
Pump 1 & 2
Capacity: 175 G.P.M. AT 70 FEET T.D.H.
Size: 2" X 2 1/2" X 5"
Motor: 5 H.P., 3600 R.P.M.

STATE OF KENTUCKY
MARK C. ASKIN
21237
LICENSED PROFESSIONAL ENGINEER
4-2-2026

DATE:
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NO.

BOOSTER PUMP STATION SECTIONS

ELEVATED STORAGE TANK AND PUMP STATION PROJECT
SOUTH HOPKINS WATER DISTRICT
HOPKINS COUNTY, KENTUCKY

JOB NO. 4748.002
PROJECT MGR. MARK ASKIN, P.E.

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SHEET 9

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GENERAL NOTES:

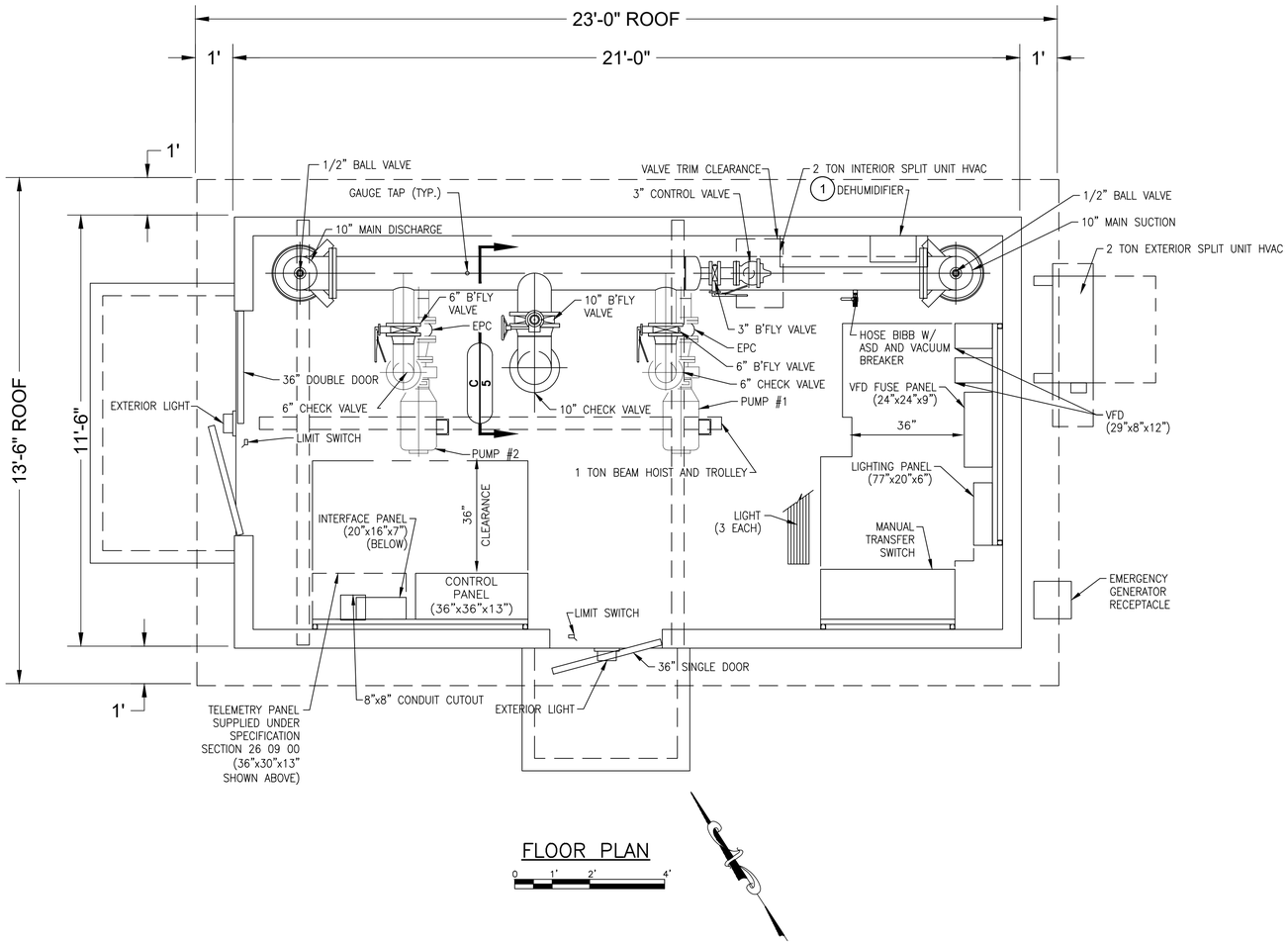
1. BUILDING SYSTEM INCLUDING WALLS, FLOORS, ROOFS, DOORS, WINDOWS, HVAC, LIGHTING, AND RECEPTACLES TO BE PROVIDED BY PREMANUFACTURED BUILDING SUPPLIER. STRUCTURAL, ELECTRICAL, AND MECHANICAL DESIGN OF THESE SYSTEMS ARE THE RESPONSIBILITY OF THE SYSTEM BUILDING SUPPLIER. DIMENSIONS, SIZING, AND LOCATIONS OF THEIR SYSTEMS ARE FOR REFERENCE ONLY.

2. EXCEPT FOR PIPE END SUPPORTS, WHICH ARE SHOWN, VERTICAL AND ANGLE PIPE BRACES ARE NOT SHOWN FOR DRAWING CLARITY.

FCA - FLANGED COUPLING ADAPTER
EPC - ELASTOMER PIPE CONNECTION

KEY NOTES:

(1) DEHUMIDIFIER SHALL BE MOUNTED TO WALL AND DRAIN PIPE SHALL BE MOUNTED THROUGH WALL TO DRAIN TO THE OUTSIDE BY GRAVITY.



FLOOR PLAN

0 1' 2' 4'

STATE OF KENTUCKY
MARK C. ASKIN
21237
LICENSED PROFESSIONAL ENGINEER
4-2-2026

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BOOSTER PUMP STATION FLOOR PLAN

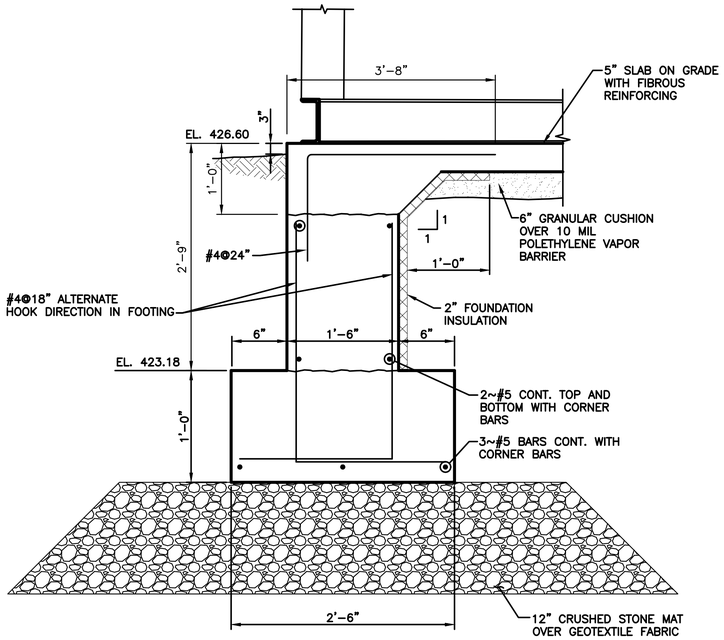
ELEVATED STORAGE TANK AND PUMP STATION PROJECT
SOUTH HOPKINS WATER DISTRICT
HOPKINS COUNTY, KENTUCKY

JOB NO.
4748.002

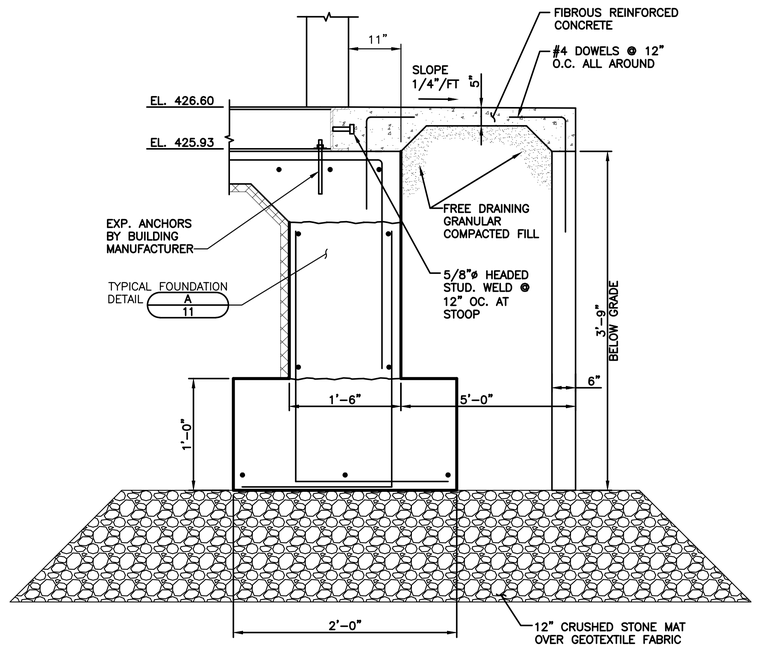
PROJECT MGR.
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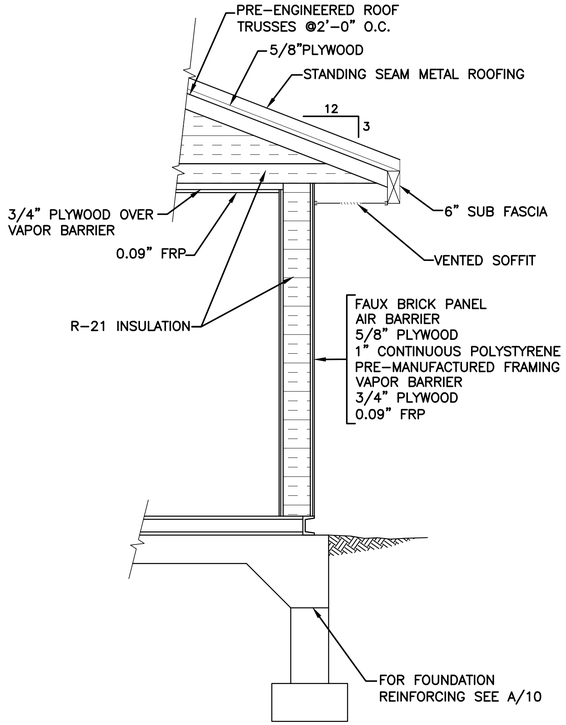
SHEET
10



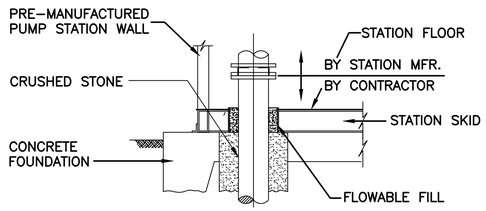
A/11 TYPICAL FOUNDATION DETAIL
NO SCALE



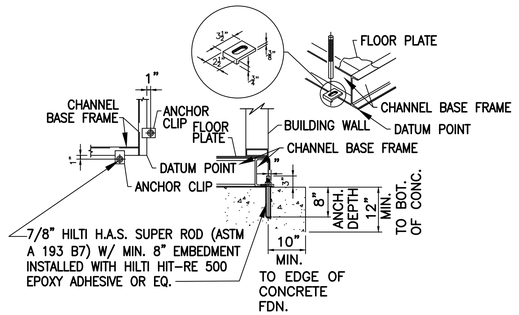
B/11 CONCRETE STOOP
NO SCALE



TYPICAL WALL SECTION C/10
NO SCALE



D/11 PIPE FLOOR EXIT DETAIL
NO SCALE



NOTES:
1. ANCHOR CLIPS FURNISHED BY BUILDING MANUFACTURER.
2. ANCHOR BOLTS AND NUTS BY INSTALLER.
3. FINAL FOUNDATION AND ANCHOR BOLT DESIGN AND DIMENSIONS AS DIRECTED BY ENGINEER (MINIMUMS ARE SHOWN).
4. SHIMS MAY BE REQUIRED AROUND PERIMETER OF BASE FRAME FOR LEVELNESS AND PROPER DOOR ALIGNMENT IN FRAME.
5. QUANTITY OF ANCHOR BOLTS SPECIFIED BY ENGINEER.
6. ANCHOR BOLTS SHALL BE PLACED WITHIN 12" OF EACH CORNER WITH THE REMAINING ANCHORS BEING SPACED NO MORE THAN 6' APART ALONG ALL SIDES OF THE BUILDING PERIMETER WITH ANY WALL OF 7 FEET OR LESS HAVING TWO ANCHOR BOLTS, ALL ACCORDING TO IBC 2308.3.1, 2015 ED.

E/11 BASE FRAME ANCHOR DETAIL
NO SCALE

STATE OF KENTUCKY
MARK C. ASKIN
21237
LICENSED PROFESSIONAL ENGINEER
4-2-2026

DATE:
REVISIONS
NO.

PUMP STATION DETAILS

ELEVATED STORAGE TANK AND PUMP STATION PROJECT
SOUTH HOPKINS WATER DISTRICT
HOPKINS COUNTY, KENTUCKY

JOB NO. 4748.002
PROJECT MGR. MARK ASKIN, P.E.

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SHEET 11

Exhibit 5

Contract Specifications

Professional

Engineering

Services

Elevated Storage Tank and Pump Station Project

Contract 1-2025



Project Manual

South Hopkins Water District

Madisonville, Kentucky

Issued for Bid

April 21, 2026

STRAND ASSOCIATES®

PLAN HOLDER: _____ Set No.: _____

PROJECT MANUAL

SOUTH HOPKINS WATER DISTRICT
MADISONVILLE, KENTUCKY
ELEVATED STORAGE TANK AND PUMP STATION PROJECT
CONTRACT 1-2025



Prepared by:

STRAND ASSOCIATES, INC.®
325 West Main Street, Suite 710
Louisville, KY 40202
www.strand.com

Issued for Bid
April 21, 2026

STRAND ASSOCIATES®
Excellence in Engineering℠

SECTION 00 01 10

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MADISONVILLE, KENTUCKY
ELEVATED STORAGE TANK AND PUMP STATION PROJECT
CONTRACT 1-2025

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ADVERTISEMENT TO BID

SOUTH HOPKINS WATER DISTRICT
MADISONVILLE, KENTUCKY
ELEVATED STORAGE TANK AND PUMP STATION PROJECT
CONTRACT 1-2025

The South Hopkins Water District (OWNER) is requesting Bids for the construction of the following Project:

Elevated Storage Tank and Pump Station Project
Contract 1-2025

Electronic Bids for the construction of the Project will be received by OWNER until May 12, 2026, at 11 A.M., local time. At that time the Bids received will be publicly downloaded and read aloud via teleconference. The login information for the teleconference is as follows: (309) 205-3325, Conference ID 918 4658 3355.

The Project includes the following Work: A new 200,000-gallon elevated tank and 175-gallon-per-minute pump station.

Complete digital Project Bidding Documents are available at www.strand.com or at www.questcdn.com. Download the digital Bidding Documents for $75 by inputting Quest project number 10127611 on the website's project search page. Please contact QuestCDN.com at (952) 233-1632 or info@questcdn.com for assistance with free membership registration, downloading, and working with this digital Project information.

For this Project, Bids will **ONLY** be received and accepted via the online electronic Bid service through QuestCDN.com. To access the electronic Bid Form, download the Project Documents and click the Online Bidding.

All Bidders submitting a sealed Bid shall obtain the Bidding Documents from QuestCDN.com or from Strand Associates, Inc.®

Bidders who submit a Bid must be a Plan Holder of record at the Issuing Office. Bids from Bidders who are not on the Plan Holders List may be returned as not being responsive.

The Bid must be accompanied by Bid security made payable to OWNER in an amount of 5% of the Bidder's maximum Bid price.

A wage rate determination is not a requirement of this Project.

OWNER reserves the right to reject any or all Bids, to waive any technicality, and to accept any Bid which it deems advantageous. All Bids shall remain subject to acceptance for 85 days after the time set for receiving Bids.

Contract award shall be made based on the lowest responsive and responsible Bidder.

This Bid is subject to Kentucky Revised Statutes Section 45A.490 through 45A.494, which in general provides that a “resident bidder” of Kentucky is to be given a bidding preference over a “nonresident bidder” who is registered in a state that gives preference to its in-state resident bidders over a Kentucky resident bidder. The bidding preference is to be the same as that stipulated for the state of the “nonresident bidder.” If the state of a “nonresident bidder” provides no specific preference, then “resident” and “nonresident bidders” are to be treated the same when evaluating Bids.

All taxes are the responsibility of the successful Bidder unless specifically exempted in the Bidding Documents.

A pre-bid conference will be held at 10 A.M., local time, on April 27, 2026, at Dunn Missionary Baptist Church, 4855 Charleston Road, Dawson Springs, KY 42408. Bidders are required to attend and participate in the conference.

The Strand Associates, Inc.® project manager is Mark C. Askin, P.E. and can be contacted at Strand Associates, Inc.®, 325 West Main Street, Suite 710, Louisville, KY 40202, (502) 583-7020 regarding the Project.

For all further requirements regarding Bid submittal, qualifications, procedures, and Contract award, refer to the Instructions to Bidders that are included in the Bidding Documents.

Published by the authority of the South Hopkins Water District
Mike Easley, Chairman

Dated at Madisonville, Kentucky
April 21, 2026

END OF SECTION

SECTION 00 21 13

INSTRUCTIONS TO BIDDERS

A. These Instructions to Bidders establish requirements for Bidding and Award of Contract.

B. These articles are not necessarily numbered consecutively.

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ARTICLE 1–DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and the 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. Issuing Office–The office from which the Bidding Documents are to be issued and which registers planholders.

ARTICLE 2–BIDDING DOCUMENTS

2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.

2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.

2.03 Electronic Documents

A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.

1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader Version 6.0 or later. It is the intent of ENGINEER and OWNER that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because OWNER and ENGINEER cannot totally control the transmission and receipt of Electronic Documents nor CONTRACTOR's means of reproduction of such documents, OWNER and ENGINEER cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.

B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.03.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

ARTICLE 3–QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder’s qualifications to perform the Work, Bidder shall submit with its Bid the Qualifications Statement.

3.02 Bidder must be prepared to submit evidence of Bidder’s qualifications to do business in the state where the Project is located prior to award of the Contract.

3.03 In accordance with KRS 45A.395, prospective Bidder shall provide OWNER with a sworn statement made under penalty of perjury that it has not knowingly violated any provision of the campaign finance laws of the Commonwealth and that the award of a Contract to Bidder will not violate any provision of the campaign finance laws of the Commonwealth.

3.04 Bidders shall submit the documentation listed in Paragraph 7.01 of the Bid Form (Section 00 41 00).

3.05 No requirement in this Article 3 to submit information will prejudice the right of OWNER to seek additional pertinent information regarding Bidder's qualifications.

3.06 Bidder is advised to carefully review those portions of the Bidding Documents requiring Bidder's representations and certifications.

ARTICLE 4–PRE-BID CONFERENCE

4.01 A pre-bid conference will be held at the time, date, and place indicated in the Advertisement or Invitation to Bid. Representatives of OWNER and ENGINEER will be present to discuss the Project. Bidders are required to attend and participate in the conference. ENGINEER will transmit to all prospective Bidders of record such Addenda as ENGINEER considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

4.02 Information presented at the pre-bid conference does not alter the Contract Documents. OWNER will issue Addenda to make any changes to the Contract Documents that result from discussions at the pre-bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

4.03 Bids submitted by Bidders who do not attend the pre-bid conference will be considered unresponsive and will not be opened.

ARTICLE 5–SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

5.01 Site and Other Areas

A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by OWNER for the use of CONTRACTOR. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by CONTRACTOR.

5.02 Existing Site Conditions

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:

a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.

b. Those drawings known to OWNER of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data.

c. Reports and drawings known to OWNER relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.

d. Technical Data contained in such reports and drawings.

2. OWNER will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

B. Underground Facilities: Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05 of the General Conditions, and not in the drawings referred to in Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

5.03 Other Site-Related Documents

A. No other Site-related documents are available.

5.04 Site Visit and Testing by Bidders

A. Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site.

B. Bidders visiting the Site are required to arrange their own transportation to the Site.

C. All access to the Site other than during a regularly scheduled Site visit must be coordinated through the following OWNER contact for visiting the Site: {provide contact information}. Bidder must conduct the required Site visit during normal working hours.

D. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.

E. On request, and to the extent OWNER has control over the Site, and schedule permitting, OWNER will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. OWNER will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on OWNER's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.

F. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by OWNER or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.

G. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.05 OWNER's Safety Program

A. Site visits and work at the Site may be governed by an OWNER safety program. If an OWNER safety program exists, it will be noted in the Supplementary Conditions.

5.06 Other Work at the Site

A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which OWNER is aware (if any) that is to be performed at the Site by OWNER or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If OWNER is party to a written contract for such other work, then on request, OWNER will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 6–BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 Express Representations and Certifications in Bid Form, Agreement

A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications, and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.

B. If Bidder is awarded the Contract, Bidder (as CONTRACTOR) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7–INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to ENGINEER in writing. Interpretations or clarifications considered necessary by ENGINEER in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Issuing Office as having received the Bidding Documents.

7.02 All requests for interpretation must be received at least five days prior to the day set for receiving Bids. Addenda will be issued not later than three days prior to the day set for receiving Bids. Failure of any Bidder to receive any such Addendum or interpretation shall not relieve such Bidder from any obligations under the Bid as submitted. All Addenda so issued shall become part of the Contract Documents.

7.03 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8–BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to OWNER in an amount of 5% of the Bidder's maximum Bid price and in the form of Surety2000, a certified check, bank money order, or a Bid Bond (on form attached) issued by a surety meeting the requirements of Paragraph 6.01 of

the General Conditions. A PDF copy of the Bid Bond can be attached to electronically submitted Bids.

8.02 The Bid security of the apparent Successful Bidder will be retained until OWNER awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, OWNER may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole in the case of a Penal Sum Bid Bond, and to the extent of OWNER's damages in the case of a damages-form bond. Such forfeiture will be OWNER's exclusive remedy if Bidder defaults.

8.03 The Bid security of other Bidders that OWNER believes to have a reasonable chance of receiving the award may be retained by OWNER until the earlier of 7 days after the Effective Date of the Contract or 30 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

8.04 Bid security of other Bidders that OWNER believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9–CONTRACT TIMES

9.01 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in the Agreement.

9.02 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 10–SUBSTITUTE OR “OR EQUAL” ITEMS

10.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without evaluation of Alternative Equipment Manufacturers listed in the Lump Sum Base Bid, if any, and without evaluation of possible substitute or “or equal” items. Whenever it is specified or described in the Bidding Documents that an Alternative Equipment Manufacturers listed in the Lump Sum Base Bid or that a substitute or “or equal” item of material or equipment may be furnished or used by CONTRACTOR if acceptable to ENGINEER, application for such acceptance will not be evaluated by ENGINEER until after the Effective Date of the Contract.

10.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that CONTRACTOR will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.

ARTICLE 11–SUBCONTRACTORS, SUPPLIERS, AND OTHERS

11.01 A Bidder must be prepared to retain specific Subcontractors and Suppliers for the performance of the Work if required to do so by the Bidding Documents or in the Specifications. If a prospective Bidder objects to retaining any such Subcontractor or Supplier and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.

11.02 Subsequent to the submittal of the Bid, OWNER may not require the Successful Bidder or CONTRACTOR to retain any Subcontractor, Supplier, or other individual or entity against which CONTRACTOR has reasonable objection.

11.03 The apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to OWNER a list of the Subcontractors or Suppliers proposed for the Work. If requested by OWNER, such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, or other individual or entity. If OWNER or ENGINEER, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, OWNER may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder shall submit a substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and OWNER may consider such price adjustment in evaluating Bids and making the Contract award.

11.04 If apparent Successful Bidder declines to make any such substitution, OWNER may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals or entities. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which OWNER or ENGINEER makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to OWNER and ENGINEER subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.

ARTICLE 12–PREPARATION OF BID

12.01 The Bid Form is included with the Bidding Documents.

A. All blanks on the Bid Form shall be completed and the Bid Forms shall be signed. A Bid price shall be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.

B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."

C. All blanks on the Bid Form must be filled and all required documents uploaded before QuestCDN.com will accept the Bid. The Bid shall be signed electronically where required and in accordance with the instructions included in this Article.

12.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown.

12.03 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 and state of incorporation shall be shown.

12.04 A Bid by a limited liability company shall be executed in the name of the firm by a member, if the LLC is member-managed, or by a manager, if manager-managed, and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.

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

12.06 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.

12.07 All names shall be printed below the signatures.

12.08 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.

12.09 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.

12.10 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

12.11 All Bids shall be signed in the presence of and be notarized by a Notary Public or other Officer authorized to administer oaths.

12.12 Bidder shall identify whether the Bidder is a resident or nonresident Bidder per KRS 45A.490 to 45A.494 and KAR 5:400. If Bidder is claiming it is a "resident Bidder" as defined in KRS 45A.942(2), the Bidder shall so indicate in the Bid and complete the Notarized Affidavit attached to the Bid that affirms it meets the criteria to be considered a "resident Bidder". If requested by OWNER, Bidder shall provide documentation proving such "resident Bidder" status. Failure to do so will result in the disqualification of the Bidder or in Contract termination.

12.13 If Bidder is a "nonresident Bidder" as defined by KRS 45A.494(3), it shall so indicate in the Bid and provide its certificate of authority to transact business in the Commonwealth as filed with the Commonwealth of Kentucky, Secretary of State. The location of the principal office identified therein will be deemed by OWNER as the state of residency for that Bidder. If the Bidder is not required by law to obtain said certificate, the state of residency for that Bidder will be deemed to be that which is identified in its mailing address as provided in its Bid.

ARTICLE 13–BASIS OF BID

13.01 Unit Price

A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.

B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity" (which OWNER or its representative has set forth in the Bid Form) for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices;" such total will be used by OWNER for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.

13.02 Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. For Bids submitted on a Lump Sum basis, discrepancies between words and figures will be resolved in favor of the words.

ARTICLE 14–SUBMITTAL OF BID

14.01 Bids will be received for all divisions of the Specifications and all other provisions of the Bidding Documents.

14.02 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.

14.03 Bids received after the date and time prescribed for the opening of Bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 15–MODIFICATION AND WITHDRAWAL OF BIDS

15.01 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 set for receiving Bids.

15.02 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, the Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, the Bidder will be disqualified from further Bidding on the Work.

ARTICLE 16–OPENING OF BIDS

16.01 Bids will be downloaded at the time and place indicated in the Advertisement or Invitation to Bid and, unless obviously nonresponsive, read aloud publicly. An abstract of the amounts of the Base Bids and major alternatives and components, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 17–BIDS TO REMAIN SUBJECT TO ACCEPTANCE

17.01 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.

ARTICLE 18–EVALUATION OF BIDS AND AWARD OF CONTRACT

18.01 OWNER reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. OWNER also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.

18.02 OWNER will reject the Bid of any Bidder that OWNER finds, after reasonable inquiry and evaluation, to not be responsible.

18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid,

whether in the Bid itself or in a separate communication to OWNER or ENGINEER, then OWNER will reject the Bid as nonresponsive.

18.04 In evaluating Bids, OWNER will consider whether or not the Bids comply with the prescribed requirements, and such alternatives, unit prices, and other data as may be requested in the Bid Form or prior to the Notice of Award.

18.05 In evaluating Bids, OWNER will consider the qualifications of Bidders and may consider the qualifications and experience 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 as provided in the Supplementary Conditions. OWNER also may consider the operating costs, maintenance requirements, performance data, and guarantees of major items of materials and equipment proposed for incorporation in the work when such data is required to be submitted prior to the Notice of Award.

18.06.1 OWNER may conduct such investigations as OWNER deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals or entities to perform the Work in accordance with the Contract Documents to OWNER's satisfaction within the prescribed time. Bidder shall furnish to OWNER all such information and data for this purpose as OWNER may request. OWNER reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy OWNER that such Bidder is properly qualified to carry out the obligations of the Contract Documents and to complete the work contemplated therein.

18.06.2 OWNER shall be satisfied that Bidder involved (1) maintains a permanent place of business, (2) has adequate plant and equipment to do the work properly and expeditiously, (3) has a suitable financial status to meet obligations incident to the work, (4) has appropriate technical experience, and (5) can submit a satisfactory performance record.

18.07.1 If a Contract is to be awarded, it will be awarded to the responsible Bidder with the lowest responsive Bid whose evaluation by OWNER indicates to OWNER that the award will be in the best interests of the Project.

18.07.2 Once all responsive and responsible Bidders have been determined and ranked, the residency of each Bidder will be identified. A preference equal to the preference given to or required by the state of the highest evaluated "nonresident Bidders" will then be given to all responsive and responsible "resident Bidders." The Bids will then be rescored and re-ranked to account for any applicable preferences to determine lowest responsive and responsible Bidder. In awarding a contract, "resident Bidders" shall only receive preference against "nonresident Bidders" residing in a state that gives a preference to Bidders from that state. The preference will not be applied against "nonresident Bidders" residing in states that do not give preference against Kentucky Bidders. If a preference evaluation results in a tie between a "resident Bidder" and a "nonresident Bidder," preference will be given to the "resident Bidder." The application of this regulation will not result in a "nonresident Bidder" receiving preference over another "nonresident Bidder."

18.08 If a Contract is to be awarded, OWNER will give the successful Bidder a Notice of Award within 60 days after the time set for opening Bids.

ARTICLE 19–BONDS AND INSURANCE

19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth OWNER's requirements as to performance and payment bonds, other required bonds

(if any), and insurance. When the Successful Bidder delivers the executed Agreement to OWNER, it must be accompanied by required bonds and insurance documentation.

19.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing Bid Bonds as part of the Bidding process.

ARTICLE 20–SIGNING OF AGREEMENT

20.01 When OWNER gives a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unexecuted counterparts of the Agreement along with all other Contract Documents which are identified in the Agreement as attached thereto. Within 15 days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement and attached documents to ENGINEER with the required Bonds and insurances. Within 10 days after receipt of properly executed documents and Bonds and insurances which meet all requirements of the Contract Documents, ENGINEER will deliver one fully signed counterpart to Successful Bidder.

ARTICLE 21–RETAINAGE

21.01 Provisions concerning retainage are set forth in the Agreement.

ARTICLE 22–WAGE RATE DETERMINATION

22.01 A wage rate determination is not a requirement of this Project.

ARTICLE 23–PERFORMANCE BOND FOR WAGES DUE

23.01 Successful Bidders, whether a corporation, partnership, or individual, who has not been doing business in the State of Kentucky for five consecutive years, shall comply with KRS 337.200.

ARTICLE 24–LICENSES, FEES, AND TAXES

24.01 The Bid shall include all taxes in effect at the time the Bid is submitted, unless specifically exempted in the Bidding Documents. No change will be allowed for taxes from which OWNER is exempt. Bidders who are uncertain as to what items are subject to tax, or who require further explanation or clarification, are requested to contact the State of Kentucky Revenue Cabinet. Refer to the Supplementary Conditions SC-7.10 for additional information on taxes.

ARTICLE 25–KICKBACK STATUTES

25.01 Bidders shall comply with Kentucky Statute KRS 45A.455 Prohibitions Against Conflicts of Interests, Gratuities, and Kickbacks. See Supplementary Conditions SC-7.11.

ARTICLE 26–OTHER BID REQUIREMENTS

26.01 Bidders shall complete the following documents attached to the Bid:

Campaign Finance Disclosure
Labor Law Disclosure
Certificate of Resident Bidder Status
Other documents specific to the Project as listed in the Bid

ARTICLE 27–LAWS, ORDINANCES, AND REGULATIONS

27.01 Bidder must familiarize itself with all laws, ordinances, and regulations by federal, state, city, or other governmental agency, which by reason of being neglected or violated may affect the Work contemplated and must secure and pay the fee required for any permits which may be necessary unless such fees are otherwise indicated to be paid in the Bidding Documents.

ARTICLE 28–INSURANCE

28.01 Before execution of Contract by OWNER, the successful Bidder shall furnish OWNER a certificate or certificates issued by or on behalf of insurers or a self-insurance program or group self insurance program, qualified to do business in the Commonwealth of Kentucky under KRS Chapter 304 or KRS Chapter 342, certifying that the successful Bidder complies with the Worker's Compensation laws of Kentucky and is insured or indemnified against public liability claims which may arise out of the performance of the Work under the proposed Contract.

END OF SECTION

SECTION 00 41 00

BID

SOUTH HOPKINS WATER DISTRICT
MADISONVILLE, KENTUCKY
ELEVATED STORAGE TANK AND PUMP STATION PROJECT
CONTRACT 1-2025

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ARTICLE 10. BID SUBMITTAL

ARTICLE 1–BID RECIPIENT

1.01 Bids to be received until 11 A.M. local time, May 12, 2026.

1.02 Online electronic Bidding through QuestCDN.com is the only way the Bid will be accepted. To access the electronic Bid Form, download the Project documents and click the Online Bidding button.

1.03 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.

ARTICLE 2–BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

2.01 Bid Acceptance Period

A. This Bid will remain subject to acceptance for 85 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of OWNER.

2.02 Instructions to Bidders

A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

2.03 In submitting this Bid, Bidder represents the following:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the addenda.

2.04 Bidder will sign and deliver the required number of counterparts of the Agreement with the bonds, insurance certificates, and other documents required by the Bidding Requirements within 15 days after the date of OWNER's Notice of Award.

ARTICLE 3–BIDDER'S REPRESENTATIONS

3.01 Bidder's Representations

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.

2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.

4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.

5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.

6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as CONTRACTOR; and (c) Bidder's (CONTRACTOR's) safety precautions and programs.

7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no 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.

8. 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.

9. Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

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

11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4–BIDDER'S CERTIFICATIONS

4.01 Bidder certifies the following:

A. 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 collusive agreement or rules of any group, association, organization, or corporation.

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.

C. Bidder has not solicited or induced any individual or entity to refrain from Bidding.

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:

1. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the Bidding process.

2. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the Bidding process to the detriment of OWNER, (b) to establish Bid prices at artificial non-competitive levels, or (c) to deprive OWNER of the benefits of free and open competition.

3. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of OWNER, a purpose of which is to establish Bid prices at artificial, non-competitive levels.

4. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the Bidding process or affect the execution of the Contract.

ARTICLE 5–BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

The following abbreviations may be used in this Bid:

CIP	-	Complete in Place	LS	-	Lump Sum
CY	-	Cubic Yard	LT	-	Left
DI	-	Ductile Iron	MBF	-	Thousand Board Feet
DIA	-	Diameter	MFOB	-	Thousand Freight-On-Board
EA	-	Each	MH	-	Manhole
EST	-	Estimate(d)	RCP	-	Reinforced Concrete Pipe
EXCL	-	Excluding	RT	-	Right
FT	-	Feet	SF	-	Square Foot
GAL	-	Gallon	STA	-	Station
HERCP	-	Horizontal Elliptical RCP	SY	-	Square Yard
HRS	-	Hours	T	-	Ton
IN	-	Inch	VLF	-	Vertical Linear Foot
INCL	-	Including	W/	-	With
LBS	-	Pounds	W/O	-	Without
LF	-	Linear Foot			

BIDDERS SHOULD NOT ADD ANY CONDITIONS OR QUALIFYING STATEMENTS TO THIS BID OR THE BID MAY BE DECLARED IRREGULAR AS NOT BEING RESPONSIVE TO THE INSTRUCTIONS TO BIDDERS.

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By

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ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.

3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

5. *Bidder*—An individual or entity that submits a Bid to Owner.

6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.

7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.

8. *Change Order*—A document 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, or other revision to the Contract, issued on or after the Effective Date of the Contract.

9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.

10. *Claim*

a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

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requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.

b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.

c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.

d. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.

13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.

14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.

15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.

16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.

17. *Cost of the Work*—See Paragraph 13.01 for definition.

18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.

19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.

20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.

21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

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recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.

23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.

24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.

    a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.

    b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.

    c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.

25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.

27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.

28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.

29. *Notice to Proceed*—A written notice 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.

30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.

32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

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33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.

34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.

35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals.

36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

38. *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, and such other lands or areas furnished by Owner which are designated for the use of Contractor.

39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

40. *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.

41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.

42. *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 of such Work.

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43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.

44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.

45. *Supplier*—A manufacturer, fabricator, supplier, distributor, 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 a Subcontractor.

46. *Technical Data*

    a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.

    b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.

    c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.

47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.

48. *Unit Price Work*—Work to be paid for on the basis of unit prices.

49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

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1.02 *Terminology*

A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives*: The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

C. *Day*: The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*: The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

1. does not conform to the Contract Documents;

2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

3. 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 15.03 or Paragraph 15.04).

E. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, means 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, means 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, means to furnish and install said services, materials, or equipment complete and ready for intended use.

4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words "furnish," "install," "perform," or "provide," then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

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F. *Contract Price or Contract Times*: References to a change in "Contract Price or Contract Times" or "Contract Times or Contract Price" or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term "or both" is not expressed.

G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).

B. *Evidence of Contractor's Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.

C. *Evidence of Owner's Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

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into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.

B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

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ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.

C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.

D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will 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.

G. Nothing in the Contract Documents creates:

1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or

2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

A. *Standards Specifications, Codes, Laws and Regulations*

1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

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inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements*: Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents*: If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:

a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

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B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract 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 Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

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

4.03 *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

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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.

4.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 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 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.

B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. Abnormal weather conditions;

3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and

4. Acts of war or terrorism.

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D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:

1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.

2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.

3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.

E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:

1. The circumstances that form the basis for the requested adjustment;

2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;

3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;

4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and

5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.

Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.

F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.

G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

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B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all 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 directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

B. *Removal of Debris During Performance of the Work*: During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.

C. *Cleaning*: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

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and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading of Structures*: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;

2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and

3. Technical Data contained in such reports and drawings.

B. *Underground Facilities*: Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

C. *Reliance by Contractor on Technical Data*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

D. *Limitations of Other Data and Documents*: Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;

3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or

4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

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5.04 *Differing Subsurface or Physical Conditions*

A. *Notice by Contractor*: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;

2. is of such a nature as to require a change in the Drawings or Specifications;

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

B. *Engineer's Review*: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. *Owner's Statement to Contractor Regarding Site Condition*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

D. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

E. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in

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Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;

b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;

b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or

c. Contractor failed to give the written notice required by Paragraph 5.04.A.

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

F. *Underground Facilities; Hazardous Environmental Conditions*: Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

A. *Contractor's Responsibilities*: Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:

1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;

2. complying with applicable state and local utility damage prevention Laws and Regulations;

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3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;

4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and

5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then 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 7.15), notify Owner and Engineer in writing regarding such Underground Facility.

C. *Engineer's Review*: Engineer will:

1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;

2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;

3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and

4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

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

D. *Owner's Statement to Contractor Regarding Underground Facility*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

E. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

F. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

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or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;

b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and

c. Contractor gave the notice required in Paragraph 5.05.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;

2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures

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of construction to be employed by Contractor, and safety precautions and programs incident thereto;

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 removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.

H. 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

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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, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.

B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.

C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

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Regulations, and must be issued and signed by a surety named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.

E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.

F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.

G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.

H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.

B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

C. Alternative forms of insurance coverage, including but not limited to self-insurance and "Occupational Accident and Excess Employer's Indemnity Policies," are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.

D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

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Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.

F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

H. Contractor shall require:

1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and

2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.

I. If either party does not purchase or maintain the insurance required of such party by the Contract, 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.

J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.

K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

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L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.

M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.

N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

A. *Required Insurance*: Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.

B. *General Provisions*: The policies of insurance required by this Paragraph 6.03 as supplemented must:

1. include at least the specific coverages required;

2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;

3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;

4. apply with respect to the performance of the Work, whether such performance is 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; and

5. include all necessary endorsements to support the stated requirements.

C. *Additional Insureds*: The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:

1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;

2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;

3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

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4. not seek contribution from insurance maintained by the additional insured; and

5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.

B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.

C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.

E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against

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Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, 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 Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.

2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.

1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.

C. The waivers in this Paragraph 6.05 include the waiver of rights 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 insured peril, risk, or cause of loss.

D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

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6.06 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *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.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

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B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.

C. 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 will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment must 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.

7.05 *"Or Equals"*

A. *Contractor's Request; Governing Criteria*: Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item 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 is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.

1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that the proposed item:

1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

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2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;

3) has a proven record of performance and availability of responsive service; and

4) is not objectionable to Owner.

b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times; and

2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.

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

C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.

E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 *Substitutes*

A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.

2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

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3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:

    a. will certify that the proposed substitute item will:

        1) perform adequately the functions and achieve the results called for by the general design;

        2) be similar in substance to the item specified; and

        3) be suited to the same use as the item specified.

    b. will state:

        1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;

        2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

        3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.

    c. will identify:

        1) all variations of the proposed substitute item from the item specified; and

        2) available engineering, sales, maintenance, repair, and replacement services.

    d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.

B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

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E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.

B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.

C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.

D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.

E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.

F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

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H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.

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

K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.

L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.

M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *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 an 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 will be disclosed in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

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7.09 *Permits*

A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. 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 the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *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.

7.11 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.

C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

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

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7.13 *Safety and Protection*

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

B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.

C. 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, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.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 at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

E. 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.

F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.

H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

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I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).

J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as 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.

7.15 *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 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 by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

1. Before submitting a Shop Drawing or Sample, Contractor shall:

a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determine and verify:

1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;

2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;

c. confirm that the Submittal is complete with respect to all related data included in the Submittal.

2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

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3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.

1. *Shop Drawings*

a. Contractor shall submit the number of copies required in the Specifications.

b. Data shown on the Shop Drawings must 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 7.16.C.

2. *Samples*

a. Contractor shall submit the number of Samples required in the Specifications.

b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.

3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Engineer's Review of Shop Drawings and Samples*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. 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, comply with the requirements of 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, or to safety precautions or programs incident thereto.

3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will

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document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.

6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. *Resubmittal Procedures for Shop Drawings and Samples*

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.

2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.

3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. *Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs*

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:

   a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.

   b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.

   c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

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d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.

2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03. 2.04, and 2.05.

F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.

B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:

1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and

2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.

C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:

1. Observations by Engineer;

2. Recommendation by Engineer or payment by Owner of any progress or final payment;

3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. Use or occupancy of the Work or any part thereof by Owner;

5. Any review and approval of a Shop Drawing or Sample submittal;

6. The issuance of a notice of acceptability by Engineer;

7. The end of the correction period established in Paragraph 15.08;

8. Any inspection, test, or approval by others; or

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9. Any correction of defective Work by Owner.

E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (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 from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.

B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will 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.

7.19 *Delegation of Professional Design Services*

A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.

B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.

C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

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D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.

E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:

1. Checking for conformance with the requirements of this Paragraph 7.19;

2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and

3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.

F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.

G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.

C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.

D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

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E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, 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.

F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;

2. An itemization of the specific matters to be covered by such authority and responsibility; and

3. The extent of such authority and responsibilities.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

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B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.

1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.

2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.

C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all 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 damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

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

9.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

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9.05 *Lands and Easements; Reports, Tests, and Drawings*

A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.

B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.

C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *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.

9.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

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

B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

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ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *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.

10.02 *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 10.07. 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.

10.03 *Resident Project Representative*

A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.

B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

A. Engineer has the authority to reject Work in accordance with Article 14.

B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.

C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.

D. Engineer's authority as to changes in the Work is set forth in Article 11.

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E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

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

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, 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, will 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 Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer has been informed.

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ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.

B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.

C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders covering:

1. Changes in 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;

2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and

4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

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B. If Owner has issued a Work Change Directive and:

1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.

2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

A. Engineer may authorize minor changes in the Work if the changes 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. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.

B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.

B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.

C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *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, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.

B. An adjustment in the Contract Price will be determined as follows:

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1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);

2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or

3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).

C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit will 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 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;

b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;

c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;

d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;

e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and

f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

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11.08 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.

B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

A. *Purpose and Content*: Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

B. *Change Proposal Procedures*

1. *Submittal*: Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.

2. *Supporting Data*: The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.

    a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.

    b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

    The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Engineer's Initial Review*: Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.

4. *Engineer's Full Review and Action on the Change Proposal*: Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

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Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

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

ARTICLE 12—CLAIMS

12.01 *Claims*

A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:

1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and

4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.

B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

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and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.

D. *Mediation*

1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.

2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.

E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.

F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

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2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.

B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will 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 accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will 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, which 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 will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

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

5. Other costs consisting of the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

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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.

1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.

2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.

3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

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

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), 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 include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

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g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

2. The cost of purchasing, renting, or furnishing small tools and hand tools.

3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

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

5. 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.

6. Expenses incurred in preparing and advancing Claims.

7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:

a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.

b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:

1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.

2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.

2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

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Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 *Allowances*

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

B. *Cash Allowances*: Contractor agrees that:

1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.

C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

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

13.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

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

D. 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

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thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:

a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.

2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.

3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

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

14.02 *Tests, Inspections, and Approvals*

A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.

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.

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D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

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losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.

C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then 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, and provide all necessary labor, material, and equipment.

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages 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 pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, 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, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *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, then Owner may order Contractor to stop the Work,

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or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will 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.

14.07 *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 defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, 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 incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *Applications for Payments*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.

2. 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 must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

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establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

   a. the Work has progressed to the point indicated;

   b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

   c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

   b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

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4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

    a. to supervise, direct, or control the Work;

    b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;

    c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;

    d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or

    e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

    a. the Work is defective, requiring correction or replacement;

    b. the Contract Price has been reduced by Change Orders;

    c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

    d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

    e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

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

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

    a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

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b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

c. Contractor has failed to provide and maintain required bonds or insurance;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

f. The Work is defective, requiring correction or replacement;

g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

h. The Contract Price has been reduced by Change Orders;

i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;

j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

k. 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; or

l. Other items entitle Owner to a set-off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, 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, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *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 and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

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submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

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

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

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significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.

2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *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, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *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, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.

2. The final Application for Payment must be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents;

   b. consent of the surety, if any, to final payment;

   c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

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d. a list of all duly pending Change Proposals and Claims; and

e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Final Application and Recommendation of Payment*: 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 have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. 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. *Notice of Acceptability*: In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.

D. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.

E. *Final Payment Becomes Due*: Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

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appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such adjacent areas;
2. correct such defective Work;
3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.

B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.

C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all 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). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.

D. 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.

E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, 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.

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F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *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 written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and 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);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, 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 complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

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attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds 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.

F. 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, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 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 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 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

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provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal 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 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and

2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:

1. in person, by a commercial courier service or otherwise, to the recipient's place of business;

2. by registered or certified mail, postage prepaid, to the recipient's place of business; or

3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

A. When any period of time is referred to in the Contract 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.

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18.03 *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. 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.

18.04 *Limitation of Damages*

A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Assignment of Contract*

A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is 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.

18.09 *Successors and Assigns*

A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

18.10 *Headings*

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

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SECTION 00 73 00

SUPPLEMENTARY CONDITIONS

A. These Supplementary Conditions amend or supplement EJCDC© C-700, Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

B. The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

C. The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix “SC” added thereto.

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SC-1.01.A Defined Terms

Insert in the first sentence after the phrase "printed with initial capital letters" the following phrase:

"or with all capital letters"

SC-1.01.A.8 Change Order

Insert a comma and the word "ENGINEER" immediately after the word "CONTRACTOR" in this definition.

SC-1.01.A.18 Drawings

Add the following to the end of Paragraph 1.01.A.18:

The following Drawings are part of the Contract Documents:

Drawings titled, "Elevated Storage Tank and Pump Station Project, Contract 1-2025, South Hopkins Water District," Sheets No. 1 through No. 11, prepared by Strand Associates, Inc.® and Drawings listed in the table of contents that are bound at the back of these Specifications.

Electronic files were provided for the convenience of CONTRACTOR. The data on which CONTRACTOR may rely is limited to the paper copy.

SC-1.01.A.50 Work Change Directive

Amend the phrase "signed by OWNER" in the first sentence of Paragraph 1.01.A.50 to read as follows:

"signed by OWNER and CONTRACTOR."
Add the following language to the end of Paragraph 1.01.A.50:

A Work Change Directive cannot change Contract Price or Contract Times without a subsequent Change Order.

SC-1.01.A.51 Request for Information

Add the following new paragraph immediately after Paragraph 1.01.A.50:

51. Request for Information

Written request submitted by CONTRACTOR to ENGINEER on a form supplied by ENGINEER requesting clarification, interpretation, or additional information pertaining to Contract Documents.

SC-1.01.A.52 Geotechnical Engineer

Add the following new paragraph immediately after Paragraph 1.01.A.51:

52. Geotechnical Engineer

The individual or entity that prepared the geotechnical report that is referenced in the Supplementary Conditions and that provides geotechnical engineering services, if any, during construction of the Project.

SC-1.01.A.53 Testing Firm

Add the following new paragraph immediately after Paragraph 1.01.A.52:

53. Testing Firm

The individual or entity that performs materials testing during construction of the Project.

SC-1.01.A.54 Special Inspector

Add the following new paragraph after Paragraph 1.01.A.53:

54. Special Inspector

The individual(s) or entity(ies) that perform special inspection testing during construction of the Project as defined in the IBC Chapter 17 and as shown on the Drawings.

SC-2.01 Delivery of Bonds and Evidence of Insurance

Delete Paragraphs 2.01.B and 2.01.C in their entirety and insert the following in their place:

B. Evidence of CONTRACTOR's Insurance: When CONTRACTOR delivers the signed counterparts of the Agreement to OWNER, CONTRACTOR shall also deliver to OWNER copies of the policies (including all endorsements, and identification of applicable self-insured retentions and deductibles) of insurance required to be provided by CONTRACTOR in this Contract. CONTRACTOR may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

SC-2.03 Before Starting Construction

Add the following subparagraph to Paragraph 2.03:

4. a proposed listing of subcontractors and major material and equipment suppliers. The list shall include any proposed substitutions in accordance with Paragraph 7.06.

SC-2.05 Acceptance of Schedules

Add the following language to the end of Paragraph 2.05.A.2:

The schedule for submittals shall show all submittals complete before 50% of completion of the Work and the schedule for maintenance manuals shall show all submittals complete before 75% of completion of the Work.

Add the following new paragraph immediately after Paragraph 2.05.A:

B. The times included in this paragraph apply to the preliminary schedules. See Division 01 for other submittal and time requirements for the construction progress schedule and submittal schedule.

Add the following language to the end of Paragraph 2.05.A.3:

The Bid will be considered the Schedule of Values of the Work required by the General Conditions.

SC-3.03 Reporting Discrepancies

Add the following language at the end of Paragraph 3.03.A:

4. CONTRACTOR shall report apparent discrepancies to ENGINEER using a Request for Information form on a form supplied by ENGINEER. The Request for Information form shall:

a. be submitted by CONTRACTOR only;

b. be legible and complete;

c. not be used for the purposes of only confirming or verifying issues; and,

d. be prioritized by CONTRACTOR in the event that multiple Requests for Information are outstanding.

Requests for Information that are not in conformance with the requirements above shall be returned to CONTRACTOR without response.

5. CONTRACTOR shall not be relieved of its responsibility to coordinate the Work to prevent adverse impacts to CONTRACTOR's Project Schedule while submitting Requests for Information.

6. If CONTRACTOR believes the Scope of Work included in the Request for Information has a cost and/or time impact, CONTRACTOR should submit a claim in accordance with Article 12 of these General Conditions.

7. If CONTRACTOR proceeds with work when CONTRACTOR had actual knowledge or should have known that a conflict, error, ambiguity, or discrepancy existed as indicated above, correction of work constructed without such notification to ENGINEER shall be at CONTRACTOR's expense, (except in an emergency as authorized by Paragraph 7.15.A).

SC-3.04 Requirements of the Contract Documents

Delete Paragraph 3.04.C in its entirety.

SC-4.01 Commencement of Contract Times; Notice to Proceed

In the last sentence of Paragraph 4.01.A, change "60th day" to "85th day."

SC-4.03 Reference Points

Add the following new paragraph immediately after Paragraph 4.03.A:

B. CONTRACTOR is referred to the General Requirements for additional requirements for laying out the work.

SC-5.03 Subsurface and Physical Conditions

Add the following new paragraphs immediately after Paragraph 5.03.D:

E. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which CONTRACTOR may rely:

Report Title	Date of Report	Technical Data
Report of Geotechnical Exploration, South Hopkins Water Tank and Pump Station, Madisonville, Hopkins County, Kentucky, prepared by S&ME, Inc.	August 1, 2025	Boring methods, level of subsurface water, boring logs, laboratory test methods and results, and boring locations.

ENGINEER accepts no responsibility for accuracy of the soil data or water level information. Soil information, included with these Contract Documents, was not obtained for the purposes of designing excavations and trenches. Soil information was used by ENGINEER for design purposes only. CONTRACTOR shall assure itself by personal examination as to subsurface conditions and shall provide its own investigations and make its own assumptions to comply with OSHA and any other applicable laws and regulations regarding excavation and trenching requirements.

F. No drawings of physical conditions relating to existing surface or subsurface structures at the Site containing technical data, are known to OWNER. CONTRACTOR shall conduct its own personal investigation to determine conditions at the site which may affect the Work, including compliance with OSHA excavation and trenching requirements.

SC-5.05 Underground Facilities

Add the following paragraph immediately after Paragraph 5.05.F:

G. CONTRACTOR is referred to the General Requirements for requirements for keeping records of Underground Facilities and allowing facility owners to inspect.

SC-5.06 Hazardous Environmental Conditions at the Site

Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:

A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to OWNER.

B. Not Used.

SC-6.01 Performance, Payment and Other Bonds

Add the following paragraphs immediately after Paragraph 6.01.B:

1. The correction period specified as one year after the date of Substantial Completion in Paragraph 15.08.A of the General Conditions is hereby revised to be two years after Substantial Completion.

2. After Substantial Completion, CONTRACTOR shall furnish a warranty bond issued in the form of EJCDC® C-612, Warranty Bond (2018). The warranty bond must be in a bond amount of 10-percent of the final contract price. The warranty bond period will extend to a date two years after Substantial Completion of the work. CONTRACTOR shall deliver the fully executed warranty bond to OWNER prior to or with the final application for payment, and in any event no later than 11 months after Substantial Completion.

3. The warranty bond must be issued by the same surety that issues the performance bond required under Paragraph 6.01.A of the general conditions.

Add the following new paragraphs immediately after Paragraph 6.01.H:

I. The forms of the performance and payment or other Bonds attached hereto shall be used for the Contract. Note instructions thereon as to the form applicable. Each form contemplates one corporate surety only. In case co-sureties or individual sureties will be furnished, proper forms therefore shall be obtained. Besides the stipulations of Paragraphs 6.01 through 6.03, the surety on the Bonds shall provide a certificate indicating surety is licensed to underwrite contracts in the jurisdiction of the project location which shall be attached to the Bonds.

SC-6.03 CONTRACTOR's Insurance

Add the following new language to the end of Paragraph 6.03.C.3:

CONTRACTOR shall provide an executed endorsement form CG 20 01 04 13, or equal, supporting this requirement.

Add the following new paragraphs under Paragraphs 6.03.C:

D. Other Additional Insureds: As a supplement to the provisions of Paragraph 6.03.C of the General Conditions, the commercial general liability, automobile liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies must include as additional insureds (in addition to OWNER and ENGINEER) the following: Wet or Dry Tank Inspection.

E. Worker's Compensation and Employer's Liability: CONTRACTOR shall purchase and maintain workers' compensation and employer's liability insurance, including, as applicable, United States Longshoreman and Harbor Workers' Compensation Act, Jones Act, stop-gap employer's liability coverage for monopolistic states, and foreign voluntary workers' compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

Workers' Compensation and Related Policies	**Policy limits of not less than:**
Workers' Compensation	
State	Statutory
Applicable Federal (e.g., Longshoreman's)	Statutory
Foreign voluntary workers' compensation (employer's responsibility coverage), if applicable	Statutory
Employer's Liability	
Each accident	$2,000,000
Each employee	$2,000,000
Policy limit	$2,000,000

F. *Commercial General Liability—Claims Covered:* CONTRACTOR shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of CONTRACTOR, on an occurrence basis, against claims for:

1. damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees,

2. damages insured by reasonably available personal injury liability coverage, and

3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

G. *Commercial General Liability—Form and Content:* CONTRACTOR's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage.

a. Such insurance must be maintained for three years after final payment.

b. CONTRACTOR shall furnish OWNER and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.

2. Blanket contractual liability coverage, including but not limited to coverage of CONTRACTOR's contractual indemnity obligations in Paragraph 7.18.

3. Severability of interests and no insured-versus-insured or cross-liability exclusions.

4. Underground, explosion, and collapse coverage.

5. Personal injury coverage.

6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together), or equal, for each required additional insured. If CONTRACTOR demonstrates to OWNER that the specified ISO endorsements are not commercially available, then CONTRACTOR may satisfy this requirement by providing equivalent endorsements.

7. Insurance certificates for commercial general, automobile, and umbrella shall specifically indicate by name the additional insureds which are to include OWNER and ENGINEER as well as other persons or entities so identified. Certificates shall be Acord 25-S or equivalent.

8. Endorsements or General Liability policy shall not exclude supervisory or inspection services.

H. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:

1. Any modification of the standard definition of "insured contract" (except to delete the railroad protective liability exclusion if CONTRACTOR is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).

2. Any exclusion for water intrusion or water damage.

3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.

4. Any exclusion of coverage relating to earth subsidence or movement.

5. Any exclusion for the insured's vicarious liability, strict liability, or statutory liability (other than worker's compensation).

6. Any limitation or exclusion based on the nature of CONTRACTOR's work.

7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

I. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	Policy limits of not less than:
General Aggregate	$2,500,000
Products—Completed Operations Aggregate	$2,000,000
Personal and Advertising Injury	$2,000,000
Bodily Injury and Property Damage—Each Occurrence	$2,000,000

General Aggregate Limits specified above shall apply separately to this project by attachment of:

"Amendment of Limits of Insurance–Designated Location(s) General Aggregate Limit" Endorsement (ISO Form No. CG 25 04 05 09) or "Designated Construction Project(s) General Aggregate Limit" Endorsement (ISO Form CG 25 03 05 09) or equivalent endorsement coverage.

J. *Automobile Liability:* CONTRACTOR shall purchase and maintain automobile liability insurance 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. The automobile liability policy must be written on an occurrence basis.

Automobile Liability	Policy limits of not less than:
Bodily Injury	
Each Person	$1,000,000
Each Accident	$1,000,000
Property Damage	
Each Accident	$1,000,000
or	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	$1,000,000

CONTRACTOR shall also provide an Additional Insured Endorsement for the automobile policy. Endorsement form shall be CA 20 48, or equal.

K. *Umbrella or Excess Liability:* CONTRACTOR shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the Paragraphs above. The coverage afforded must be at least as broad as that of each and every one of the underlying policies.

Excess or Umbrella Liability	Policy limits of not less than:
Each Occurrence	$2,000,000
General Aggregate	$2,000,000

L. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* CONTRACTOR may meet the policy limits specified for employer's liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy's policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy was required under this Contract, at a specified minimum policy limit, such umbrella or excess policy must retain a minimum limit of $2,000,000 after accounting for partial attribution of its limits to underlying policies, as allowed above.

M. *Contractor's Pollution Liability Insurance:* CONTRACTOR shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from CONTRACTOR's operations and completed operations. This insurance must be maintained for no less than three years after final completion.

Contractor's Pollution Liability	**Policy limits of not less than:**
Each Occurrence/Claim	$1,000,000
General Aggregate	$1,000,000

☐ If box is checked, CONTRACTOR is not required to provide this insurance.

CONTRACTOR's Pollution Liability coverage shall include coverage for fungus, mold, and bacteria.

N. *Contractor's Professional Liability Insurance:* If CONTRACTOR will provide or furnish professional services under this *Contract*, through a delegation of professional design services or otherwise, then CONTRACTOR shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance must cover negligent acts, errors, or omissions in the performance of professional design or related services by the insured or others for whom the insured is legally liable. The insurance must be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. The retroactive date on the policy must pre-date the commencement of furnishing services on the Project.

CONTRACTOR's Professional Liability	**Policy limits of not less than:**
Each Claim	$2,000,000
Annual Aggregate	$2,000,000

☐ If box is checked, CONTRACTOR is not required to provide this insurance.

O. Waiver of Subrogation: CONTRACTOR's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall provide a waiver of subrogation covering OWNER and ENGINEER, and any individuals or entities identified in the Supplementary Conditions. CONTRACTOR shall obtain all necessary endorsements to support these requirements. Endorsement shall be CG 24 04 05 09, or equal.

P. General Liability, Automobile Liability, and Umbrella Liability shall include coverage for mental anguish and punitive damages.

Q. The specimen Insurance Certificate bound at the end of this section has been prepared as a guide to assist CONTRACTOR and CONTRACTOR's Insurance Agent when preparing the required insurance documentation. This specimen certificate is included as a representation of what acceptable documents will look like. Specific project information must be included when preparing the actual document.

SC-6.04 Builder's Risk and Other Property Insurance

Supplement Paragraph 6.04 of the General Conditions with the following provisions:

F. *Builder's Risk Requirements:* The builder's risk insurance must:

1. be written on a builder's risk "all risk" policy form that at a minimum includes insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment stored and in transit, and must not exclude the coverage of the following risks: fire; windstorm; hail; flood; earthquake, volcanic activity, and other earth movement; lightning; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; and water damage (including that caused by flood and hydrostatic pressure).

a. Such policy will include an exception that results in coverage for ensuing losses from physical damage or loss with respect to any defective workmanship, methods, design, or materials exclusions.

b. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake, volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance will be provided through other insurance policies acceptable to OWNER and CONTRACTOR.

2. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including OWNER-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

3. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of contractors, engineers, and architects).

4. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).

5. extend to cover damage or loss to insured property while in transit.

6. allow for the waiver of the insurer's subrogation rights, as set forth in this Contract.

7. allow for partial occupancy or use by OWNER by endorsement, and without cancellation or lapse of coverage.

8. be maintained in effect until the Work is complete, as set forth in Paragraph 15.06.D of the General Conditions, or until written confirmation of OWNER's procurement of property insurance following Substantial Completion, whichever occurs first.

9 include as named insureds OWNER, CONTRACTOR, Subcontractors (of every tier), and any other individuals or entities required by this Contract to be insured under such builder's risk policy. For purposes of Paragraphs 6.04, 6.05, and 6.06 of the General Conditions, and this and all other corresponding Supplementary Conditions, the parties required to be insured will be referred to collectively as "insureds."

G. *Builder's Risk and Other Property Insurance Deductibles:* The purchaser of any required builder's risk, installation floater, or other property insurance will be responsible for costs not covered because of the application of a policy deductible.

SC-7.03.C Labor; Working Hours

Add the following new paragraph immediately after Paragraph 7.03.C:

D. CONTRACTOR shall be responsible for the cost of any overtime pay or other expense incurred by OWNER for ENGINEER's services (including those of the Resident Project Representative, if any), OWNER's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If CONTRACTOR is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then OWNER may impose a reasonable set-off against payments due under Article 15.

SC-7.04.B Services, Materials, and Equipment Warranty

Add the following to the end of Paragraph 7.04.B:

Suppliers shall be deemed to impliedly warrant that their products and all component materials incorporated into them are suitable and fit for the intended use of such products and shall be free from defect in material, workmanship or design, such warranty to run to the benefit of OWNER and ENGINEER. The foregoing applies whether the products or their component materials are specified in the Contract Documents or are of Supplier's design.

SC-7.09 Permits

Delete last sentence of Paragraph 7.09.A and add the following in its place:

See General Requirements and technical specification sections for utility charge provisions.

Add Paragraph 7.09.B as follows:

B. See General Requirements for additional permit information.

SC-7.10 Taxes

Add the following new paragraph immediately after Paragraph 7.10.A:

B. OWNER is exempt from payment of sales and compensating use taxes of the State of Kentucky, the City of Madisonville, and the County of Hopkin on equipment and material purchases used for the drinking water portions of the Work to be incorporated into the Work in accordance with KRS 139.480.

1. OWNER will furnish the required certificates of tax exemption to CONTRACTOR for use in the purchase of supplies and materials to be incorporated into the Work.

2. OWNER's exemption also does not apply to construction tools, machinery, equipment, or other property purchased by or leased by CONTRACTOR, or to supplies or materials not incorporated into the Work.

SC-7.11 Laws and Regulations

Add the following new paragraph immediately after Paragraph 7.11.C:

D. CONTRACTOR shall comply with the following, including all reporting or notification requirements.

1. Kickback Statutes–CONTRACTOR shall comply with the requirements of KRS 45A.455 with respect to gratuities and kickbacks among other matters.

2. Campaign Finance Disclosure–CONTRACTOR shall comply with requirements of KRS 45A.395 with respect to campaign finance laws.

3. Labor Law Disclosures–CONTRACTOR shall comply with requirements of KRS 45A.343 with respect to labor law disclosure.

4. Payment Bond for Wages Due–CONTRACTOR, whether a corporation, partnership, or individual, who have not been doing business in the State of Kentucky for 5 consecutive years, shall comply with KRS 337.200 which requires a Performance Bond to assure payment of wages.

SC-7.12 Record Documents

In Paragraph 7.12.A delete last sentence and insert the following:

Upon completion of the Work, these record documents, samples, and shop drawings shall be delivered by CONTRACTOR to OWNER.

SC-7.13 Safety and Protection

Add the following language to the end of Paragraph 7.13.A:

If the Work includes excavation or trenches, CONTRACTOR shall keep at the Site at all times during the progress of the Work a competent person to comply with OSHA trenching and excavation requirements. The competent person shall be one who is capable of identifying existing and predictable hazards in the

surroundings, or working conditions that are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

SC-7.18 Indemnification

Delete the word “negligent” from Paragraph 7.18.A.

Add the following to the end of Paragraph 7.18.A:

In addition, CONTRACTOR shall indemnify, hold harmless, and pay for the defense of OWNER and ENGINEER from and against claims, losses, or damages in regard to any act or failure to act by OWNER or ENGINEER in connection with general supervision, inspection and/or coordination of CONTRACTOR's operations.

CONTRACTOR shall, at its own expense, appear, defend, and pay all fees of attorneys and all costs and other expenses arising therefrom or incurred in connection therewith; and, if any judgments shall be rendered against any individual or entity indemnified hereunder in any such action, CONTRACTOR shall, at its own expense, satisfy and discharge same. CONTRACTOR expressly understands and agrees that any Letter of Credit or insurance protection required by the Contract, or otherwise provided by CONTRACTOR, shall in no way limit the responsibility to indemnify, hold harmless, and defend any individual or entity indemnified hereunder as herein provided.

Add the following new paragraph immediately after Paragraph 7.18.B:

C. For any matter for which OWNER and ENGINEER are indemnified under Paragraph 7.18.A, CONTRACTOR shall pay for OWNER’s and ENGINEER’s reasonable defense, 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 or awards until OWNER or ENGINEER are found negligent.

D. In Paragraphs 7.18.A through C as may be amended by the Supplementary Conditions, ENGINEER shall also include Wet of Dry Tank Inspections.

SC-7.19 Delegation of Professional Design Services

Add the following new paragraphs immediately after Paragraph 7.19.G:

H. The design professional providing the design calculations and design drawings shall be licensed in the State of the Project.

I. The design calculation and design drawings are not shop drawings, but shall be submitted to ENGINEER separately along with the required shop drawings for the system, material, or equipment specified. These calculations will be forwarded to OWNER for their records.

SC-9 OWNER's Responsibilities

Add the following new paragraph immediately after Paragraph 9.12:

SC-9.13 OWNER's Site Representative

A. OWNER will furnish an "OWNER's Site Representative" to represent OWNER at the Site and assist OWNER in observing the progress and quality of the Work. OWNER's Site Representative is not ENGINEER's consultant, agent, or employee. On this project, OWNER's Site Representative shall be Wet or Dry Tank Inspections.

SC-10.03 Resident Project Representative

Add the following new subparagraph immediately after Paragraph 10.03.A:

1. Strand Associates, Inc.® provided design services for the Project and will assume all duties and responsibilities of ENGINEER in Article 10 with the exception of Paragraph 10.03.

Add the following new paragraphs immediately after Paragraph 10.03.B:

C. The Resident Project Representative (RPR) will be OWNER's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with ENGINEER and CONTRACTOR. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of CONTRACTOR. The RPR will not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).

2. Exceed limitations of ENGINEER's authority as set forth in the Contract Documents.

3. Undertake any of the responsibilities of CONTRACTOR, Subcontractors, or Suppliers.

4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.

5 Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of OWNER or CONTRACTOR.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by ENGINEER.

7. Authorize OWNER to occupy the Project in whole or in part.

SC-11.01 Amending and Supplementing the Contract

Delete the second sentence in Paragraph 11.01.C in its entirety.

SC-11.07 Change of Contract Price

Amend the phrase at the end of Paragraph 11.07.B.2 to read:

(which may include an allowance for overhead and profit in accordance with Paragraph 11.07.C.2. unless OWNER and CONTRACTOR agree that these allowances are not appropriate for the Work involved.)

SC-11.09.C Change Proposals

Delete Paragraph 11.09.C in its entirety and insert the following in its place:

"Not used."

SC-11.10 Notification to Surety

Add the following new paragraphs immediately after Paragraph 11.10.A:

B. CONTRACTOR shall be responsible for notifying the surety of any assignment, modification, or change of the Contract, change in the Work covered thereby, or extension of time for the completion of the project.

C. Failure to provide notice to the surety of any such change shall not exonerate the surety from its obligations under the bond.

SC-12.01.A Claims Process

Delete Paragraph 12.01.A.3 in its entirety and insert the following in its place:

"Not used."

SC-13.03 Unit Price Work

Delete Paragraph 13.03.E in its entirety and insert the following in its place:

E. Adjustments in Unit Price

1. CONTRACTOR or OWNER shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:

a. the extended price of a particular item of Unit Price Work amounts to 15 percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by CONTRACTOR differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and

b. CONTRACTOR's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.

2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in CONTRACTOR's costs to perform such other

Work, such that the resulting overall change in Contract Price is equitable to OWNER and CONTRACTOR.

3. Adjusted unit prices will apply to all units of that item.

SC-14.02.A Tests and Inspections

Add the following to the beginning of Paragraph 14.02.A:

All Work is subject to testing to indicate compliance with Contract Document requirements. Copies of test results of all tests required shall be submitted to ENGINEER. Tests and inspection of work may be conducted by OWNER or an independent laboratory employed by OWNER. Tests may also be performed in the field by ENGINEER as a basis for acceptance of the Work.

Add the following to the end of Paragraph 14.02.A:

Samples required for testing shall be furnished by CONTRACTOR at no cost to OWNER. In the event that completed Work does not conform to specification requirements during the initial test, the Work shall be corrected and retested for conformance. The entire cost of retesting completed Work shall be borne by CONTRACTOR. This shall include the extra cost for inspection to OWNER which will be deducted from the final amount due CONTRACTOR.

SC-15.01 Progress Payments

Add the following language at the end of Paragraph 15.01.B.1:

An updated Progress Schedule shall be submitted with each Application for Payment. Applications for Payment submitted without an acceptable updated Progress Schedule will be returned to CONTRACTOR without review. Progress Schedules that are submitted which do not reflect current project conditions, will not be considered acceptable.

SC-15.01.B Applications for Progress Payment

Delete Paragraph 15.01.B.3 in its entirety and renumber Paragraph 15.01.B.4 as 15.01.B.3.

Add the following language at the end of Paragraph 15.01.B.3:

No payments will be made that would deplete the retainage, place in escrow any funds that are required for retainage, or invest the retainage for the benefit of CONTRACTOR.

Add the following paragraphs immediately after Paragraph 15.01.B.3:

4. CONTRACTOR shall submit with each pay request CONTRACTOR's partial waiver of lien for the full amount of the requested payment. Beginning with the second pay request, and with each succeeding pay request, CONTRACTOR shall submit partial waivers of lien for each Subcontractor and Supplier showing that the amount paid to date to each is at least equivalent to the total value of Subcontractor's or Supplier's work, less retainage, included on the previous pay request. CONTRACTOR shall submit with each pay request a signed Waiver of Lien Log clearly documenting the following:

a. The names of all Subcontractors/Suppliers on the project.

b. Contract amounts for each Subcontractor/Supplier.

c. Amount paid to date to each Subcontractor/Supplier.

d. Lien waivers provided with current pay application for previous month's payments.

e. Amount to be paid to each Subcontractor/Supplier included in the pending pay request.

f. Remaining balance for each Subcontractor/Supplier.

5. No advanced payment for shop drawing preparation will be made. Shop drawing costs will be paid when equipment and materials are delivered and suitably stored on the site.

6. All stored equipment and materials for which payment is requested shall have invoices included with the pay request. Equipment shall be identified thoroughly on the invoices, including serial numbers.

7. Payment for the stored equipment and material which are on the site shall not exceed the invoiced amount for each item, less the Contract retainage. The overhead and profit for the stored items shall not be invoiced until the item is installed.

8. Payment for off-site storage is normally reserved for sensitive or very large pieces of equipment that in ENGINEER's opinion would not be practical to have stored on the site. Payment for off-site stored items shall be limited to 75% of the invoiced value of the item, less Contract retainage. CONTRACTOR shall reimburse OWNER the cost of inspecting off-site stored items. When off-site storage is approved, CONTRACTOR shall provide Insurance Certificates and Document of Ownership to OWNER.

SC-15.02 CONTRACTOR's Warranty of Title

Amend Paragraph 15.02.A by striking out the following text: "no later than seven days after the time of payment by OWNER" and inserting "no later than the time of payment by OWNER."

SC-15.03 Substantial Completion

Add the following new subparagraph to Paragraph 15.03.B:

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by ENGINEER, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by CONTRACTOR to OWNER. If CONTRACTOR does not pay, or the parties are unable to agree as to the amount owed, then OWNER may impose a reasonable set-off against payments due under this Article 15.

SC-15.08 Correction Period

Add the following new Paragraph 15.08.G:

G. The correction period specified as one year after the date of Substantial Completion in

Paragraph 15.08.A of the General Conditions, as may be amended by the Supplementary Conditions, is hereby revised to be the number of years set forth in SC-6.01.B.1.

Add the following new Paragraph 15.08.H:

H. If Substantial Completion for the entire work is never requested by CONTRACTOR, the correction period shall commence after final payment.

SC-16.02 OWNER May Terminate for Cause

Add the following new paragraphs immediately after Paragraph 16.02.B.2:

3. complete the Work as OWNER may deem expedient at the expense of CONTRACTOR and surety;

4. apply the amounts retained from partial payments to the completion of the Work; and

5. authorize the surety to complete the steps in Paragraphs 16.02.B.1 through 4.

SC-16.03 OWNER May Terminate for Convenience

Add the following paragraph after Paragraph 16.03.B:

C. CONTRACTOR shall require similar provisions contained in Paragraph 16.03 in each of its subcontracts to protect CONTRACTOR from claims by Subcontractors arising from OWNER's termination for convenience, or to minimize claims by such subcontractors. The remedy provided to CONTRACTOR under this Paragraph 16.03 shall be CONTRACTOR's sole remedy in the event of termination for convenience by OWNER.

END OF SECTION

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

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

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

PRODUCER	CONTACT NAME:	
Insurance Agency	PHONE (A/C, No, Ext):	FAX (A/C, No):
	E-MAIL ADDRESS:	
	PRODUCER CUSTOMER ID #:	

INSURED	INSURER(S) AFFORDING COVERAGE	NAIC #
Contractor	INSURER A : Insurance Company	
	INSURER B :	
	INSURER C :	
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

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

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS		
	GENERAL LIABILITY						EACH OCCURRENCE	$	
	X COMMERCIAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea occurrence)	$	2,000,000
	CLAIMS-MADE X OCCUR						MED EXP (Any one person)	$	
		X					PERSONAL & ADV INJURY	$	2,000,000
							GENERAL AGGREGATE	$	2,500,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						PRODUCTS - COMP/OP AGG	$	2,000,000
	POLICY X PRO-JECT LOC							$	
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$	1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$	1,000,000
	ALL OWNED AUTOS						BODILY INJURY (Per accident)	$	1,000,000
	SCHEDULED AUTOS	X					PROPERTY DAMAGE (Per accident)	$	1,000,000
	HIRED AUTOS							$	
	NON-OWNED AUTOS							$	
	UMBRELLA LIAB X OCCUR						EACH OCCURRENCE	$	2,000,000
	EXCESS LIAB CLAIMS-MADE	X					AGGREGATE	$	2,000,000
	PROFESSIONAL LIABILITY						EACH CLAIM	$	2,000,000
							AGGREGATE	$	2,000,000
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N						X WC STATU-TORY LIMITS OTH-ER		
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH)	N/A					E.L. EACH ACCIDENT	$	2,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$	2,000,000
							E.L. DISEASE - POLICY LIMIT	$	2,000,000
	BUILDER'S RISK, POLLUTION LIABILITY						SEE SC-6.04 EACH CLAIM	$	1,000,000
							GENERAL AGGREGATE	$	1,000,000

SPECIMEN

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

Elevated Storage Tank and Pump Station Project, Contract 1-2025, South Hopkins Water District, Kentucky
The South Hopkins Water District, Wet or Dry Tank Inspections, and Strand Associates, Inc. are additional insured with respect to General Liability, Automobile Liability, Pollution Liability, and Excess/Umbrella Liability. The South Hopkins Water District is an insured with respect to Builder's Risk policy. In addition, see attached Additional Insured Endorsements for the General Liability and Automobile Liability policies.

CERTIFICATE HOLDER

South Hopkins Water District
129 South Main Street
Dawson Springs, KY 42408

Wet or Dry Tank Inspection
1609 Hillsboro Road
Campbellsburg, KY 40011

(Provide separate certificate to each party.)

Strand Associates, Inc.
325 West Main Street, Suite 710
Louisville, KY 40202

CANCELLATION

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

AUTHORIZED REPRESENTATIVE

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SPECIFICATIONS

SECTION 01 11 00

SUMMARY OF WORK

PART 1–GENERAL

1.01 DIVISION ONE

A. The requirements of Division 01 apply to all sections of the Contract.

1.02 PROJECT SCOPE

A. CONTRACTOR shall provide all items, articles, materials, operations or methods mentioned or scheduled on the Drawings or herein specified: including all labor, supervision, equipment, incidentals, taxes, and permits necessary to complete the Work as described within the Contract Documents. CONTRACTOR shall install all items provided by OWNER as mentioned or scheduled on the Drawings or herein specified.

1.03 CONTRACT DOCUMENTS–INTENT AND USE

A. Intent of Documents:
   1. Singular notations and Specifications shall be considered plural where application is reasonably inferred.
   2. Mention or indication of extent of work under any division or Specification section is done only for convenience of CONTRACTOR and shall not be construed as describing all work required under that division or section.
   3. Some individual sections may contain a list of related sections. The list of related sections in individual sections is provided for the convenience of CONTRACTOR and is not necessarily all-inclusive. CONTRACTOR may not rely upon this listing for determination of scope of work. Other sections of the Specifications not referenced in individual sections shall apply as required for proper performance of the Work.
   4. Command type sentences may be used in the Contract Documents. These sentences refer to and are directed to CONTRACTOR.
   5. Symbols for various elements and systems are shown on the Drawings. Should there be any doubt regarding the meaning or intent of the symbols used, a written interpretation shall be obtained from ENGINEER.

B. Use of Documents:
   1. CONTRACTOR shall examine all Specifications and Drawings for the Work, including those that may pertain to Work CONTRACTOR does not normally perform with its own forces.
   2. CONTRACTOR shall use all of the Project Drawings and Specifications:
      a. For a complete understanding of the Project.
      b. To determine the type of construction and systems required.
      c. For coordination with other contractors.
      d. To determine what other work may be involved in various parts or phases.
      e. To anticipate and notify others when work by others will be required.
      f. And all other relevant matters related to the project.
   3. CONTRACTOR is also bound by all requirements of the Contract Documents which are applicable to, pertain to, or affect its Work as may be shown or inferred by the entire set of Project Drawings and Specifications.

1.04 CONTRACTOR USE OF SITE

A. General:
   1. The “area of the site” referred to in these Specifications shall be as shown on the Drawings. If the “area of the site” is not shown, OWNER's property lines, the Project right-of-way and/or any easements obtained for the Project shall be considered the “area of the site.”
   2. Construction activities shall be confined within the “area of the site” limits.
   3. From the start of work to completion CONTRACTOR is responsible for the care of the site and the premises which are affected by operations of Work of this Contract.
   4. Except for permanent site improvements provided under the Contract, CONTRACTOR shall restore property disturbed during the Work, to the conditions which previously existed.
   5. Work in occupied spaces shall be restricted to specified Work and essential activities, such as making necessary connections and extending services or constructing temporary access ways. Such work shall be scheduled in advance with OWNER.

B. Parking and Deliveries:
   1. CONTRACTOR is responsible for control of traffic by vehicles and persons within the limits of its operations.
   2. Parking for employees, subcontractors, and agents of CONTRACTOR shall be in areas subject to approval of OWNER.
   3. Access to the site for delivery of construction material or equipment shall be subject to approval of OWNER.

1.05 EXISTING SERVICES, OVERHEAD UTILITIES, AND UNDERGROUND FACILITIES INCLUDING STRUCTURES

A. Interruption of existing services and systems including heating, ventilating, air conditioning, water, sanitary, lighting and power, signal and security systems, and similar work shall be kept to an absolute minimum and shall be limited to times approved by OWNER.

B. If deemed necessary by OWNER, such work shall be accomplished after OWNER’s normal office hours.

C. Work shall not commence until all labor, materials, and equipment are available so Work can continue without interruption or delay.

D. Should uncharted or incorrectly charted services or Underground Facilities be encountered during installation, notify OWNER and consult with utility owner immediately.

E. Cooperate with OWNER and utility companies in keeping respective services and Underground Facilities in operation and repair any damage.

F. CONTRACTOR shall not interrupt existing services and Underground Facilities occupied and used by OWNER or others, except when permitted in writing by OWNER.

G. Any accidental interruption of services and Underground Facilities shall be repaired immediately, including provision of temporary facilities until permanent repairs can be made.

H. Prior to any excavation, demolition, or drilling on site, CONTRACTOR shall contact owners of the Underground Facilities in and near the construction area of the intent to excavate,

demolish, or drill. As part of this notification requirement, CONTRACTOR shall contact the utility notification service Kentucky 811 (811 or 1-800-752-6007) at least two but not more than 10 business days in advance of any work. CONTRACTOR shall be aware that not all owners participate in Kentucky 811. A call to this agency shall not absolve CONTRACTOR of the requirements for contacting all owners of Underground Facilities in and near the construction area. CONTRACTOR shall give reasonable advance notice to Kentucky 811 and other owners–such notification shall not be less than the minimum advance notification required.

I. Locations and elevations of services and Underground Facilities as shown on the Drawings are approximate. It shall be CONTRACTOR's responsibility to determine their exact location when in their vicinity. To this end, CONTRACTOR shall proceed with caution in the excavation and preparation of the Site so the exact location of services and Underground Facilities can be determined. CONTRACTOR shall include in the Contract Price any costs for temporary or permanent relocations of such services and Underground Facilities required to complete the Work unless specifically indicated otherwise in the Specifications.

J. Where potential grade conflicts might occur with existing services and Underground Facilities, CONTRACTOR shall uncover such services and Underground Facilities sufficiently in advance of construction so that elevations may be determined to allow any necessary adjustments to be made.

K. CONTRACTOR shall coordinate with overhead utility companies prior to the Work. CONTRACTOR shall provide all necessary temporary and permanent support relocation or temporary and permanent restraint to maintain overhead utilities in service.

L. CONTRACTOR shall keep an accurate and complete record of all such services and Underground Facilities encountered and shall provide OWNER a copy of this record. The record shall include a description of the item encountered, opinion as to conditions, and adequate measurements and depths so that the item can be located in the future.

M. CONTRACTOR shall inspect all services and Underground Facilities for condition and soundness. Unsound conditions shall be reported to OWNER immediately after exposing. CONTRACTOR shall not proceed with the Work until the service or facility owner has been notified. Service or facility owner shall then be given time to inspect and correct, if required, the service or Underground Facility. CONTRACTOR may make claim under the provisions of Articles 11 and 12 of the General Conditions should CONTRACTOR feel a price or time adjustment is justified.

N. Any additional costs incurred because of failure of CONTRACTOR to report the condition of any and all existing services and Underground Facility encountered shall be paid for by CONTRACTOR.

O. Whenever ENGINEER feels it is necessary to explore and excavate to determine the location of existing services and Underground Facilities, CONTRACTOR shall make explorations and excavations for such purposes. If CONTRACTOR is required to perform additional Work in making the explorations and excavations, extra compensation will be allowed as provided for in the General Conditions.

1.06 PROTECTION OF WORK AND IMPROVEMENTS

A. CONTRACTOR shall protect the property of OWNER, existing improvements, and the Work installed by CONTRACTOR and others from abuse, damage, dust, debris, and other objectionable materials resulting from construction activities.

B. CONTRACTOR shall provide suitable covers, partitions, or other dust and fume containment devices to suit construction operations.

C. CONTRACTOR shall keep property, existing improvements, and the Work including structures, mains, fittings, and accessories free from dirt and foreign matter at all times.

D. CONTRACTOR shall provide temporary plugging of openings, holes, and pipe ends that are existing or that CONTRACTOR has installed.

E. Property, improvements, and Work damaged by CONTRACTOR shall be repaired or replaced by CONTRACTOR to the satisfaction of OWNER.

F. CONTRACTOR is cautioned that existing public and private streets, alleyways, and roads may not hold up to typical construction traffic or activities. CONTRACTOR shall repair or replace streets, alleyways, roads, and shoulders damaged by its construction activities to their original condition at CONTRACTOR's expense.

1.07 AVAILABILITY OF LANDS

A. Easements were obtained for this Project. CONTRACTOR shall confine its operations, equipment and storage areas to the easements, lands and rights-of-way in which the Project is to be located. CONTRACTOR may enter into written agreements with property owners for use of other lands during construction. Copies of such agreements shall be provided to OWNER.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 29 00

CONTRACT CONSIDERATIONS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Measurement and Payment.

1.02 MEASUREMENT AND PAYMENT

A. Payment will be based on the accepted schedule of values for the Project.

B. An acceptable schedule of values will include the following features:
   1. Schedule shall list the installed value of the component parts of the work in sufficient detail to serve as a basis for computing values for progress payments during construction. Schedule shall be subdivided as necessary by specification section and work area.
   2. Identify each line item with the number and title of the respective Specification Section.
   3. For each major line item list sub-values of major products or operations under the item.
   4. For the various portions of the work:
      a. Each item shall include a directly proportional amount of CONTRACTOR's overhead and profit.
      b. For items on which progress payments will be requested for stored materials, break down the value into:
         (1) The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials upon request by ENGINEER.
         (2) The total installed value.
   5. The sum of all values listed in the schedule shall equal the total Contract Sum.
   6. Schedule shall include a separate listing of general items such as bonds, insurance, mobilization, demobilization, field supervision, record documents, and cash allowances.

C. Once a schedule of values is accepted, it shall not be revised, except for changes associated with subsequently executed change orders.

D. No separate measurement for payment will be performed.

E. CONTRACTOR shall estimate percentage of Work completed. ENGINEER will review CONTRACTOR's estimate of quantity of Work completed.

F. Payment will be made based on the percentage of the Contract completed less retainage and/or liquidated damages.

G. Unless noted otherwise, all Work described in the Specifications and/or shown on the Drawings shall be included in the Bid.

H. Some technical specification sections may include payment provisions. These provisions are in addition to the provisions of this section which apply to all of the Work.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 31 00

COORDINATION, FIELD ENGINEERING, AND MEETINGS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Coordination.
   2. Field Engineering.
   3. Progress Meetings.
   4. Preinstallation Meeting.
   5. Preconstruction Video.

1.02 COORDINATION

A. CONTRACTOR shall coordinate scheduling, submittals, and work of the various sections of the work to provide an efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. CONTRACTOR shall verify utility requirements and characteristics of operating equipment are compatible with building utilities and coordinate Work of various sections having interdependent responsibilities for installing, connecting to, and placing in service such equipment.

C. CONTRACTOR shall coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on the Drawings and shall follow routing shown for pipes, ducts, and conduit as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas, except as otherwise indicated, CONTRACTOR shall conceal pipes, ducts, and wiring within the construction and coordinate locations of fixtures and outlets with finish elements.

E. CONTRACTOR shall coordinate completion and cleanup of Work of separate sections in preparation for substantial completion and for portions of Work designated for OWNER's occupancy.

F. After OWNER occupancy of premises, CONTRACTOR shall coordinate access to Site for correction of defective Work and Work not in accordance with Contract Documents to minimize disruption of OWNER's activities.

1.03 FIELD ENGINEERING

A. CONTRACTOR shall locate and protect property stakes, legal survey monuments, benchmarks, and survey control and reference points. CONTRACTOR shall pay for replacement of disturbed property stakes and legal survey monuments by a Registered Land Surveyor acceptable to OWNER and for replacement of benchmarks and survey control and reference points provided by ENGINEER.

B. CONTRACTOR shall provide field engineering services as required to establish elevations, lines, and levels utilizing recognized engineering survey practices.

C. CONTRACTOR shall furnish all required plummets and graduated poles to check all Work.

D. If stakes and boards have to be reset because of negligence of CONTRACTOR, CONTRACTOR shall bear the cost of such work.

E. If laser beam is used, CONTRACTOR shall check its Work against intermediate grade stakes provided between manholes. Prior to initial use of the laser, CONTRACTOR shall set up laser on ground surface and check line and gradient controls. Lasers not functioning properly shall be immediately removed.

F. CONTRACTOR shall be responsible for all lines, elevations, and measurements of buildings, structures, piping, utilities, and other work executed by CONTRACTOR under the Contract. CONTRACTOR must exercise proper precaution to verify figures before laying out the Work and will be held responsible for any error resulting from its failure to exercise such precaution.

1.04 PROGRESS MEETINGS

A. Progress meetings will be held throughout progress of the Work at intervals agreed to by OWNER, ENGINEER, and CONTRACTOR. Interval will generally be monthly.

B. CONTRACTOR's project manager, job superintendent, major subcontractors, and suppliers shall attend as appropriate to address agenda topics for each meeting. CONTRACTOR's representatives shall have authority to bind CONTRACTOR to decisions at the meetings.

C. The project schedule shall be updated monthly and shall be reviewed at each progress meeting.

D. CONTRACTOR shall also provide the following information in written form at each meeting.
   1. Construction progress, including:
      a. Activities completed this reporting period.
      b. Activities in progress this reporting period.
      c. Activities scheduled to commence this reporting period.
   2. Description of problem areas.
   3. Current and anticipated delays.
      a. Cause of the delay.
      b. Corrective action and schedule adjustments to correct the delay.
      c. Impact of the delay on other activities, on milestones, and on completion dates.
   4. Changes in construction sequence.

E. ENGINEER will prepare and distribute minutes to all attending parties.

1.05 PREINSTALLATION MEETING

A. When required in individual specification sections, CONTRACTOR shall convene a preinstallation meeting at Work Site prior to commencing Work of the section.

B. CONTRACTOR shall require attendance of parties directly affecting or affected by work of the specific section.

C. CONTRACTOR shall notify ENGINEER seven days in advance of meeting date.

D. CONTRACTOR shall prepare agenda and preside at meeting:
   1. Review conditions of installation, preparation, and installation procedures.
   2. Review coordination with related work.

E. CONTRACTOR shall record minutes and distribute copies to participants and those affected by decisions made within one week after meeting.

1.06 PRECONSTRUCTION VIDEO

A. Prior to mobilization at the site, CONTRACTOR shall furnish to ENGINEER a high-resolution color audio-video recording of all planned construction areas, including but not limited to streets, driveways, sidewalks, curbs, fencing, visible utilities, retaining structures, and adjacent building structures. The purpose of the video is to document existing conditions and to provide a fair measure of required restoration. Care should be taken to record all existing conditions that exhibit deterioration, imperfections, structural failures, or situations that would be considered substandard.

B. The video recording shall be performed by a professional firm specializing in audio-video work. The videos shall be high quality, color, and high-resolution. The video shall be provided in a digitized format that is supported by Window Media Player. The videos shall be provided via DVD, thumb drive, or other media requested by OWNER. Temporary lighting shall be provided as necessary to properly video areas where natural lighting is insufficient (indoors, shadows, etc.). The videos shall include an audio soundtrack, to provide the following information.
   1. Detailed description of location being viewed referenced to Contract Drawings (i.e., station number, building designation, pipeline route, etc.).
   2. Direction (N, S, E, W, looking up, looking down, etc.) of camera view.
   3. Date, time, temperature, and environmental conditions at time of video.

C. Video recording shall not be performed during inclement weather or when the ground is covered partially of totally with snow, ice, leaves, etc.

D. As many videos as are necessary to satisfy the requirements of this section shall be prepared. The original videos shall be submitted to ENGINEER accompanied by a detailed log of the contents of each video. The log should include location descriptions to facilitate the quick location of information contained in the videos. The videos will be maintained by ENGINEER during construction and may be viewed at any time by CONTRACTOR upon request. Upon final acceptance, the videos will become permanent property of OWNER.

E. All costs associated with this shall be included in the Lump Sum Bid for this Work.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 33 00

SUBMITTALS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Whenever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or by reference to recognized industry standards.
   2. To facilitate CONTRACTOR's understanding of the design intent, procedures have been established for advance submittal of design data and for its review or rejection by ENGINEER.
   3. The type of submittal requirements specified in this section include construction progress schedule, submittal schedule, shop drawings, product data, samples, maintenance manuals, and other miscellaneous work-related submittals.

B. Related work described elsewhere: More detailed requirements for submittals are described in other sections of these Specifications for some materials and equipment. They are to be considered additional requirements to supplement the requirements specified in this section. Submittals shall conform to Article 7 of the General Conditions.

C. Definitions: "Electronic Submittal" is defined as any submittal transmitted electronically to ENGINEER for review.

1.02 IDENTIFICATION OF SUBMITTALS

A. CONTRACTOR shall completely identify each submittal and resubmittal by showing at least the following information:
   1. Name and address of submitter, plus name and telephone number of the individual who may be contacted for further information.
   2. Name and location of project and identification number.
   3. Drawing number and Specifications section number to which the submittal applies.
   4. Include the date of each submittal or resubmittal.

1.03 GROUPING OF SUBMITTALS

A. Unless otherwise specifically permitted by ENGINEER, CONTRACTOR shall make all submittals in groups containing all associated items so that information is available for checking each item when it is received.

B. Partial submittals may be rejected as not complying with the provisions of the Contract Documents.

1.04 TIMING OF SUBMITTALS

A. CONTRACTOR shall make all submittals far enough in advance of scheduled dates of installation to provide required time for reviews, for securing necessary approval, for possible revision and resubmittal, and for placing orders and securing delivery.

B. The review period for submittals that are received after 3 P.M. shall commence on the following business day.

1.05 CONSTRUCTION PROGRESS AND SUBMITTAL SCHEDULES

A. Submit preliminary schedules within 10 days of the Effective Date of the Contract.

B. Revise schedules incorporating any comments provided at the schedule review conference required in GC-2.05 and resubmit.

C. As a minimum, the construction progress schedule shall consist of a horizontal bar chart with a separate line for each major portion of Work or operation, identifying first workday of each week.

D. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration for each activity. Identify activities that are on the critical path.

E. Include line items for milestones (if any), Substantial, and Final Completion.

F. Submit updated schedules with each Application for Payment, identifying changes since previous version.

G. Indicate estimated percentage of completion for each item of Work at each submission.

H. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates.

1.06 SHOP DRAWINGS

A. Shop drawings shall include specially prepared technical data for this project including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements, and similar information not in standard printed form for general application to a range of similar projects. Shop drawings shall be submitted for all manufactured or fabricated items. See individual technical sections for special requirements.

B. CONTRACTOR shall make all shop drawings accurately to scale and sufficiently large to show all pertinent aspects of the item and its method of connection to the work.

C. Shop drawings shall be checked, approved, and stamped by CONTRACTOR in accordance with the General Conditions before transmittal to ENGINEER for review and approval.

D. Complete shop drawings and descriptive data shall be submitted on all manufactured or fabricated items prior to 50% completion of the Work. Applications for payment beyond 50% of the Contract amount will not be recommended for payment until all shop drawings are submitted, including color hard copies if requested by OWNER, or a revised schedule for any remaining submittals is agreed to by OWNER and ENGINEER.

E. CONTRACTOR shall submit shop drawings following the electronic submittal procedure described below.

F. Shop drawings submitted to ENGINEER will be reviewed and stamped “Approved,” “Approved as Noted,” “Approved as Noted-Resubmit,” or “Not Approved.” CONTRACTOR shall resubmit shop drawings stamped “Approved as Noted-Resubmit” and “Not Approved,” and will continue this process until shop drawings are stamped “Approved” or “Approved as Noted.” If Drawings are stamped “Approved as Noted-Resubmit,” fabrication may proceed in accordance with the marked-up shop drawings. Installation shall not proceed until shop drawings have been resubmitted and stamped “Approved” or “Approved as Noted.”

G. If shop drawings are stamped “Approved as Noted” or “Approved as Noted-Resubmit” and CONTRACTOR does not agree with revisions or cannot conform with revisions, fabrication shall not proceed and shop drawings shall be resubmitted with explanation of CONTRACTOR’s position.

H. All shop drawings used for construction site activities shall bear the “Approved” or “Approved as Noted” stamp of ENGINEER.

I. PDF Submittal Procedures:
   1. Summary:
      a. Shop drawing and product data submittals shall be transmitted to ENGINEER in electronic (PDF) format.
      b. The intent of PDF submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.
      c. The PDF submittal process is not intended for color samples, color charts, or physical material samples.
   2. Procedures:
      a. CONTRACTOR shall review and apply a stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer/product, dimensions and coordination of information with other parts of the work.
      b. CONTRACTOR shall transmit each cover letter and submittal to ENGINEER as an e-mail attachment.
      c. ENGINEER will return the reviewed shop drawing via e-mail with a transmittal letter, after review, indicating the status of the shop drawing review.
      d. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of CONTRACTOR.
      e. Electronically submitted shop drawings shall follow the following format:
         (1) Filenames for the shop drawing submittals shall follow a XX XX XX.YYY-Z. Description convention where XX XX XX is the Specification section number, YYY is the submittal number, .Z is the resubmittal number, and description is a short description of what the submittal includes. Submittals shall be consecutively numbered in direct sequence of submittal. Resubmittals shall be consecutively numbered with the first submittal numbered with a -0 and the first resubmittal numbered with a -1. Example file name: 03 20 00.016-1. Structure 10 Concrete Reinforcement. This would be the first revision of the sixteenth submittal and contain information on concrete reinforcement.
         (2) All files shall be delivered in PDF format with a minimum resolution of 300 dpi unless otherwise requested by ENGINEER. Scanned in material shall be scanned in color and any markings by CONTRACTOR shall be made in red. Pages shall be rotated to the appropriate position for easy reading on a computer monitor such that the majority of text is vertical.
         (3) Files shall be delivered without security features activated.

(4) Shop Drawings shall be uploaded as individual files. All pages of one submittal should be contained in one file.
(5) The file shall open to a cover page containing, at a minimum, the following information:
(a) CONTRACTOR's stamp.
(b) Name, e-mail, and telephone number of the individual who may be contacted for further information.
(c) Project number.
(d) Submittal number.
(e) Submission date, if resubmittal, all previous submission dates.
(f) Index detailing contents and the total number of pages in the submittal.

f. Once a shop drawing has been "Approved" or "Approved as Noted," CONTRACTOR shall provide three hard color copies of the "Approved" or "Approved as Noted" shop drawings to ENGINEER. CONTRACTOR is responsible for the hard copy color replication of ENGINEER's "Approved" or "Approved as Noted" shop drawings for use by CONTRACTOR. Hard copy shop drawings shall be submitted in 3-ring binders or 3-tab report covers.

J. Shop drawings shall include verification that the item meets applicable codes and standards.

1.07 PRODUCT DATA

A. CONTRACTOR shall provide product data as required to supplement shop drawings.

B. Product data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by CONTRACTOR to illustrate a material, product, or system for some portion of the work.

C. CONTRACTOR shall collect required product data into one submittal for each unit of work or system.

D. CONTRACTOR shall include manufacturer's standard printed recommendations for application and use, compliance with standards, performance characteristics, wiring and piping diagrams and controls, component parts, finishes, dimensions, required clearances, and other special coordination requirements.

E. CONTRACTOR shall mark each copy of standard printed data to identify pertinent products, models, options, and other data.

F. CONTRACTOR shall supplement manufacturer's standard data to provide information unique to the work.

1.08 RESUBMISSION REQUIREMENTS

A. Make any corrections or changes in the submittals required by ENGINEER.

B. Shop Drawings and Product Data:
1. Revise initial drawings or data and resubmit as specified for initial submittal.
2. Itemize in a cover letter any changes which have been made other than those requested by ENGINEER.

1.09 MANUFACTURER'S DIRECTIONS

A. Manufactured articles, materials, and equipment shall be stored, commissioned, operated, applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer, unless specified to the contrary.

B. Wherever Specifications call for work to be performed or materials to be installed in accordance with the manufacturer's printed instructions or directions, CONTRACTOR shall furnish copies as required for shop drawings of those instructions or directions to ENGINEER before installing the material or performing the work.

1.10 MAINTENANCE MANUAL

A. Prior to 75% completion of the Contract or at a minimum of 45 days prior to the scheduled start-up date of any individual item of equipment, whichever is earlier, CONTRACTOR shall furnish to ENGINEER two complete color hard copies of a maintenance manual for all equipment furnished. Applications for payment beyond 75% of the contract amount will not be recommended for payment until all maintenance manuals are submitted or a revised schedule for remaining maintenance manuals is agreed to by OWNER and ENGINEER.

B. The manuals shall include manufacturer's instructions for maintenance and operation for each item of mechanical and electrical equipment. Manuals shall be specific for the equipment as installed; provide project specific inserts as required. Manuals shall contain: operation instructions, lubrication schedules, types and quantities, preventative maintenance program, spare parts list, parts lists, I.D. No. and exploded views, assembly instructions, parts supplier location, trouble shooting and startup procedures and, where applicable, test data and curves.

C. All sheets shall have reduced dimensions as described for shop drawings, and shall be furnished in 3-ring binders or 3-tab report covers.

D. CONTRACTOR is responsible for producing an electronic version of the Equipment Operations and Maintenance (O&M) Manuals Manual. The Electronic Equipment O&M Manual shall be delivered in Portable Document Format (PDF). The entire manual may be converted to PDF via scanning or other method of conversion. Drawings or other graphics must be converted to PDF format and made part of the PDF document. CONTRACTOR shall provide all Equipment O&M Manuals in the electronic format as defined below.

E. The filename for the Equipment O&M Manual submittal will be provided with the request for final Equipment O&M Manuals. Filenames use the "eight dot three" convention (XX XX XX_YY.PDF) where XX XX XX is the specification section number and YY is an ID number. No one file shall be larger than 10 MB. If technical problems require that the submittal be divided into more than one file, a letter extension shall be added to the end of each filename.

F. The number of files shall be kept to a minimum. Equipment O&M Manuals that span more than one file shall have the final Bookmark "Return to Table of Contents" which shall take the User to the first file on the Equipment O&M Manual.

G. All text (word processed), spreadsheets, and electronic graphics shall be delivered in portable document format (*.PDF). The resolution of all scanned images shall be a minimum of 300 dpi unless otherwise requested by ENGINEER. Scanned images shall be processed with the "original image with hidden text" option (Adobe Acrobat 6 or higher). This results in

a clear image and provides for optical character recognition (OCR) and word search functionality. Graphical files shall be fully searchable. All submittals must be indexed with the Adobe Catalog feature. Placement and structure of index files shall be in accordance with Adobe's recommendations to minimize problems when transferring files. Successful searches for words or strings in the PDF document shall demonstrate proof of OCR.

H. Rotate pages viewed in landscape to the appropriate position for easy reading on a computer monitor.

I. Bookmarks shall be created in the navigation frame for each entry in the Table of Contents. Three levels deep is usually enough (i.e., “Chapter,” “Section,” “Subsection”); however, complex submittals like instrumentation and electrical may be required at the discretion of ENGINEER. When setting bookmarks for Chapter level heading, the page shall be displayed at Full Page. Section and Subsection level heading pages shall be displayed as a magnified view. Bookmarks shall be displayed as subordinate to other bookmarks in their hierarchy set so that only the Chapter level headings are displayed.

J. Thumbnails shall be generated and embedded in each PDF file.

K. Files shall be delivered without Security features activated. Password protected files will be unacceptable.

L. The opening view for PDF files shall be set as follows:
   1. Initial View: Bookmarks and Page
   2. Magnification: Fit In Window
   3. Page Layout: Single Page

M. The file shall open to the cover page of the Equipment O&M Manual with bookmarks to the left. The first bookmark shall be the name of Equipment O&M Manual.

N. O&M Manual PDFs shall be delivered electronically.

O. CONTRACTOR shall reprocess any portion of the document that does not view or print to OWNER's satisfaction.

P. CONTRACTOR is fully responsible for obtaining any and all copyright permissions associated with conversion of this information to electronic format.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

EQUIPMENT MAINTENANCE SUMMARY FORM(1)

Equipment No.:

Specification Section:

Equipment Name:

Building Name: Room No.:

Plant Location:

Manufacturer:

Address:

Phone:

Service Representative:

Address:

Phone: Fax:

Make: Model:

Serial No.: Type:

Size:

Equipment Speed:

Capacity:

Operating Range:

Material:

Alarms:

Drive Ratio:

Motor Speed: Service Factor:

Volts: Phase: hp: Efficiency:

Motor Type:

Motor Sensors:

Motor Manufacturer:

Model: Motor Frame:

Insulation Class: FLA: LRA:

(1) Complete as applicable; attach supplementary pages as necessary.

Maintenance Requirements

(Use additional sheets if more space is needed.)

LUBRICATION

Item	Generic Type of Lubricant	Supplier	Estimated Frequency	Annual Quantity

PREVENTIVE MAINTENANCE

Item	Action	Frequency	Reference

SUGGESTED MINIMUM SPARE PARTS LIST

Manufacturer	Part No.	Quantity Unit	Description

The following information is included in O&M Manual:

Check or mark N/A

1. Recommended installation, adjustment, calibration, and troubleshooting. _____
2. Complete internal and connection wiring diagrams. _____
3. Complete parts lists, by generic title and identification number, with exploded views of each assembly. _____
4. Disassembly, overhaul, and reassembly instructions. _____
5. Recommended prestart checks. _____
6. Recommended start procedure. _____
7. Recommended shutdown procedure for both short and long term. _____
8. Recommended operating precautions that include safety for personnel and equipment. _____
9. Recommended standing maintenance procedure. _____

END OF SECTION

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
1. OSHA Requirements.
2. Roadway Limits.
3. Permits.
4. Wage Rates.
5. Recording and Preserving Historical and Archaeological Finds.

1.02 OSHA REQUIREMENTS

A. All work including site safety, equipment, materials, and fabricated items provided under the Contract shall comply with the provisions of the "Occupational Safety and Health Act" (OSHA), the Kentucky Occupational Safety and Health Act (KYOSH), and all other applicable federal, state, county and local laws, ordinances, codes, the requirements set forth herein, and any regulations that may be specified in other parts of these Contract Documents. Where any of these are in conflict, the more stringent requirements shall be followed.

B. CONTRACTOR's failure to thoroughly familiarize itself with the aforementioned safety provisions shall not relieve CONTRACTOR from compliance with the obligations and penalties set forth therein.

1.03 ROADWAY LIMITS

A. CONTRACTOR shall comply with roadway weight restrictions including seasonal weight restrictions.

1.04 PERMITS

A. The following permit was obtained by OWNER: Kentucky Division of Water Construction Permit.

B. The permit is included as an attachment to this division. CONTRACTOR shall comply with all provisions of this permit and shall be responsible for notifications as required by this permit. CONTRACTOR shall obtain all other permits required for the Work. Where the requirements of any permit is more restrictive than the Drawings or the Specifications, the permit requirements shall govern.

C. Any permits required for dewatering operations shall be obtained and paid for by CONTRACTOR.

1.05 WAGE RATES

A. A state wage rate determination is not a requirement of this Project.

1.06 RECORDING AND PRESERVING HISTORICAL AND ARCHAEOLOGICAL FINDS

A. In the event archaeological materials (arrowheads, stone tools, stone axes, prehistoric and historic pottery, bottles, foundations, Civil War artifacts, and other types of artifacts) are uncovered during the construction of the Project, Work is to immediately cease at the location and the Kentucky Heritage Council shall be contacted. The telephone number is (502) 564-7005. Construction shall not commence at this location until a written release is received from the Kentucky Heritage Council. Failure to report a find could result in legal action.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 42 00

REFERENCE STANDARDS AND DEFINITIONS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Reference Standards:
      a. Throughout the Contract Documents, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics.
      b. Where materials or workmanship are required by these Contract Documents to meet or exceed the specifically named code or standard, it is CONTRACTOR's responsibility to provide materials and workmanship which meet or exceed that specifically named code or standard.
      c. It is also CONTRACTOR's responsibility, when so required by the Contract Documents, to deliver to ENGINEER all required proof that the material or workmanship, or both, meet or exceed the requirements of the specifically named code or standard.
   2. Definitions:
      a. A substantial amount of specification language constitutes definitions for terms found in other Contract Documents, including the Drawings which must be recognized as diagrammatic in nature and not completely descriptive of requirements indicated thereon.
      b. Certain terms used in the Contract Documents are defined generally in this section to supplement definitions of the Agreement, General Conditions, Supplementary Conditions, and other general contract documents.
      c. Definitions and explanations of this section are not necessarily either complete or exclusive, but are general for the Work.

B. Related Work Described Elsewhere: The specific naming of codes or standards occurs on the Drawings and in other sections of these Specifications.

1.02 QUALITY ASSURANCE

A. Familiarity with Pertinent Codes and Standards:
   1. It is CONTRACTOR's responsibility to verify the requirements of the specifically named codes and standards and to verify that the items procured for use in this Work meet or exceed the specified requirements.
   2. When required by individual sections of these Specifications, CONTRACTOR shall obtain a copy of each pertinent code or standard and maintain the copies at the job site during submittals, planning, and progress of the Work until Substantial Completion of the Work is attained.

B. Overlapping or Conflicting Requirements:
   1. Where compliance with two or more industry standards or sets of requirements are specified, and the overlapping of those standards or requirements establishes different or conflicting minimums or levels of quality, the most stringent requirement (which is

generally recognized to be also most costly) is intended and will be enforced, unless more detailed language written directly into Contract Documents clearly indicates that a less stringent requirement is acceptable.

2. Refer all uncertainties to ENGINEER for decision before proceeding.

1.03 REFERENCE STANDARDS

A. Applicable standards of the construction industry are made a part of the Contract Documents by reference as if copied directly into the Contract Documents, or as if published copies were bound herewith. See Article 3.02 of the General Conditions for additional provisions regarding references.

B. Standards referenced directly in the Contract Documents or by governing regulation, have precedence over nonreferenced standards which are recognized in industry for applicability to the Work.

C. Nonreference standards are hereby defined to have no particular applicability to the Work except as a general measurement of whether the Work complies with standards recognized in the construction industry.

D. Reference standards and codes listed in these Specifications may include, but are not necessarily limited to, standards or codes published by the following agencies and organizations:

1. AA — Aluminum Association
   1525 Wilson Boulevard, Arlington, VA 22209

2. AAMA — American Architectural Manufacturer's Association
   1827 Walden Office Square Suite 550, Schaumberg, IL 60173-4268

3. AASHTO — American Association of State Highway & Transportation Officials
   444 North Capitol Street NW Suite 249, Washington, DC 20001

4. ACI — American Concrete Institute
   38800 Country Club Drive, Farmington Hills, MI 48331-3439

5. AI — Asphalt Institute
   2696 Research Park Drive, Lexington, KY 40511-8480

6. AISC — American Institute of Steel Construction
   One East Wacker Drive Suite 700, Chicago, IL 60601-1802

7. AISI — American Iron and Steel Institute
   25 Massachusetts Avenue NW Suite 800, Washington, DC 20001

8. ANSI — American National Standards Institute
   25 West 43rd Street, New York, NY 10036

9. APA — American Plywood Association
   7011 South 19th, Tacoma, WA 98466-5333

10. API	American Petroleum Institute 1220 L Street NW, Washington, DC 20005-4070
11. ARI	Air-Conditioning & Refrigeration Institute 4100 North Fairfax Drive Suite 200, Arlington, VA 22203
12. ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers 1791 Tullie Circle NE, Atlanta, GA 30329
13. ASME	American Society of Mechanical Engineers Two Park Avenue, New York, NY 10016-5990
14. ASSE	American Society of Sanitary Engineering 901 Canterbury Suite A, Westlake, OH 44145
15. ASTM	ASTM International 100 Barr Harbor Drive, West Conshohoken, PA 19428-2959
16. AWI	Architectural Woodwork Institute 46179 Westlake Drive Suite 120, Potomac Falls, VA 20165-5874
17. AWPA	American Wood Protection Association P.O. Box 361784, Birmingham, AL 35236-1784
18. AWS	American Welding Society 8669 Doral Boulevard Suite 130, Doral, FL 33166
19. AWWA	American Water Works Association 6666 West Quincy Avenue, Denver, CO 80235
20. BHMA	Builder's Hardware Manufacturers Association 355 Lexington Avenue 15th floor, New York, NY 10017
21. BIA	Brick Industry Association 1850 Centennial Park Drive Suite 301, Reston, VA 20191
22. CRSI	Concrete Reinforcing Steel Institute 9333 North Plum Grove Road, Schaumburg, IL 60173
23. DOT	U.S. Department of Transportation 1200 New Jersey Avenue, SE, Washington, DC 20590
24. EJMA	Expansion Joint Manufacturers Association 25 North Broadway, Tarrytown, NY 10591
25. FM	FM Global FM Global Corporate Offices, 270 Central Avenue, Johnston, RI 02919

26. FTI	Facing Tile Institute Box 8880, Canton, OH 44711
27. GA	Gypsum Association 6525 Belcrest Road Suite 480, Hyattsville, MD 20782
28. GANA	Glass Association of North America 800 SW Jackson Street Suite 1500, Topeka, KS 66612-1200
29. ICC	International Code Council 500 New Jersey Avenue NW 6th Floor, Washington, DC 20001
30. IES	Illuminating Engineering Society 120 Wall Street, Floor 17, New York, NY 10005-4001
31. MIL	Military Specifications Naval Publications and Forms Center 5801 Tabor Avenue, Philadelphia, PA 19120
32. NAAMM	National Association of Architectural Metal Manufacturers 800 Roosevelt Road Building C Suite 312, Glen Ellyn, IL 60137
33. NCMA	National Concrete Masonry Association 13750 Sunrise Valley Drive, Herndon, VA 20171-4662
34. NECA	NECA National Electrical Contractors Association 3 Bethesda Metro Center Suite 1100, Bethesda, MD 20814
35. NEMA	National Electrical Manufacturers Association 1300 North 17th Street Suite 1752, Rosslyn, VA 22209
36. NFPA	National Fire Protection Association 1 Batterymarch Park, Quincy, MA 02169-7471
37. NIST	National Institute of Standards and Technology (U.S. Department of Commerce), 100 Bureau Drive, Stop 1070 Gaithersburg, MD 20899-1070
38. NRCA	National Roofing Contractors Association 10255 West Higgins Road Suite 600, Rosemont, IL 60018-5607
39. NSF	National Sanitation Foundation International P.O. Box 130140, 789 North Dixboro Road, Ann Arbor, MI 48113-0140
40. OSHA	Occupational Safety & Health Administration 200 Constitution Avenue NW, Washington, DC 20210
41. PCA	Portland Cement Association 5420 Old Orchard Road, Skokie, IL 60077

42. PCI — Prestressed Concrete Institute
200 West Adams Street Suite 2100, Chicago, IL 60606

43. SAE — Society of Automotive Engineers
SAE World Headquarters
400 Commonwealth Drive, Warrendale, PA 15096-0001

44. SDI — Steel Deck Institute
P.O. Box 25, Fox River Grove, IL 60021

45. SDI — Steel Door Institute
30200 Detroit Road, Westlake, OH 44145-1987

46. SIGMA — Sealed Insulating Glass Manufacturers Assoc.
401 North Michigan Avenue Suite 2400, Chicago, IL 60611

47. SJI — Steel Joist Institute
234 Cheves Street, Florence, SC 29501

48. SMACNA — Sheet Metal and Air Conditioning
Contractor's National Association
4201 Lafayette Center Drive, Chantilly, VA 20151-1219

49. SSPC — Society for Protective Coatings
40 24th Street 6th Floor, Pittsburgh, PA 15222-4656

50. TCA — Tile Council of America
100 Clemson Research Boulevard, Anderson, SC 29625

51. UL — Underwriters Laboratories
333 Pfingston Road; Northbrook, IL 60062

1.04 SUBMITTALS

A. For OWNER's records, CONTRACTOR shall submit copies of permits, licenses, certifications, inspection reports, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

1.05 DEFINITIONS

A. Indicated:
1. The term “indicated” is a cross-reference to details, notes, or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in the Contract Documents.
2. Where terms such as “shown,” “noted,” “scheduled,” and “specified” are used in lieu of “indicated,” it is for the purpose of helping the reader locate cross-reference, and no limitation is intended except as specifically noted.

B. Approve (or Words of Similar Nature):
   1. Where used in conjunction with ENGINEER's response to submittals, requests, applications, inquiries, reports, and claims by CONTRACTOR, the meaning of the term “approve” will be held to the limitation of ENGINEER's responsibilities and duties as specified in Paragraph 1.02.B of the General Conditions.
   2. In no case will “approval” by ENGINEER be interpreted as a release of CONTRACTOR from responsibility to fulfill requirements of the Contract Documents.

C. Minimum Requirements:
   1. Indicated requirements are for a specific minimum acceptable level of quality or quantity, as recognized in the industry.
   2. Actual work must comply with (or within specified tolerances) or exceed minimums.
   3. CONTRACTOR shall refer uncertainties to ENGINEER before proceeding.

D. Abbreviations: Abbreviations, where not defined in the Contract Documents, will be interpreted to mean the normal construction industry terminology.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

PART 1–GENERAL

1.01 SUMMARY

A. Work Includes:
   1. Quality Assurance–Control of Installation.
   2. Tolerances.
   3. Manufacturers' Field Services and Reports.

1.02 QUALITY ASSURANCE–CONTROL OF INSTALLATION

A. CONTRACTOR shall monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce Work of specified quality.

B. CONTRACTOR shall comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, CONTRACTOR shall request clarification from ENGINEER before proceeding.

D. CONTRACTOR shall comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Work shall be performed by persons qualified to produce workmanship of specified quality.

F. CONTRACTOR shall secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.03 TOLERANCES

A. CONTRACTOR shall monitor tolerance control of installed products to produce acceptable work and shall not permit tolerances to accumulate.

B. CONTRACTOR shall comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, CONTRACTOR shall request clarification from ENGINEER before proceeding.

C. CONTRACTOR shall adjust products to appropriate dimensions; position before securing products in place.

1.04 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified in individual specification sections or when requested by ENGINEER, CONTRACTOR shall require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, and quality of workmanship.

B. CONTRACTOR shall submit qualifications of observer to ENGINEER 30 days in advance of required observations.

C. CONTRACTOR shall report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

D. CONTRACTOR shall submit report in duplicate within 30 days of observation to ENGINEER for information.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Temporary Utilities.
   2. Construction Sign.
   3. Removal of Temporary Facilities.
   4. Temporary Stockpiling of Excavated Fill Material Storage Area.

B. CONTRACTOR shall arrange for and provide temporary facilities as required for proper and expeditious prosecution of the Work.

C. CONTRACTOR shall pay all costs, except as otherwise specified, until final acceptance of the Work unless OWNER makes arrangements for use of completed portions of the Work after substantial completion in accordance with the provisions of the General Conditions.

D. CONTRACTOR shall make all temporary connections to utilities and services in locations acceptable to OWNER and local authorities having appropriate jurisdiction.
   1. Furnish all necessary labor and materials.
   2. Make all installations in a manner subject to the acceptance of such authorities and OWNER.
   3. Maintain such connections.
   4. Remove temporary installation and connection when no longer required.
   5. Restore services and sources of supply to proper operating conditions.

1.02 TEMPORARY UTILITIES

A. Temporary Toilets: CONTRACTOR shall provide and maintain sanitary temporary chemical toilets located where approved by OWNER and in sufficient number required for the work force employed by CONTRACTOR.

B. Temporary Electrical Services:
   1. CONTRACTOR shall make all necessary arrangements, furnish, install, and maintain necessary temporary electrical services at the Site. CONTRACTOR shall remove all temporary services when Project is complete.
   2. All utility charges for installation of the temporary services shall be paid for by CONTRACTOR. All metering installation charges and all energy charges for electric current used for temporary lighting and power are to be paid by CONTRACTOR.
   3. No permanent electrical equipment or wiring shall be used without express written permission of OWNER. Such approval, if given, shall not affect guarantee period. If OWNER authorizes use of permanent service facilities, CONTRACTOR shall pay all metering costs until acceptance or occupancy (whichever occurs first) of building by OWNER.

C. Weather Protection and Temporary Heat: CONTRACTOR shall provide weather protection to protect the Work from damage because of freezing, rain, snow, and other inclement weather.

D. Temporary Water: CONTRACTOR shall supply its own water during construction. CONTRACTOR shall also provide its own piping, valves, and appurtenances for its requirements.

E. Temporary Fire Protection: CONTRACTOR and Subcontractor(s) who maintain or provide an enclosed shed or trailer shall provide and maintain in operating order in each shed or trailer a minimum of one fire extinguisher. More extinguishers shall be provided as necessary. Fire extinguishers shall be minimum dry chemical, nonfreezing-type, UL rating 2A-30BC, with 10-pound capacity for Class A, B, and C fires.

F. CONTRACTOR's and Subcontractor(s)' personnel shall refrain from smoking during excavation, laying pipe, backfilling, and other work at the Site which may involve potential contact with explosive vapors or gasoline products.

1.03 CONSTRUCTION SIGN

A. Furnish and erect a construction sign to be maintained and kept in place until completion of the Contract.

B. Furnish and erect a construction sign to be maintained and kept in place until completion of the Contract.

C. The sign shall be minimum 4 feet high by 8 feet wide, constructed by a professional sign painter, and shall show the name of the Project, OWNER, all prime contractors and ENGINEER. OWNER will select colors of paint required. General sign layout shall be as approved by OWNER.

1.04 REMOVAL OF TEMPORARY FACILITIES

A. Remove temporary materials, equipment, services, and construction as soon as practicable but no later than just prior to final completion inspection.

B. Clean and repair damage caused by installation or use of temporary facilities and restore existing facilities used during construction to specified, or to original, condition.

1.05 TEMPORARY STOCKPILING OF EXCAVATED FILL MATERIAL STORAGE AREA

A. If excavated fill materials are identified as requiring testing, CONTRACTOR shall furnish and maintain a storage area for the temporary stockpiling of excavated fill materials which are potentially hazardous and are undergoing testing. The storage area shall be located on Site where acceptable to OWNER. The area shall be lined with 20 mil thick (minimum) plastic sheeting to prevent migration of materials or leachate from the area. Surface runoff shall be directed around the area. Plastic sheeting (10 mil minimum thickness) shall be used as a cover to prevent precipitation from entering area. Seams for the plastic cover and liner shall be installed to provide a watertight system. CONTRACTOR shall provide sandbags or other ballast as required to secure the plastic sheeting. Stockpiled materials shall be stored such that solids or leachate from different areas of the Site do not mix. Costs to provide and install the temporary storage area and dismantling at the end of construction shall be included.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 57 00

TEMPORARY CONTROLS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Dust Control.
   2. Water, Erosion, and Sediment Control.
   3. Noise Control.
   4. Site Security.
   5. Daily Cleanup.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 DUST CONTROL

A. CONTRACTOR shall execute the Work by methods to minimize raising dust from construction operations.

B. CONTRACTOR shall provide positive means to prevent airborne dust from dispersing into atmosphere.

C. CONTRACTOR shall provide partitions, enclosures, etc., within buildings as necessary to confine dust and protect adjacent areas.

3.02 WATER, EROSION, AND SEDIMENT CONTROL

A. CONTRACTOR shall grade site to drain and shall maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. CONTRACTOR shall protect Site from puddling or running water.

C. CONTRACTOR shall provide erosion control measures as necessary to control discharge of sediment laden water to surface waters and wetlands.

D. Except as provided for in the document, overland discharge of water from dewatering operations shall not be allowed. Depending on water quality, such water shall either be piped directly to the surface water or shall be directed to sedimentation basins or other such structures or features prior to discharge to surface waters so as not to cause damage to existing ground and improvements, erosion, or deposition in the discharge area.

E. CONTRACTOR shall use jute or synthetic netting, silt fences, straw bales, dikes, channels, and other applicable measures to prevent erosion of soils disturbed by its construction operation.

F. Restoration of the Site shall proceed concurrently with the construction operation. See Drawings and Specifications for erosion control measures in addition to that which may be required above.

G. Erosion control measures shall comply with the following document: Kentucky's Best Management Practices for Construction Activities.

3.03 NOISE CONTROL

A. Provide methods, means, and facilities to minimize noise produced by construction operations.

3.04 TRAFFIC CONTROL

A. CONTRACTOR shall be responsible for providing all signs, barricades, flagmen, and other traffic control devices in the construction zone.

B. Do not close or obstruct roadways without approval of OWNER.

C. Conduct operations with minimum interference to roadways.

D. CONTRACTOR shall be responsible for providing all signs, barricades, flagmen and other traffic control devices in the construction zone. All traffic control measures shall meet the requirements Manual on Uniform Traffic Control Devices for Streets and Highways, Latest Edition.

E. Maintain one-way traffic on streets at all times.

3.05 SITE SECURITY

A. CONTRACTOR shall have the sole responsibility of safeguarding the Site perimeter to prevent unauthorized entry to the Site throughout the duration of the Project. CONTRACTOR shall at all times provide such permanent and temporary fencing or barricades or other measures as may be necessary to restrict unauthorized entry to its construction area including construction in public rights-of-way or easements. Site security measures shall include safeguards against attractive nuisance hazards as a result of construction activity.

B. CONTRACTOR shall at all times be responsible for the security of the Work including materials and equipment. OWNER will not take any responsibility for missing or damaged equipment, tools, or personal belongings. CONTRACTOR shall have the sole responsibility of safeguarding the Work and the Site throughout the duration of the Project.

3.06 DAILY CLEANUP

A. CONTRACTOR shall clean up the Site and remove all rubbish on a daily basis.

B. CONTRACTOR shall clean up public streets and highways and remove any dirt, mud, or other materials due to project traffic on daily basis and shall comply with all local and state ordinances and permit requirements.

END OF SECTION

SECTION 01 60 00

MATERIALS AND EQUIPMENT

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: CONTRACTOR shall be responsible for the delivery, handling, storage and protection of all material and equipment required to complete the Work as specified herein.

B. Related Sections and Divisions: Specific requirements for the handling and storage of material and equipment are described in other sections of these Specifications.

1.02 PRODUCTS

A. Components required to be supplied in quantity within a Specification section shall be the same, and shall be interchangeable.

B. CONTRACTOR shall not use materials and equipment removed from existing construction, except as specifically required, or allowed, by the Contract Documents.

C. When any construction deviations from the Drawings and/or Specifications necessary to accommodate equipment supplied by CONTRACTOR, result in additional costs to CONTRACTOR or other contractors, such additional costs shall be borne by CONTRACTOR. CONTRACTOR shall also pay any additional costs necessary for revisions of Drawings and/or Specifications by ENGINEER.

D. Each major component of equipment shall bear a nameplate giving the name and address of the manufacturer and the catalogue number or designation.

1.03 TRANSPORTATION AND HANDLING

A. Materials, products and equipment shall be properly containerized, packaged, boxed, and protected to prevent damage during transportation and handling.

B. CONTRACTOR shall not overload any portion of the structure in the transporting or storage of materials.

C. CONTRACTOR shall not damage other construction by careless transportation, handling, spillage, staining or impact of materials.

D. CONTRACTOR shall provide equipment and personnel to handle products, including those provided by OWNER, by methods to prevent soiling and damage.

E. CONTRACTOR shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

F. CONTRACTOR shall handle product by methods to avoid bending or overstressing. Lift large and heavy components only at designated lift points.

1.04 DELIVERY AND RECEIVING

A. CONTRACTOR shall arrange deliveries of products in accordance with the Progress Schedule, allowing time for observation prior to installation.

B. CONTRACTOR shall coordinate deliveries to avoid conflict with the Work and conditions at the Site; work activities of other contractors or OWNER; limitations on storage space; availability of personnel and handling equipment and OWNER's use of premises.

C. CONTRACTOR shall deliver products in undamaged, dry condition, in original unopened containers or packaging with identifying labels intact and legible.

D. CONTRACTOR shall clearly mark partial deliveries of component parts of equipment to identify equipment and contents to permit easy accumulation of parts and to facilitate assembly.

E. Immediately on delivery, CONTRACTOR shall inspect shipment to review that:
   1. Product complies with requirements of Contract Documents and reviewed submittals.
   2. Quantities are correct.
   3. Accessories and installation hardware are correct.
   4. Containers and packages are intact and labels legible.
   5. Products are protected and undamaged.

1.05 STORAGE AND PROTECTION

A. General:
   1. CONTRACTOR shall store products, immediately on delivery, in accordance with manufacturer's instructions, with all seals and labels intact and legible.
   2. Any additional off-site space required shall be arranged by CONTRACTOR.
   3. CONTRACTOR shall allocate the available storage areas and coordinate their use by the trades on the job.
   4. CONTRACTOR shall arrange storage in a manner to provide access for maintenance of stored items and for observation.

B. In enclosed storage, CONTRACTOR shall:
   1. Provide suitable temporary weather tight storage facilities as may be required for materials that will be damaged by storage in the open.
   2. Maintain temperature and humidity within ranges stated in manufacturer's instructions.
   3. Provide ventilation for sensitive products as required by manufacturer's instructions.
   4. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.
   5. Store solid materials such as insulation, tile, mechanical and electrical equipment, fittings, and fixtures under shelter, in original packages, away from dampness and other hazards.
   6. Store liquid materials away from fire or intense heat and protect from freezing.

C. At exterior storage, CONTRACTOR shall:
   1. Store unit materials such as concrete block, brick, steel, pipe, conduit, door frames, and lumber off ground, out of reach of dirt, water, mud and splashing.
   2. Store tools or equipment that carry dirt outside.
   3. Store large equipment so as not to damage the Work or present a fire hazard.
   4. Cover products subject to discoloration or deterioration from exposure to the elements, with impervious sheet material and provide ventilation to avoid condensation.

5. Completely cover and protect any equipment or material which is prime coated or finish painted with secured plastic or cloth tarps. Store out of reach of dirt, water, mud and splashing.
6. Store loose granular materials on clean, solid surfaces such as pavement, or on rigid sheet materials, to prevent mixing with foreign matter.
7. Provide surface drainage to prevent erosion and ponding of water.
8. Prevent mixing of refuse or chemically injurious materials or liquids.
9. Cover aggregates such as sand and gravel in cold wet weather.
10. Remove all traces of piled bulk materials at completion of work and return site to original or indicated condition.

1.06 MAINTENANCE OF STORAGE

A. CONTRACTOR shall periodically inspect stored products on a scheduled basis.

B. CONTRACTOR shall verify that storage facilities comply with manufacturer's product storage requirements, and verify that manufacturer required environmental conditions are maintained continually.

C. CONTRACTOR shall verify that surfaces of products exposed to the elements are not adversely affected and that any weathering of finishes is acceptable under requirements of Contract Documents.

D. CONTRACTOR shall perform scheduled maintenance of equipment in storage as recommended by the manufacturer. A record of the maintenance shall be kept and turned over to ENGINEER when the equipment is installed.

1.07 INSTALLATION REQUIREMENTS

A. Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the respective manufacturers, unless otherwise specified.

B. After installation, CONTRACTOR shall protect all materials and equipment against weather, dust, moisture, and mechanical damage.

C. CONTRACTOR shall be responsible for all damages that occur in connection with the care and protection of all materials and equipment until completion and final acceptance of the Work by OWNER. Damaged material and equipment shall be immediately removed from the Site.

1.08 EQUIPMENT WARRANTIES

A. Warranties shall be nonprorated, include all parts and labor, and be in written form. Warranties shall specifically exclude buyer's indemnification language. Warranty language shall not eliminate manufacturer’s responsibility for sizing of the equipment. During warranty period, manufacturer shall be responsible for any travel expenses, outside contractor fees, and rental equipment fees associated with providing warranty service. Manufacturer shall pay expenses incurred for repairs and parts replacement not made by manufacturer if manufacturer’s response is not within 72 hours of notification by OWNER. Warranty language shall be provided with the shop drawings.

1.09 CONCRETE EQUIPMENT BASE

A. Cast-in-place concrete equipment bases shall be provided for all new and relocated equipment including electrical control panels, motor control centers, switchgear, etc. Concrete equipment bases shall be provided by CONTRACTOR except where specifically noted to be provided by others. Bases shall be 3 1/2-inch minimum height and shall be a minimum of 3 inches larger than equipment being supported. Grouting of equipment bases shall be as recommended by equipment manufacturer.

B. Concrete and grout shall meet applicable sections of the Specifications.

C. Provide all anchor bolts, metal shapes and templates to be cast in concrete or used to form concrete for support of equipment.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 77 00

CONTRACT CLOSEOUT

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Closeout Procedures.
   2. Final Cleaning.
   3. Adjusting.
   4. Project Record Documents.
   5. Warranties.
   6. Warranty Bond.

1.02 CLOSEOUT PROCEDURES

A. CONTRACTOR shall provide submittals to ENGINEER that are required by governing or other authorities.

B. CONTRACTOR shall comply with General Conditions and Supplementary Conditions and complete the following before requesting ENGINEER's observation of the Work or designated portion thereof for substantial completion.
   1. Submit executed warranties, workmanship bonds, maintenance agreements, inspection certificates, and similar required documentation for specific units of Work, enabling OWNER's unrestricted occupancy and use.
   2. Submit record documentation, maintenance manuals, tools, spare parts, keys, and similar operational items.
   3. Submit consent of surety (if surety required in Contract).
   4. Complete final cleaning, touch-up work of marred surfaces, and remove temporary facilities and tools.

1.03 FINAL CLEANING

A. It is CONTRACTOR's responsibility to completely clean up the inside and outside of all buildings and the construction site at the completion of the Work.

B. CONTRACTOR shall clean areas of the building in which painting and finishing work is to be performed just prior to the start of this work and maintain these areas in satisfactory condition for painting and finishing. This cleaning includes:
   1. Removal of trash and rubbish from these areas.
   2. Broom cleaning of floors.
   3. Removal of any plaster, mortar, dust, and other extraneous materials from finish surfaces, including but not limited to exposed structural steel, miscellaneous metal, masonry, concrete, mechanical equipment, piping, and electrical equipment.

C. In addition to the cleaning specified above and the more specific cleaning that may be required in various technical sections of the Specifications, CONTRACTOR shall prepare the Project for occupancy by a thorough cleaning throughout, which shall include the following:

1. Clean interior and exterior glass surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
2. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
3. Replace filters of operating equipment.
4. Clean debris from roofs, gutters, downspouts, and drainage systems.
5. Clean site; sweep paved areas, rake clean landscaped surfaces.
6. Remove waste and surplus materials, rubbish, and construction facilities from the Site.

1.04 ADJUSTING

A. CONTRACTOR shall adjust operating products and equipment to provide smooth and unhindered operation.

1.05 PROJECT RECORD DOCUMENTS

A. CONTRACTOR shall maintain on Site one set of the following record documents to record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. CONTRACTOR shall make entries that are complete and accurate, enabling future reference by OWNER.

C. CONTRACTOR shall store record documents separate from documents used for construction.

D. CONTRACTOR shall record information concurrent with construction progress.

E. Specifications: CONTRACTOR shall legibly mark and record at each Product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by addenda and modifications.

F. Record Drawings: CONTRACTOR shall legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of the Work.
   4. Field changes of dimension and detail.
   5. Details not on original Contract Drawings.

1.06 WARRANTIES

A. CONTRACTOR shall provide warranties beyond project one-year warranty as required by technical sections.

B. Submit warranty information as follows:
   1. Provide original copies bearing authorized signatures.
   2. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers, and provide Table of Contents and assemble in three-ring binder with durable cover.
   3. Submit with request for certificate of Substantial Completion.
   4. For items of work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance listing date of acceptance as start of warranty period.

1.07 WARRANTY BOND

A. CONTRACTOR shall provide warranty bond prior to or with the final Application for Payment in accordance with SC-6.01.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 91 00

STARTING OF SYSTEMS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
1. General.
2. Equipment and System Installation.
3. Starting Equipment and Systems.
4. Demonstration, Instructions, and Operator Training.
5. Start-Up and Testing.
6. Equipment Systems Requiring Certification of Proper Installation.

B. CONTRACTOR shall perform the Work described in the following subsections.

1.02 GENERAL

A. The number of days for manufacturer's services stated in the Specifications shall be considered as the minimum number of days. Should additional time be required for services because of equipment malfunction or other problem, such time shall be at the expense of CONTRACTOR, with no change in Contract Price.

B. "Days" specified shall consist of 8-hour days on-site, excluding travel time.

C. CONTRACTOR shall designate and provide one person to be responsible for scheduling, coordinating, and expediting the specified services. Scheduling the services shall be done in cooperation with, and with the prior approval of ENGINEER and OWNER. Such schedule shall be arranged with the appropriate subcontractors, manufacturers, and suppliers with sufficient time to allow their compliance with the service requirements.

D. CONTRACTOR shall manage equipment checkout such that checkout has been completed and deficiencies addressed prior to demonstration and training. Scheduling training prior to checkout may result in cancellation when checkout cannot be completed prior to training.

1.03 EQUIPMENT AND SYSTEM INSTALLATION

A. Competent and experienced technical personnel shall represent the manufacturers of all equipment and systems for as many days as may be necessary to provide proper installation and to resolve assembly or installation problems at the site that are attributable to, or associated with, the equipment furnished. This requirement applies to manufacturers for all equipment furnished, whether or not specifically set forth in the Specifications.

B. Where a Certificate of Proper Installation is called for in this Specification Section, the manufacturer's representative shall provide the attached Certificate of Proper Installation stating that the equipment or system has been installed in accordance with the manufacturer's instructions and has been inspected by a manufacturer's authorized representative, that it has been serviced with the proper initial lubricants, that applicable safety equipment has been properly installed, that the proper electrical and mechanical

connections have been made, and that any other manufacturer requirements have been met. This certification shall be provided to ENGINEER and OWNER prior to the start-up. This certificate is in addition to the manufacturer's standard startup reports, checklists, and other pertinent information.

C. Functional (or run) testing is required for all equipment and systems. The manufacturer's representative shall supervise the functional test, which shall include checking for proper rotation, alignment, speed, excessive vibration, and noisy operation. The Manufacturer's Certificate of Proper Installation shall state that proper adjustments have been made and that the equipment or system is ready for start-up.

D. Manufacturer shall demonstrate, using laser alignment equipment, if appropriate, that the installed equipment has been aligned properly. Final acceptance of equipment will not be granted until manufacturer has demonstrated to ENGINEER that acceptable alignment to tolerances have been achieved. For pumps with motors 7.5 hp and larger, the acceptable shaft alignment tolerances shall be as recommended in the pump manufacturer's written instructions and shall include parallel offset and angular gap measurements.

1.04 STARTING EQUIPMENT AND SYSTEMS

A. Where field testing and start-up services are called for in the Specifications, or when technical assistance is necessary as a result of any malfunction of the equipment or system furnished, the manufacturer's representative shall provide such services.

B. Manufacturer's representative shall also conduct and/or assist with performance testing, as required by the Specifications. These services shall continue until such times as the applicable equipment or system has been successfully tested for performance and has been accepted by OWNER for full-time operation.

C. Coordinate schedule for start-up of various equipment and systems. Coordination includes, but is not limited to, communication with subcontractors, suppliers, OWNER, and ENGINEER. CONTRACTOR shall confirm that all necessary work is complete and that the equipment and systems can be operated in conjunction with all associated processes.

D. Notify ENGINEER and OWNER a minimum of 7 days prior to start-up of each item using the attached Equipment Startup and O&M Training Scheduling form. CONTRACTOR shall submit form to ENGINEER.

E. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions that may cause damage.

F. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

G. Verify wiring and support components for equipment are complete and tested.

H. Execute start-up under supervision of applicable manufacturer's representative and CONTRACTOR's personnel in accordance with manufacturers' instructions.

I. Require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up and to supervise

placing equipment or system in operation. Authorized representative shall provide approval for starting of systems in writing where specified.

J. Equipment manufacturer shall provide a written report covering checkout, testing, inspections, and start-up and shall identify any deficiencies noted. Report shall be submitted to ENGINEER. CONTRACTOR shall be responsible for correcting all deficiencies noted in report.

1.05 DEMONSTRATION, INSTRUCTIONS, AND OPERATOR TRAINING

A. For all mechanical equipment and systems and where called for in the Specifications, provide a qualified technical representative to provide detailed instructions to OWNER's personnel for operation and maintenance of equipment and associated instrumentation. Training services shall include pre-start-up classroom instruction and start-up on-site instruction, as stated in the Specifications.

B. Refer to the Specifications for additional training requirements.

C. CONTRACTOR shall coordinate the pre-start-up training periods with OWNER's operating personnel and manufacturers' representatives.
   1. Schedule training dates and times with OWNER, that are acceptable to OWNER, using equipment, startup, and O&M training form. Normal hours available for training are between 7:30 A.M. to 3 P.M., Monday through Friday, except for holidays.
   2. Submit outline and presentation to ENGINEER at least 7 days in advance of training.
   3. Provide name, contact information, and brief synopsis of qualifications of the trainer.
   4. If materials above are not provided at least 7 days in advance, training may be canceled.
   5. Failure of supplier's or manufacturer's representative to appear for scheduled training, failure to notify OWNER 24 hours in advance of need to cancel scheduled training or failure to arrive within 30 minutes of start of scheduled training shall result in reimbursement to OWNER for time lost by OWNER's personnel in waiting for arrival of manufacturer's representative. Except in case of failure to arrive on time, time will not exceed 1 hour for each employee scheduled to receive training. Failure to arrive on time will be reimbursed by actual time late, up to 1 hour, after 1 hour, training will be rescheduled. CONTRACTOR shall reimburse OWNER via a change order.
   6. During the training, instructor will dedicate its time solely to training and not start-up services.
   7. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with OWNER's personnel in detail to explain all aspects of operation and maintenance.
   8. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment.
   9. Prepare and insert additional data in operation and maintenance manuals when need for additional data becomes apparent during instruction.
   10. OWNER may videorecord the training for future internal use. Provide to OWNER paper and electronic copies of any media used as part of training.
   11. Provide training handouts for each of OWNER's personnel present.

D. CONTRACTOR shall provide attached Certificate of Operator Training cosigned by OWNER and supplier's representative verifying training was accomplished to satisfaction of all parties.

E. Operation and maintenance manual submitted in accordance with Section 01 33 00–Submittals shall be provided prior to operator training.

F. For equipment or systems requiring seasonal operation, perform demonstration for dormant season at start of dormant season.

G. Final payment for various items of equipment will not be made by OWNER until the equipment is operating to OWNER's satisfaction.

H. Where items of equipment are placed into service at different times or sequence, manufacturer's services for start-up, field testing, and supervision shall be provided for each time or sequence. Training shall be provided prior to or at the time the first similar item of equipment is placed in service.

1.06 START-UP AND TESTING

A. Prior to acceptance of any portion of the Work, start-up and testing of all equipment and testing of all materials furnished on the Project by CONTRACTOR shall have been conducted in the presence of representatives of CONTRACTOR, OWNER, and ENGINEER and also manufacturer if requested by OWNER or ENGINEER.

B. CONTRACTOR shall provide whatever temporary installations and conditions are necessary in order to perform start-up and testing operations on all equipment and materials furnished under the Contract. Temporary connections and equipment necessary during start-up and testing operations shall include, but not be limited to, temporary piping and electrical power and control equipment and devices, temporary connection from various parts of the systems and any other labor, materials, fuel, devices, or items that may be required for start-up and testing operations. Temporary conditions shall include filling with water, if necessary, to check equipment and materials.

C. All temporary installations and conditions shall be removed by CONTRACTOR upon completion of start-up and testing.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 EQUIPMENT SYSTEMS REQUIRING CERTIFICATION OF PROPER INSTALLATION

A. Section 26 32 13–Standby Power System.

B. Section 33 12 33–Above Ground Packaged Water Booster Pumping Station.

END OF SECTION

TS No. _____

EQUIPMENT START-UP AND O&M TRAINING SCHEDULING FORM
STRAND ASSOCIATES, INC.®

PROJECT _____ CLIENT _____

CONTRACT _____

CONTRACTOR _____ Date: _____

The following equipment is scheduled for start-up on _____

EQUIPMENT NAME: _____ SPECIFICATION SECTION: _____

MANUFACTURER: _____ MINIMUM HOURS OF TRAINING: _____

DATE O&M MANUALS SUBMITTED: _____

Specification Section 01 91 00 requires that start-up and operation and training be conducted by a qualified manufacturer's representative prior to placing equipment in operation. Review Specification Sections 01 33 00 and 01 45 00 and the individual equipment sections for start-up and training requirements. OWNER may find it necessary to propose alternate dates for training based on conflicts with other training and staff availability. The Operation and Maintenance Manuals must be submitted prior to training.

After the equipment or system has been properly installed and is functioning correctly, submit a written report in accordance with Specification Section 01 45 00.

Submit the completed form to ENGINEER and OWNER at least 7 days prior to start-up and training.

Proposed Training Date: _____ Time of Training: _____

Factory-trained representative giving training:

Name(s): _____

Company: _____

Address: _____

Phone: _____

Fax: _____

E-mail: _____

CERTIFICATE OF PROPER INSTALLATION

Project _____

Equipment _____

Specification Section _____

Contract _____

I hereby certify the equipment supplier/manufacturer has inspected this equipment and that it has been properly installed, adjusted, and calibrated. I further certify this equipment may now be operated for test purposes and/or normal use.

MANUFACTURER'S REPRESENTATIVE

Signature _____ Date _____

Name (print) _____

Title _____

Representing _____

CONTRACTOR

Signature _____ Date _____

Name (print) _____

Title _____

This form shall be completed and submitted to ENGINEER prior to OWNER training.

CERTIFICATE OF OPERATOR TRAINING

Project _____

Equipment _____

Specification Section _____

Contract _____

I hereby certify the equipment supplier/manufacturer has instructed OWNER's personnel in the start-up operation and maintenance of this equipment as required in the Specifications.

MANUFACTURER'S REPRESENTATIVE

Signature _____ Date _____

Name (print) _____

Title _____

Representing _____

CONTRACTOR

Signature _____ Date _____

Name (print) _____

Title _____

OWNER

I hereby state that my operating personnel received instruction for start-up, operation, and maintenance of this equipment.

Signature _____ Date _____

Name (print) _____

Title _____

END SECTION

PERMITS

Andy Beshear
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
300 Sower Boulevard
Frankfort, Kentucky 40601
Phone: (502) 564-2150
Fax: 502-564-4245

Rebecca W. Goodman
SECRETARY

Anthony R. Hatton
COMMISSIONER

March 19, 2026

Jon Blalock
South Hopkins Water District
PO Box 487
Dawson Springs, KY 42408

RE: Elevated Storage Tank & Pump Station Project
Hopkins County, KY
South Hopkins Water District
AI #: 33927, APE20260001
PWSID #: 0540406-26-001

Dear Jon Blalock:

We have reviewed the plans and specifications for the above-referenced project. The plans include the construction of approximately 400 linear feet of 8-inch PVC water line, a 200,000-gallon elevated storage tank, and a duplex pump station with pumps capable of 175 gpm at 70 ft of TDH. This is to advise that plans and specifications for the above referenced project are APPROVED with respect to sanitary features of design, as of this date with the requirements contained in the attached construction permit.

If you have any questions concerning this project, please contact Stephen Kietz at 502-782-0769.

Sincerely,

Terry Humphries, P.E.
Supervisor, Drinking Water Engineering Section
Water Infrastructure Branch
Division of Water

TH:SK
Enclosures
c: Strand Associaties Inc
Hopkins County Health Department
Division of Plumbing

Distribution-Major Construction

South Hopkins Water District

Facility Requirements

Activity ID No.:APE20260001

GACT0000000017 (Elevated Storage Tank and Pump Station Project) 400 linear feet of 8-inch PVC water line, a 200,000 gallon elevated storage tank, and a pump station with two pumps capable of a design rating of 175 gpm at 70 ft of TDH and a max rating of 260 gpm at 46 ft of TDH:

Narrative Requirements:

Condition No.	Condition
T-1	Construction of this project shall not result in the water system's inability to supply consistent water service in compliance with 401 KAR 8:010 through 8:600. [401 KAR 8:100 Section 5]
T-2	The public water system shall not implement a change to the approved plans without the prior written approval of the cabinet. [401 KAR 8:100 Section 4(3)]
T-3	A proposed change to the approved plans affecting sanitary features of design shall be submitted to the cabinet for approval in accordance with Section 2 of this administrative regulation. [401 KAR 8:100 Section 4(2)]
T-4	During construction, a set of approved plans and specifications shall be available at the job site. Construction shall be performed in accordance with the approved plans and specifications. [401 KAR 8:100 Section 3(1)]
T-5	Unless construction begins within two (2) years from the date of approval of the final plans and specifications, the approval shall expire. [401 KAR 8:100 Section 3(3)]
T-6	Upon completion of construction, a professional engineer shall certify in writing that the project has been completed in accordance with the approved plans and specifications. [401 KAR 8:100 Section 4(1)]
T-7	The system shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow. [Recommended Standards for Water Works 8.2.1, Drinking Water General Design Criteria IV.1.a]
T-8	Water lines should be hydraulically capable of a flow velocity of 2.5 ft/s while maintaining a pressure of at least 20 psi. [Drinking Water General Design Criteria IV.1.b]
T-9	The normal working pressure in the distribution system at the service connection shall not be less than 30 psi under peak demand flow conditions. Peak demand is defined as the maximum customer water usage rate, expressed in gallons per minute (gpm), in the pressure zone of interest during a 24 hour (diurnal) time period. [Drinking Water General Design Criteria IV.1.d]
T-10	When static pressure exceeds 150 psi, pressure reducing devices shall be provided on mains or as part of the meter setting on individual service lines in the distribution system. [Drinking Water General Design Criteria IV.1.c]
T-11	The minimum size of water main in the distribution system where fire protection is not to be provided should be a minimum of three (3) inch diameter. Any departure from minimum requirements shall be justified by hydraulic analysis and future water use, and can be considered only in special circumstances. [Recommended Standards for Water Works 8.2.2, Drinking Water General Design Criteria IV.2.b]

GACT0000000017 (Elevated Storage Tank and Pump Station Project) 400 linear feet of 8-inch PVC water line, a 200,000 gallon elevated storage tank, and a pump station with two pumps capable of a design rating of 175 gpm at 70 ft of TDH and a max rating of 260 gpm at 46 ft of TDH:

Narrative Requirements:

Condition No.	Condition
T-12	Water mains not designed to carry fire-flows shall not have fire hydrants connected to them. [Recommended Standards for Water Works 8.4.1.b]
T-13	Flushing devices should be sized to provide flows which will give a velocity of at least 2.5 feet per second in the water main being flushed. [Recommended Standards for Water Works 8.2.4.b, Recommended Standards for Water Works 8.4.1.b]
T-14	No flushing device shall be directly connected to any sewer. [Recommended Standards for Water Works 8.2.4.b, Recommended Standards for Water Works 8.4.1.b]
T-15	Pipe shall be constructed to a depth providing a minimum cover of 30 inches to top of pipe. [Drinking Water General Design Criteria IV.3.a]
T-16	Water mains shall be covered with sufficient earth or other insulation to prevent freezing. [Recommended Standards for Water Works 8.7]
T-17	A continuous and uniform bedding shall be provided in the trench for all buried pipe. Backfill material shall be tamped in layers around the pipe and to a sufficient height above the pipe to adequately support and protect the pipe. Stones found in the trench shall be removed for a depth of at least six inches below the bottom of the pipe. [Recommended Standards for Water Works 8.7]
T-18	Water line installation shall incorporate the provisions of the AWWA standards and/or manufacturer's recommended installation procedures. [Recommended Standards for Water Works 8.7]
T-19	All materials used for the rehabilitation of water mains shall meet ANSI/NSF standards. [Recommended Standards for Water Works 8.1]
T-20	Packing and jointing materials used in the joints of pipe shall meet the standards of AWWA and the reviewing authority. [Recommended Standards for Water Works 8.1]
T-21	All tees, bends, plugs and hydrants shall be provided with reaction blocking, tie rods or joints designed to prevent movement. [Recommended Standards for Water Works 8.7]
T-22	All materials including pipe, fittings, valves and fire hydrants shall conform to the latest standards issued by the ASTM, AWWA and ANSI/NSF, where such standards exist, and be acceptable to the Division of Water. [Recommended Standards for Water Works 8.1]
T-23	Water mains which have been used previously for conveying potable water may be reused provided they meet the above standards and have been restored practically to their original condition. [Recommended Standards for Water Works 8.1]

GACT0000000017 (Elevated Storage Tank and Pump Station Project) 400 linear feet of 8-inch PVC water line, a 200,000 gallon elevated storage tank, and a pump station with two pumps capable of a design rating of 175 gpm at 70 ft of TDH and a max rating of 260 gpm at 46 ft of TDH:

Narrative Requirements:

Condition No.	Condition
T-24	Manufacturer approved transition joints shall be used between dissimilar piping materials. [Recommended Standards for Water Works 8.1]
T-25	The minimum size of water main which provides for fire protection and serving fire hydrants shall be six?inch diameter. [Recommended Standards for Water Works 8.2, Drinking Water General Design Criteria IV.2.a]
T-26	Pipes and pipe fittings containing more than 8% lead shall not be used. All products shall comply with ANSI/NSF standards. [Recommended Standards for Water Works 8.1]
T-27	Gaskets containing lead shall not be used. Repairs to lead?joint pipe shall be made using alternative methods. [Recommended Standards for Water Works 8.1]
T-28	Pipe materials shall be selected to protect against both internal and external pipe corrosion. [Recommended Standards for Water Works 8.1]
T-29	Dead end mains shall be equipped with a means to provide adequate flushing. [Recommended Standards for Water Works 8.2]
T-30	The hydrant lead shall be a minimum of six inches in diameter. Auxiliary valves shall be installed on all hydrant leads. [Recommended Standards for Water Works 8.4.3]
T-31	A sufficient number of valves shall be provided on water mains to minimize inconvenience and sanitary hazards during repairs. [Recommended Standards for Water Works 8.3]
T-32	Wherever possible, chambers, pits or manholes containing valves, blow?offs, meters, or other such appurtenances to a distribution system, shall not be located in areas subject to flooding or in areas of high groundwater. Such chambers or pits should drain to the ground surface, or to absorption pits underground. The chambers, pits and manholes shall not connect directly to any storm drain or sanitary sewer. Blow?offs shall not connect directly to any storm drain or sanitary sewer. [Recommended Standards for Water Works 8.6]
T-33	At high points in water mains where air can accumulate provisions shall be made to remove the air by means of air relief valves. [Recommended Standards for Water Works 8.5.1]
T-34	Automatic air relief valves shall not be used in situations where flooding of the manhole or chamber may occur. [Recommended Standards for Water Works 8.5.1]

GACT0000000017 (Elevated Storage Tank and Pump Station Project) 400 linear feet of 8-inch PVC water line, a 200,000 gallon elevated storage tank, and a pump station with two pumps capable of a design rating of 175 gpm at 70 ft of TDH and a max rating of 260 gpm at 46 ft of TDH:

Narrative Requirements:

Condition No.	Condition
T-35	The open end of an air relief pipe from automatic valves shall be extended to at least one foot above grade and provided with a screened, downward?facing elbow. [Recommended Standards for Water Works 8.5.2.c]
T-36	Discharge piping from air relief valves shall not connect directly to any storm drain, storm sewer, or sanitary sewer. [Recommended Standards for Water Works 8.5.2.d]
T-37	Water pipe shall be constructed with a lateral separation of 10 feet or more from any gravity sanitary or combined sewer measured edge to edge where practical. If not practical a variance may be requested to allow the water pipe to be installed closer to the gravity sanitary or combined sewer provided the water pipe is laid in a separate trench or undisturbed shelf located on one side of the sewer with the bottom of the pipe at least 18 inches above the top of the gravity sanitary or combined sewer pipe. [Drinking Water General Design Criteria IV.3.b]
T-38	Water lines crossing sanitary, combined or storm sewers shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sanitary, combined or storm sewer with preference to the water main located above the sanitary, combined or storm sewer. [Drinking Water General Design Criteria IV.3.c]
T-39	At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. [Recommended Standards for Water Works 8.8.3.b]
T-40	There shall be no connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water or other contaminating materials may be discharged or drawn into the system. [Recommended Standards for Water Works 8.10.1]
T-41	Water utilities shall have a cross connection program conforming to 401 KAR 8. [Recommended Standards for Water Works 8.10.1]
T-42	Installed pipe shall be pressure tested and leakage tested in accordance with the appropriate AWWA Standards. [Recommended Standards for Water Works 8.7.6]
T-43	New, cleaned and repaired water mains shall be disinfected in accordance with AWWA Standard C651. The specifications shall include detailed procedures for the adequate flushing, disinfection, and microbiological testing of all water mains. In an emergency or unusual situation, the disinfection procedure shall be discussed with the Division of Water. [Recommended Standards for Water Works 8.7.7]
T-44	A minimum cover of five feet shall be provided over pipe crossing underwater. [Recommended Standards for Water Works 8.9.2]

GACT0000000017 (Elevated Storage Tank and Pump Station Project) 400 linear feet of 8-inch PVC water line, a 200,000 gallon elevated storage tank, and a pump station with two pumps capable of a design rating of 175 gpm at 70 ft of TDH and a max rating of 260 gpm at 46 ft of TDH:

Narrative Requirements:

Condition No.	Condition
T-45	Valves shall be provided at both ends of water crossings so that the section can be isolated for testing or repair; the valves shall be easily accessible, and not subject to flooding for pipes crossing underwater. [Recommended Standards for Water Works 8.9.2.b]
T-46	Permanent taps or other provisions to allow insertion of a small meter to determine leakage and obtain water samples on each side of the valve closest to the supply source for pipes crossing. [Recommended Standards for Water Works 8.9.2.c]
T-47	Water storage tanks shall have a minimum 100% turnover rate of once per 72 hours. [Drinking Water General Design Criteria IV.6.a]
T-48	Minimum water level for all gravity storage tanks shall maintain a minimum design pressure of 30 psi for all potential points of use supplied by the tank. [Drinking Water General Design Criteria IV.6.b]
T-49	Separate inlet and outlet is required on storage tanks; and the inlet has to be in the upper half of the tank (unless there is a separate mixing system). [Drinking Water General Design Criteria IV.6.c]
T-50	The maximum variation between high and low levels in storage structures providing pressure to a distribution system should not exceed 30 feet. [Recommended Standards for Water Works 7.3.1]
T-51	Finished water storage structures which provide pressure directly to the distribution system shall be designed so they can be isolated from the distribution system and drained for cleaning or maintenance without causing a loss of pressure in the distribution system. [Recommended Standards for Water Works 7.3.2]
T-52	The storage structure drain shall discharge to the ground surface with no direct connection to a sewer or storm drain. [Recommended Standards for Water Works 7.3.2]
T-53	Adequate controls shall be provided to maintain levels in distribution system storage structures. Level indicating devices should be provided at a central location. [Recommended Standards for Water Works 7.3.3]
T-54	Pumping facilities shall be elevated to a minimum of three feet above the 100?year flood elevation, or three feet above the highest recorded flood elevation, whichever is higher, or protected to such elevations, [Recommended Standards for Water Works 6.1.1.a]
T-55	Pumping facilities shall be readily accessible at all times. [Recommended Standards for Water Works 6.1.1.b]
T-56	Pumping facilities shall be graded around the station so as to lead surface drainage away from the station. [Recommended Standards for Water Works 6.1.1.c]

GACT0000000017 (Elevated Storage Tank and Pump Station Project) 400 linear feet of 8-inch PVC water line, a 200,000 gallon elevated storage tank, and a pump station with two pumps capable of a design rating of 175 gpm at 70 ft of TDH and a max rating of 260 gpm at 46 ft of TDH:

Narrative Requirements:

Condition No.	Condition
T-57	Pumping facilities shall be protected to prevent vandalism and entrance by animals or unauthorized persons. [Recommended Standards for Water Works 6.1.1.d]
T-58	Raw and finished pump stations shall have adequate space for the installation of additional units if needed, and for the safe servicing of all equipment. [Recommended Standards for Water Works 6.2.a]
T-59	Raw and finished pump stations shall have floors that slope to a suitable drain. [Recommended Standards for Water Works 6.2.e]
T-60	Raw and finished pump stations shall provide a suitable outlet for drainage from pump glands without discharging onto the floor. [Recommended Standards for Water Works 6.2.f]
T-61	At least two pumping units shall be provided. With any pump out of service, the remaining pump or pumps shall be capable of providing the maximum pumping demand of the system. [Recommended Standards for Water Works 6.3]
T-62	Pumps shall have ample capacity to supply the peak demand against the required distribution system pressure without dangerous overloading, [Recommended Standards for Water Works 6.3.a]
T-63	Pumps shall be driven by prime movers able to meet the maximum horsepower condition of the pumps. [Recommended Standards for Water Works 6.3.b]
T-64	Pumps shall be provided with readily available spare parts and tools. [Recommended Standards for Water Works 6.3.c]
T-65	Pump stations shall have indicating, totalizing, and recording metering of the total water pumped. [Recommended Standards for Water Works 6.6.3]
T-66	Each pump shall have a standard pressure gauge on its discharge line. [Recommended Standards for Water Works 6.6.3.a]
T-67	Each pump shall have a compound gauge on its suction line. [Recommended Standards for Water Works 6.6.3.b]
T-68	Where two or more pumps are installed, provision shall be made for alternation. [Recommended Standards for Water Works 6.6.5]
T-69	Provisions shall be made to prevent energizing the pump motor in the event of a backspin cycle. [Recommended Standards for Water Works 6.6.5]

GACT0000000017 (Elevated Storage Tank and Pump Station Project) 400 linear feet of 8-inch PVC water line, a 200,000 gallon elevated storage tank, and a pump station with two pumps capable of a design rating of 175 gpm at 70 ft of TDH and a max rating of 260 gpm at 46 ft of TDH:

Narrative Requirements:

Condition No.	Condition
T-70	Electrical controls shall be located above grade. [Recommended Standards for Water Works 6.6.5]
T-71	Equipment shall be provided or other arrangements made to prevent surge pressures from activating controls which switch on pumps or activate other equipment outside the normal design cycle of operation. [Recommended Standards for Water Works 6.6.5]
T-72	Pump stations shall have a power supply provided from at least two independent sources or a standby or an auxiliary source. [Recommended Standards for Water Works 6.6.6]
T-73	If standby power is provided by onsite generators or engines, the fuel storage and fuel line must be designed to protect the water supply from contamination. [Recommended Standards for Water Works 6.6.6]
T-74	All lubricants which come into contact with the potable water shall be certified for conformance to ANSI/NSF Standard 60. [Recommended Standards for Water Works 6.6.8]
T-75	Booster pumps stations shall have a bypass available. [Recommended Standards for Water Works 6.4.e]
T-76	Each booster pumping station shall contain not less than two pumps with capacities such that peak demand can be satisfied with the largest pump out of service. [Recommended Standards for Water Works 6.4.1]
T-77	All booster pumping stations shall be fitted with a flow rate indicating and totalizer meter. [Recommended Standards for Water Works 6.4.2]
T-78	Inline booster pumps shall be accessible for servicing and repairs. [Recommended Standards for Water Works 6.4.3]
T-79	Each pump must have an isolation valve on the intake and discharge side of the pump to permit satisfactory operation, maintenance and repair of the equipment. [Recommended Standards for Water Works 6.6.1]
T-80	Each pump shall have a positive?acting check valve on the discharge side between the pump and the shut?off valve. [Recommended Standards for Water Works 6.6.1]
T-81	Pump station piping shall be designed so that the friction losses will be minimized, not be subject to contamination, have watertight joints, be protected against surge or water hammer with suitable restraints when necessary, and be such that each pump has an individual suction line or the lines shall be manifolded that they will insure similar hydraulic and operating conditions. [Recommended Standards for Water Works 6.6.2]

GACT0000000017 (Elevated Storage Tank and Pump Station Project) 400 linear feet of 8-inch PVC water line, a 200,000 gallon elevated storage tank, and a pump station with two pumps capable of a design rating of 175 gpm at 70 ft of TDH and a max rating of 260 gpm at 46 ft of TDH:

Narrative Requirements:

Condition No.	Condition
T-82	Booster pumps taking suction from storage tanks shall be provided adequate net positive suction head. [Recommended Standards for Water Works 6.4.b]
T-83	Booster pumps shall controlled so that automatic shutoff or low pressure controllers maintain at least 20 psi in the suction line under all operating conditions. [Recommended Standards for Water Works 6.4.c]
T-84	Booster pumps taking suction from ground storage tanks shall be equipped with automatic shutoffs or low pressure controllers. [Recommended Standards for Water Works 6.4.c]
T-85	All automatic pump stations should be provided with automatic signaling apparatus which will report when the station is out of service. [Recommended Standards for Water Works 6.5]
T-86	All remote controlled stations shall be electrically operated and controlled and shall have signaling apparatus of proven performance. [Recommended Standards for Water Works 6.5]
T-87	Raw and finished pump stations shall have a floor elevation of at least six inches above finished grade. [Recommended Standards for Water Works 6.2.c]
T-88	The minimum storage capacity (or equivalent capacity) for systems not providing fire protection shall be equal to the average daily consumption. [Recommended Standards for Water Works 7.0.1.b]
T-89	The system should be designed to facilitate turnover of water in the reservoir. [Recommended Standards for Water Works 7.0.6]
T-90	Excessive storage capacity should be avoided to prevent potential water quality deterioration problems. [Recommended Standards for Water Works 7.0.1.c]
T-91	The overflow pipe shall be of sufficient diameter to permit waste of water in excess of the filling rate. [Recommended Standards for Water Works 7.0.7.d]
T-92	Finished water storage structures shall be designed with reasonably convenient access to the interior for cleaning and maintenance. [Recommended Standards for Water Works 7.0.8]
T-93	Finished water storage structures shall be vented. Vents shall prevent the entrance of surface water, rainwater, bird, and animals. The overflow pipe shall not be considered a vent. Open construction between the sidewall and roof is not permissible. [Recommended Standards for Water Works 7.0.9]

GACT0000000017 (Elevated Storage Tank and Pump Station Project) 400 linear feet of 8-inch PVC water line, a 200,000 gallon elevated storage tank, and a pump station with two pumps capable of a design rating of 175 gpm at 70 ft of TDH and a max rating of 260 gpm at 46 ft of TDH:

Narrative Requirements:

Condition No.	Condition
T-94	Finished water storage structures and their appurtenances, especially the riser pipes, overflows, and vents, shall be designed to prevent freezing. Equipment used for freeze protection that will come into contact with the potable water shall meet ANSI/NSF Standard 61. [Recommended Standards for Water Works 7.0.13]
T-95	If a flapper valve is utilized, a screen shall be provide inside the valve. Provisions must be included to prevent the flapper from freezing shut. [Recommended Standards for Water Works 7.0.7.e]
T-96	The roof and sidewalls of all water storage structures must be watertight with no openings except properly constructed vents, manholes, overflows, risers, drains, pump mountings, control ports, or piping for inflow and outflow. [Recommended Standards for Water Works 7.0.10]
T-97	Any pipes running through the roof or sidewall of a metal storage structure must be welded, or properly gasketed. In concrete tanks, these pipes shall be connected to standard wall castings which were poured in place during the forming of the concrete. [Recommended Standards for Water Works 7.0.10.a]
T-98	Openings in the roof of a storage structure designed to accommodate control apparatus or pump columns, shall be curbed and sleeved with proper additional shielding to prevent contamination from surface or floor drainage. [Recommended Standards for Water Works 7.0.10.b]
T-99	Valves and controls should be located outside the storage structure so that the valve stems and similar projections will not pass through the roof or top of the reservoir. [Recommended Standards for Water Works 7.0.10.c]
T-100	Every catwalk over finished water in a storage structure shall have a solid floor with sealed raised edges, designed to prevent contamination from shoe scrapings and dirt. [Recommended Standards for Water Works 7.0.14]
T-101	The discharge pipes from water storage structures shall be located in a manner that will prevent the flow of sediment into the distribution system. [Recommended Standards for Water Works 7.0.15]
T-102	Smooth-nosed sampling tap(s) shall be provided to facilitate collection of water samples for both bacteriological and chemical analyses. The sample tap(s) shall be easily accessible. [Recommended Standards for Water Works 7.0.19]
T-103	Sewers, drains, standing water, and similar sources of possible contamination must be kept at least 50 feet from water storage facilities. Gravity sewers constructed of water main quality pipe, pressure tested in place without leakage, may be used at distances greater than 20 feet but less than 50 feet. [Recommended Standards for Water Works 7.0.2.c]

GACT0000000017 (Elevated Storage Tank and Pump Station Project) 400 linear feet of 8-inch PVC water line, a 200,000 gallon elevated storage tank, and a pump station with two pumps capable of a design rating of 175 gpm at 70 ft of TDH and a max rating of 260 gpm at 46 ft of TDH:

Narrative Requirements:

Condition No.	Condition
T-104	The roof of the storage structure shall be well drained. Downspout pipes shall not enter or pass through the reservoir. [Recommended Standards for Water Works 7.0.10.d]
T-105	Porous material, including wood and concrete block shall not be used for potable water contact applications. [Recommended Standards for Water Works 7.0.11]
T-106	All finished water storage structures shall have suitable watertight roofs which exclude birds, animals, insects, and excessive dust. [Recommended Standards for Water Works 7.0.3]
T-107	Fencing, locks on access manholes, and other necessary precautions shall be provided to prevent trespassing, vandalism, and sabotage. [Recommended Standards for Water Works 7.0.4]
T-108	Ladders, ladder guards, balcony railings, and safely located entrance hatches shall be provided where applicable. [Recommended Standards for Water Works 7.0.12.a]
T-109	All water storage structures shall be provided with an overflow which is brought down to an elevation between 12 and 24 inches above the ground surface, and discharges over a drainage inlet structure or a splash plate. All overflow pipes shall be located so that any discharge is visible. [Recommended Standards for Water Works 7.0.7]
T-110	No drain on a water storage structure may have a direct connection to a sewer or storm drain. [Recommended Standards for Water Works 7.0.5]
T-111	The design shall allow draining the storage facility for cleaning or maintenance without causing loss of pressure in the distribution system. [Recommended Standards for Water Works 7.0.5]
T-112	No overflow may be connected directly to a sewer or a storm drain. [Recommended Standards for Water Works 7.0.7]
T-113	Proper protection shall be given to metal surfaces by paints or other protective coatings, by cathodic protective devices, or by both. [Recommended Standards for Water Works 7.0.17]
T-114	Paint systems shall meet ANSI/NSF standard 61. [Recommended Standards for Water Works 7.0.17.a]
T-115	Interior paint must be applied, cured, and used in a manner consistent with the ANSI/NSF approval. [Recommended Standards for Water Works 7.0.17.a]

GACT0000000017 (Elevated Storage Tank and Pump Station Project) 400 linear feet of 8-inch PVC water line, a 200,000 gallon elevated storage tank, and a pump station with two pumps capable of a design rating of 175 gpm at 70 ft of TDH and a max rating of 260 gpm at 46 ft of TDH:

Narrative Requirements:

Condition No.	Condition
T-116	After curing, the coating shall not transfer any substance to the water which will be toxic or cause taste or odor problems. [Recommended Standards for Water Works 7.0.17.a]
T-117	Wax coatings for the tank interior shall not be used on new tanks. [Recommended Standards for Water Works 7.0.17.b]
T-118	Old wax coating must be completely removed before using another tank coating. [Recommended Standards for Water Works 7.0.17.b]
T-119	Finished water storage structures shall be disinfected in accordance with AWWA Standard C652. Two or more successive sets of samples, taken at 24?hour intervals, shall indicate microbiologically satisfactory water before the facility is placed into operation. [Recommended Standards for Water Works 7.0.18.a]
T-120	The disinfection procedure specified in AWWA Standard C652 chlorination method 3, section 4.3 which allows use of the highly chlorinated water held in the storage tank for disinfection purposes, is prohibited unless the initial heavily chlorinated water is properly disposed. [Recommended Standards for Water Works 7.0.18.c]
T-121	The overflow for an elevated tank shall open downward and be screened with a four mesh, non-corrodible screen. [Recommended Standards for Water Works 7.0.7.c]
T-122	Elevated storage tanks shall have at least one of the access manholes framed at least four inches above the surface of the roof at the opening. All other manholes or access ways shall be bolted and gasketed. [Recommended Standards for Water Works 7.0.8.1]
T-123	Elevated storage tank vents shall open downward, and be fitted with either four mesh non-corrodible screen, or with finer mesh non-corrodible screen in combination with an automatically resetting pressure-vacuum relief mechanism. [Recommended Standards for Water Works 7.0.9.e]
T-124	Elevated tanks with riser pipes over eight inches in diameter shall have protective bars over the riser openings inside the tank. [Recommended Standards for Water Works 7.0.12.b]
T-125	Railings or handholds shall be provided on elevated tanks where persons must transfer from the access tube to the water compartment. [Recommended Standards for Water Works 7.0.12.c]
T-126	When an internal overflow pipe is used on elevated tanks, it should be located in the access tube. For vertical drops on other types of storage facilities, the overflow pipe should be located on the outside of the structure. [Recommended Standards for Water Works 7.0.7.a]

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Narrative Requirements:

Condition No.	Condition
T-127	If a water circulation system is used, it is recommended that the circulation pipe be located separately from the riser pipe. [Recommended Standards for Water Works 7.0.13]
T-128	Reservoirs with pre-cast concrete roof structures must be made watertight with the use of a waterproof membrane or similar product. [Recommended Standards for Water Works 7.0.10.f]

SECTION 03 11 00

CONCRETE FORMWORK

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Forms for Cast-In-Place Concrete.
   2. Form Accessories.
   3. Openings for Other Work.
   4. Form Stripping.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ACI 117–Tolerances for Concrete Construction.

B. ACI 301–Structural Concrete for Buildings.

C. ACI 318–Building Code Requirements for Reinforced Concrete.

D. ACI 347–Recommended Practice for Concrete Formwork.

E. PS1–Construction and Industrial Plywood.

F. NSF/ANSI 61–Drinking Water System Components.

1.03 DESIGN

A. All formwork shall comply with ACI 347 and ACI 301.

B. CONTRACTOR shall assume the responsibility for the complete design and construction of the formwork.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01 33 00–Submittals for form ties, form coatings, form liners (if any), and any other form accessories.

B. Submit geometry of forms for circular structures.

PART 2–PRODUCTS

2.01 FORMS

A. Forms shall be of wood, plywood, steel, fiberboard lined, or other approved materials which

will produce concrete which meets the specified requirements. The type, size, quality, and shape of all materials of which the forms are made are subject to the review of ENGINEER.

B. Caution shall be exercised in the use of wood or composition forms or form liner to be certain that no chemical reaction will take place which causes a damaging effect on the concrete surface.

2.02 FORM TIES–NONREMOVABLE

A. Internal wall ties shall contain positive stops at the required wall thickness. The exterior clamp portions of the tie shall be adjustable in length. Ties shall provide a positive disconnection on both ends 1 to 1 1/2 inches inside the finished face of the concrete.

B. The use of wood spacers and wire ties will not be approved.

2.03 FORM TIES–REMOVABLE

A. Taper ties which are designed to be removed entirely from the wall may be used with forms designed for this tie type and spacing.

B. Tie holes shall be plugged with either a neoprene plug, Sure-Plug by Dayton Superior, Inc., or an EPDM rubber plug, X-Plug by Sika Greenstreak, or equal.

C. Cementitious waterproofing material for patching taper tie holes shall be Hey Di K-11, Xypex Patch-N-Plug, or equal. Taper tie holes above the normal operating water surface shall be patched with mortar mix as specified in Section 03 30 00–Cast-In-Place Concrete for patching tie holes.

2.04 FORM COATINGS

A. Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.

B. Form release agents for potable water containing structures shall be compliant with NSF/ANSI 61.

2.05 CHAMFER STRIPS

A. Provide 3/4-inch by 3/4-inch wood or plastic chamfer strips at all exposed corners, except as noted.

PART 3–EXECUTION

3.01 CONSTRUCTION

A. Forms shall conform to the shape, line, grade, and dimensions as shown on the Drawings. They shall be mortar-tight and sufficiently rigid to prevent displacement or sagging between supports and shall support the loads and pressures without deflection from the prescribed lines. They shall be properly braced or tied together so as to maintain position and shape. Spacing of ties shall be recommended by the tie manufacturer.

B. Formwork and finished concrete construction shall meet the tolerances specified in ACI 117.

C. All exposed curved surfaces shall be formed to the continuous surface of the radius specified. Where segmented forms are proposed, a form system which deviates more than 3/8 inch from a circle through pan edges will not be allowed.

D. Architectural surfaces and surfaces to be fitted with equipment shall be formed to match the shape intended. Where indicated on the Drawings, the form shall be lined with minimum 3/8-inch masonite and shimmed as required.

E. When forms are placed for successive concrete placement, thoroughly clean concrete surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets.

F. At the request of ENGINEER, temporary openings shall be provided at the base of column forms and wall forms and at other points where necessary to facilitate cleaning and observation immediately before depositing concrete.

G. Provide inserts and provide openings in concrete form work to accommodate work of other trades. Verify size and location of openings, recesses, and chases with the trade requiring such items. Securely support items to be built into forms.

H. The forms shall be oiled with a field-applied commercial form oil or a factory-applied nonabsorptive liner. Oil shall not stain or impede the wetting of surfaces to be cured with water or curing compounds. The forms shall be coated prior to placing reinforcing steel. Oil on reinforcement will not be permitted.

I. All form surfaces shall be thoroughly cleaned, patched, and repaired before reusing and are subject to review of ENGINEER.

3.02 FORM REMOVAL

A. Supporting forms and shoring shall not be removed until the member has acquired sufficient strength to support its own weight and the construction live loads on it.

B. All form removal shall be accomplished in such a manner that will prevent injury to the concrete.

C. Forms shall not be removed before the expiration of the minimum times as stated below or until the concrete has attained its minimum 28-day design strength as confirmed by concrete cylinder tests, unless specifically authorized by ENGINEER. Wall and Vertical Faces: 24 hours.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1–GENERAL

1.01 SUMMARY

A. Work includes providing complete, in-place, all steel and fibers required for reinforcement of cast-in-place concrete.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. Applicable standards listed in this section include, but are not necessarily limited to the following:
   1. ACI 315–Manual of Standard Practice for Detailing Reinforced Concrete Structures.
   2. ACI 318–Building Code Requirements for Reinforced Concrete.
   3. ASTM A1064–Standard Specifications for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
   4. ASTM A615–Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
   5. ASTM A996–Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcing.
   6. ASTM C1116–Standard Specification for Fiber-Reinforced Concrete.
   7. CRSI–Manual of Standard Practice.

1.03 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 00–Submittals.

B. Provide complete shop drawings of all material to be furnished and installed under this section:
   1. Before fabrication of the reinforcement is begun, CONTRACTOR shall obtain the approval of ENGINEER on reinforcing bar lists and placing drawings.
   2. These drawings and lists shall show in detail the number, size, length, bending, and arrangement of the reinforcing. Reinforcing supports shall also be located on the shop drawings.
   3. Shop drawings shall be in accordance with ACI 315.

1.04 PRODUCT HANDLING

A. Delivery:
   1. Deliver reinforcement to the job site bundled, tagged, and marked.
   2. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

B. Storage: Store reinforcement at the job site on blocks and in a manner to prevent damage and accumulation of dirt and excessive rust.

PART 2–PRODUCTS

2.01 MATERIALS

A. Reinforcing bars shall comply with ASTM A615 or A996 Type R, Grade 60. Reinforcing bars required to be welded shall be ASTM A706 low alloy.

B. Reinforcement supports, including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place shall be:
   1. Wire bar-type supports complying with CRSI recommendations, unless otherwise indicated.
   2. For slabs on grade, supports with sand plates, or horizontal runners where base material will not support chair legs.
   3. For exposed-to-view concrete surfaces or where the concrete surface will be exposed to weather or moisture, where legs of supports are in contact with forms, supports with either hot-dipped galvanized or plastic protected legs.
   4. When supports bear directly on the ground and it is not practical to use steel bar supports, precast concrete blocks may be used to support only the bottom lift of reinforcement. The precast blocks must be solid, be of an equal or higher strength than the concrete being placed, must provide adequate support to the reinforcement, and be of proper height to provide specified reinforcing cover. The use of face bricks, hollow concrete blocks, rocks, wood blocks, or other unapproved objects will not be permitted.

C. Fibrous Reinforcing:
   1. Fibrous concrete reinforcement shall be Fibermesh 300, manufactured by Propex Concrete Systems, or equal.
   2. Reinforcement shall be 100% virgin polypropylene fibrillated, multi-length graded fiber containing no reprocessed olefin materials and specifically manufactured for use as concrete secondary reinforcement.
   3. Physical Characteristics:
      a. Specific Gravity: 0.91.
      b. Fiber Length: Multidesign gradation.

2.02 FABRICATION

A. General:
   1. Fabricate reinforcing bars to conform to required shapes and dimensions with fabrication tolerances which comply with CRSI Manual.
   2. In case of fabricating errors, do not rebend or straighten reinforcement in a manner that will injure or weaken the material.
   3. Unless otherwise shown on the Drawings, all end hook dimensions shall conform with “ACI Standard Hooks.”

B. Reinforcement with any of the following defects shall be deemed unacceptable and will not be permitted in the work:
   1. Bar lengths, depths, and bends exceeding specified fabrication tolerances.
   2. Bend or kinks not indicated on Drawings or final shop drawings.
   3. Bar with reduced cross section because of excessive rusting or other cause.

PART 3–EXECUTION

3.01 INSPECTION

A. Examine the substrate, formwork, and the conditions under which concrete reinforcement is to be placed.

B. Correct conditions detrimental to the proper and timely completion of the work.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General:
   1. Comply with the specified standards for details and methods of placing reinforcement and supports.
   2. Clean reinforcement to remove loose rust, mill scale, earth, and other materials that reduce or destroy bond with concrete.

B. Placing Reinforcement:
   1. All reinforcing shall be placed in accordance with Contract Drawings and with shop drawings stamped and approved by ENGINEER.
   2. Position, support, and secure reinforcing against displacement by formwork, construction, or concrete placement operations.
   3. Support reinforcing by metal chairs, runners, bolsters, spacers, and hangers as needed.
   4. Unless otherwise shown on the Drawings, the reinforcement is to be so detailed and placed as to allow the following concrete protection:
      a. Three inches of cover where the concrete is placed directly against ground.
      b. Two inches of cover where the concrete is placed in forms but is to be exposed to weather, liquid, or the ground.
      c. One-inch cover in slabs and walls not exposed to weather, liquid, or the ground.
      d. One and one-half-inch cover in beams, girders, and columns not exposed to weather, liquid, or the ground. This cover applies to beam stirrups and column ties where applicable.
   5. Reinforcement shall be positioned within ±3/8 inch for members with depth to tension reinforcing from compression face less than or equal to 8 inches. Tolerance shall be ±1/2 inch for members with depth to tension reinforcing from compression face greater than 8 inches. Tolerance on dimension between adjacent bars in slab and wall reinforcing mats shall be 1 inch. Secure against displacement by anchoring at the supports and bar intersections with wire or clips.
   6. Bars shall be securely tied at all intersections, except where spacing is less than 1 foot in each direction when alternate intersections shall be tied. To avoid interference with embedded items, bar spacing may be varied slightly if acceptable to ENGINEER. Tack welding of reinforcing will not be permitted.
   7. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
   8. If reinforcing must be cut because of openings or embedded items in the concrete, additional reinforcing must be provided adjacent to the opening at least equal in cross sectional area to that reinforcing which was cut, and it shall extend a minimum of 36 bars diameters beyond the opening on each side or as shown on the Drawings. At sumps or depressions in slabs, bars shall be bent and/or extended under sumps or depressions.
   9. Wall reinforcing mats shall be secured in a vertical plane by providing clearance from forms with bar supports and by using Z-shaped bars at ±4 feet on center wired between

two mats of steel, spacing and staying both of them. Nails shall not be driven into the forms to support reinforcement and neither shall wire for this purpose come in contact with the forms. Alternate top transverse bars in slab shall be supported by individual bar chairs at approximately 3 foot 0-inch centers. Bottom longitudinal bars shall be supported by continuous bar chairs at approximately 4 foot 0-inch centers.

10. If carrier bars are to be used, CONTRACTOR shall provide reinforcing bars for this purpose in addition to the reinforcing called for by the Drawings and Specifications.
11. Reinforcement bars used as grade pins shall not be tied to or used to support structural reinforcement. Grade pins shall either be completely removed or lowered to provide the specified clear cover from the slab surface.

C. Reinforcement Supports:
   1. Strength and number of supports shall be sufficient to carry reinforcement.
   2. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support.
   3. Do not use supports as bases for runways for concrete-conveying equipment and similar construction loads.

D. Splices:
   1. Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying.
   2. Lap splices in reinforcing shall be provided as shown on the Drawings. Where lap splice lengths are not shown on the Drawings, provide Class B, Category 1 lap splices in accordance with ACI 318.
   3. Adjacent splices of tangential bars in circular slabs and horizontal bars in circular walls shall be staggered a minimum of one full lap splice length or 3 feet, whichever is greater, unless otherwise shown. Stagger dimension shall be measured from center to center of lap splices.
   4. For circular walls, horizontal bar lap splices shall not coincide in vertical arrays more frequently than every third bar.
   5. Mechanical splices and threaded dowel bar inserts may be used where acceptable to ENGINEER.

E. Embedded Items:
   1. Allow other trades to install embedded items as necessary.
   2. Particularly after bottom layer of reinforcing is placed in slabs, allow electrical contractors to install conduit scheduled for encasement in slabs prior to placing upper layer of reinforcing.

F. Minimum Reinforcing: Where reinforcing is not shown, provide a minimum of No. 4 at 8-inch centers each way in members 10 inches or less in thickness and No. 5 at 12-inch centers each way in each face in members greater than 10 inches thick.

G. Fibrous Reinforcing:
   1. Fibrous concrete reinforcing shall be used in all building interior slab-on-grade concrete and all precast concrete topping, and where shown on the Drawings.
   2. Add fibers at a minimum rate of 1.5 pounds per cubic yard.
   3. Mix concrete in strict accordance with reinforcement manufacturer’s recommendations.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: All cast-in-place concrete as shown except as noted otherwise.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ACI 211.1–Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

B. ACI 301–Specifications for Structural Concrete.

C. ACI 304R–Guide for Measuring, Mixing, Transporting, and Placing Concrete.

D. ACI 305R–Guide to Hot Weather Concreting.

E. ACI 306R–Guide to Cold Weather Concreting.

F. ACI 308–Specification for Curing Concrete.

G. ACI 309–Guide for Consolidation of Concrete.

H. ACI 318–Building Code Requirements for Structural Concrete and Commentary.

I. ASTM C31–Standard Practice for Making and Curing Concrete Test Specimens in the Field.

J. ASTM C33–Standard Specification for Concrete Aggregates.

K. ASTM C39–Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

L. ASTM C40–Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.

M. ASTM C88-Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

N. ASTM C94–Standard Specification for Ready-Mixed Concrete.

O. ASTM C143–Standard Test Method for Slump of Hydraulic-Cement Concrete.

P. ASTM C150–Standard Specification for Portland Cement.

Q. ASTM C156–Standard Test Method for Water Loss (from a Mortar Specimen) Through Liquid Membrane-Forming Curing Compounds for Concrete.

R. ASTM C172–Standard Practice for Sampling Freshly Mixed Concrete.

S. ASTM C231–Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

T. ASTM C260–Standard Specification for Air-Entraining Admixtures for Concrete.

U. ASTM C309–Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

V. ASTM C494–Standard Specification for Chemical Admixtures for Concrete.

W. ASTM C595–Standard Specification for Blended Hydraulic Cements.

X. ASTM C618–Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

Y. ASTM C652–Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale).

Z. ASTM D994–Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

AA. ASTM D1752–Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with Section 01 33 00–Submittals.

B. Submit the following information:
1. Gradation of fine and coarse aggregate–ASTM C33.
2. Specific gravity and dry rodded density of each aggregate.
3. Test of deleterious substances in fine and coarse aggregate–ASTM C33.
4. Design mix of each individual concrete mix to be used.
5. Previous test results or trial batch results with 7- and 28-day compressive strengths for each concrete mix proposed.
6. Certified mill test results for cement identifying brand, type, and chemistry of cement to be used.
7. Brand, type, principal ingredient, and amount of each admixture to be used.

C. It is important that the above data be submitted to ENGINEER well in advance of anticipated concreting operations to avoid any delay in construction.

PART 2–PRODUCTS

2.01 CEMENT

A. Cement shall be Portland cement Type I/II conforming to ASTM C150 or Portland limestone cement Type IL conforming to ASTM C595. All cement shall be the product of one reputable manufacturer and mill.

B. Cement shall be stored in a dry, weathertight, properly ventilated structure with the floor raised not less than 1 foot above the ground.

2.02 FLY ASH

A. All fly ash used as an admixture in Portland cement or Portland limestone cement concrete shall be Class C or F conforming to the requirements of ASTM C618.

2.03 AGGREGATE

A. All aggregates shall be washed and shall consist of natural sand, gravel, or crushed rock and shall have clean, hard, durable, uncoated grains of strong minerals. The amounts of deleterious substances present in the fine and coarse aggregate expressed in percentages by weight shall not exceed the following:

	Aggregate	
Deleterious Substance	Fine	Coarse
Clay Lumps and Friable Particles	3.0	3.0
Coal and Lignite	0.5	0.5
Mineral finer than No. 200 sieve	3.0	
Soft Fragments	3.0	3.0
Chert*	---	5.0
Sum of Chert and Clay Lumps		5.0

* Material classified as chert and having a bulk specific gravity of less than 2.45. The percentage of chert shall be determined on the basis of the weight of chert in the sample retained on a 3/8-inch sieve divided by the weight of the total sample.

B. The combined amount of all deleterious substances in an aggregate shall not exceed 5% of the weight of the aggregate.

C. If requested by ENGINEER, sodium sulfate soundness tests (ASTM C88) shall be performed on the aggregate. When the aggregate is subjected to 5 cycles, the weight loss shall not exceed 12%. Samples of proposed aggregates shall be submitted to an independent laboratory for testing in advance of concrete work. All testing shall be performed in accordance with ASTM C33. Certified test results shall be submitted to ENGINEER confirming that aggregate complies with all stated specifications. Report shall identify source of aggregate and absorbed water.

D. Fine aggregate shall be well-graded from coarse to fine and shall conform to the following requirements:

Percentage by Weight	
Passing 3/8-inch sieve	100
Passing No. 4 sieve	95-100
Passing No. 8 sieve	80-100
Passing No. 16 sieve	50-85
Passing No. 30 sieve	25-60
Passing No. 50 sieve	5-30
Passing No. 100 sieve	0-10

E. Gradation of fine aggregate shall be reasonably uniform and not subject to the extreme percentages of gradation specified above. The fineness modulus shall be not less than 2.3 or more than 3.1, nor shall the fineness modulus of any sample vary by more than +0.20 from the fineness modulus of the representative sample used in proportioning the concrete.

F. If requested by ENGINEER, fine aggregate shall be subjected to the color-metric test for organic impurities (ASTM C40) and shall not produce a color darker than Figure 1, unless they pass the mortar strength test. Aggregate producing color darker than Figure 2 shall not be used in any event.

G. Coarse aggregate shall be well-graded from coarse to fine, and when tested by laboratory sieves having square openings, shall conform to the following requirements:

	Percentage by Weight Aggregate	
	3/4-Inch Stone	1 1/2-Inch Stone
Passing 2-inch sieve	---	100
Passing 1 1/2-inch sieve	---	90-100
Passing 1-inch sieve	100	20-55
Passing 3/4-inch sieve	90-100	0-15
Passing 3/8-inch sieve	20-55	0-5
Passing No. 4 sieve	0-10	---
Passing No. 8 sieve	0-5	---

H. Aggregates must be allowed to drain for at least 12 hours before being used. The ground upon which aggregates are stored must be hard, firm, well-drained, and free from all vegetable matter. Various sizes of aggregates must be stored separately, and if they have become contaminated or merged with each other, they shall not be used.

2.04 WATER

A. Water used in mixing concrete shall be clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious substances.

2.05 ADMIXTURES

A. Water Reducing Admixture shall be Master Pozzolith® 200 by Master Builders Solutions, Daracem 19 by Grace, or equal. Water reducing admixture shall conform to ASTM C494, Type A and Type F. Water reducing admixture shall not reduce durability, shall increase strength 10%, and shall not affect bleeding characteristics over reference mix.

B. Air-Entraining Admixture shall be equal to MasterAir® AE 90 by Master Builders Solutions, Darex by Grace Construction Products, or equal. Air-entraining admixture shall conform to ASTM C260.

C. No other admixture will be allowed without written approval of ENGINEER. All admixture shall be compatible with cement, aggregate, and water used.

2.06 PROPORTIONING

A. The proportions of aggregate to cement shall be such as to produce a workable mixture that can be thoroughly compacted and that will work readily in the forms and around reinforcement without permitting materials to segregate or excess water to collect on the

surfaces. The combined aggregates shall be such that when separated on the No. 4 sieve, the weight passing the sieve shall not be less than 30% nor greater than 50%.

B. Concrete of various classes shall have the following maximum water/cement or water/(cement + fly ash) ratio minimum compressive strengths at 28 days and minimum cement and fly ash contents:

Class	Maximum Water/ Cement or Water/ (Cement+Fly Ash)	Minimum 28 Day Strength-Pounds per Square Inch	Cement Content-Pounds per Cubic Yard	Fly Ash-Pounds per Cubic Yard	
				Type C	Type F
A	0.45	4,000	564	---	---
A-FA	0.45	4,000	480	110	125

C. All concrete mixes shall be designed for a strength of 15% above that specified to allow for job variations. All mixes shall be designed in accordance with ACI 211.1 by a qualified concrete engineer or qualified laboratory technician. Required materials test data shall be submitted with design mixes for review and approval by ENGINEER. Mix computations shall be submitted if requested by ENGINEER.

D. The slump for all concrete shall be 3 inches and concrete with a slump within the range of 2 to 3 1/2 inches will be acceptable, unless otherwise stated.

E. A water-reducing admixture shall be used in all concrete. A qualified representative of the manufacturer shall be available to assist in proportioning the concrete, advise on the proper addition of the admixture to the concrete, and advise on adjustments of concrete proportions to suit job conditions.

F. An air-entraining admixture shall be used in all concrete except as noted. Air content shall be tested by the pressure method as outlined in ASTM C231 and shall be between 4% to 7% by volume. An air-entraining admixture is not required for concrete patching and for concrete floors, equipment pads, and supports in interior heated buildings where the concrete will be protected from freezing during and after construction.

G. CONTRACTOR shall submit to ENGINEER concrete cylinder compressive strength results from previous projects for the same concrete mixes proposed on the current project. If this information is not available, one cubic yard trial batches of each individual mix proposed for use shall be made prior to use in the work. Four test cylinders shall be made for each trial batch, two to be tested at 7 days and two at 28 days. The trial batches shall be made preceding actual placement operations so that the results of the 7-day tests can be obtained. All costs for material, equipment, and labor incurred during design of concrete mixes shall be borne by CONTRACTOR.

H. All aggregates shall be measured by weight. The concrete mixer is to be equipped with an automatic water-measuring device that can be adjusted to deliver the desired amount of water.

I. Pipe Penetrations:
   1. Wall/slab thickness between 4 inches and 9 inches and pipe diameter greater than 4 inches and less than or equal to 24 inches: KBA-1510FP (9/16 inch by 3/8 inch).

2. Wall/slab thickness greater than 9 inches with double mat of reinforcing and pipe diameter greater than 4 inches and less than or equal to 24 inches: MC-2005T (3/4 inch by 3/16 inch).
3. Wall/slab thickness greater than 9 inches with double mat of reinforcing and pipe diameter greater than 24 inches: MC-2010MN (3/4 inch by 3/8 inch) with embedded stainless steel wire mesh for expansion control.

2.07 BONDING AGENT

A. Bonding agent for bonding new concrete to existing concrete at construction joints and for bonding concrete overlays to existing concrete shall be a liquid latex product meeting ASTM C1059, Type II. Acceptable products include Eucoweld 2.0 by Euclid Chemical, Acrylic Bonding Agent J40 by Dayton Superior, or equal.

2.08 PATCHING ADDITIVE

A. Acceptable manufacturers include MasterEmaco® A 660 by Master Builders Solutions, Sonocrete by Sonneborn Contech Co., or equal.

PART 3–EXECUTION

3.01 MIXING

A. Ready-mixed concrete shall be batched, mixed, and delivered in accordance with ASTM C94 and ACI 304R. In general, concrete shall be mixed 50 revolutions at plant, 20 upon arrival at site, and 20 each time water is added; maximum of 110 revolutions at mixing speed. Concrete shall be delivered and discharged within 1 1/2 hours or before the drum has revolved 300 times after introduction of water to the cement and aggregates or the cement to the aggregates. Truck mixers shall be equipped with drum revolution counters. In no event shall concrete which has taken its initial set be allowed to be used. Retempering of concrete is not permitted.

B. A representative of ENGINEER may be at the batching plant periodically to observe the batching and mixing.

C. No water shall be added on the job unless required by CONTRACTOR and with the knowledge of ENGINEER; the amount of water, if added, shall be recorded on all copies of the delivery tickets. If water is added, CONTRACTOR shall verify that the required water-cement ratio is not exceeded.

D. Concrete shall have a temperature not less than 60°F nor more than 80°F as delivered to the jobsite.

E. With each load of concrete, CONTRACTOR shall obtain delivery tickets and shall make these tickets available for review by ENGINEER. Delivery tickets shall provide the following information:
1. Date.
2. Name of ready-mix concrete plant, job location, and CONTRACTOR.
3. Type of cement and admixtures, if any.
4. Specified cement content in sacks per cubic yard of concrete and approved concrete mix number or designation.
5. Amount of concrete in load, in cubic yards.
6. Water-cement ratio.

7. Water added at job, if any.
8. Truck number and time dispatched.
9. Number of mixing drum revolutions.

F. For job-mixed concrete, all concrete materials shall be mixed in a machine batch mixer for at least 1 1/2 minutes after all ingredients are in the mixer and shall continue until there is a uniform distribution of the materials and the mass is uniform in color and homogeneous. The mixer shall not be loaded beyond the capacity given by the manufacturer and shall be rotated at the speed recommended by the manufacturer. The mixer is to be provided with positive timing device that will positively prevent discharging the mixture until the specified mixing time has elapsed.

3.02 EMBEDDED ITEMS IN CONCRETE

A. All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support shall be placed prior to concreting.

B. All contractors whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to introduce and/or furnish embedded items before the concrete is placed.

C. Embedded items shall be positioned accurately and supported against displacement. Reinforcing bars shall clear embedded items a minimum of 2 inches.

3.03 PLACING CONCRETE

A. Before placing concrete, all equipment, forms, ground, reinforcements, and other surfaces with which the concrete will come in contact are to be thoroughly cleaned of all debris, ice, and water. Ground shall be wetted prior to placement of concrete on it.

B. After reinforcement is placed and before concrete is placed over it, ENGINEER shall be allowed sufficient time to observe the reinforcing.

C. Unless otherwise authorized by ENGINEER, all concrete shall be placed in the presence of ENGINEER.

D. Concrete shall be conveyed from the mixer to the place of final deposit as rapidly as practicable by methods that will prevent the segregation or loss of materials. Chuting for conveying purposes must be accomplished in such a manner as to prevent segregation or loss of materials. Receiving hoppers shall be installed at the chute discharge and at no point in its travel from the mixer to place of final deposit shall the concrete pass through a free vertical drop of more than 3 feet. Elephant trunks or tremies shall be used in all wall pours to prevent coating of forms and reinforcing bars.

E. Care shall be taken to avoid an excess of water on the concrete surface. Excess water shall be drained or otherwise removed from the surface. Dry cement or a mixture of cement and sand shall not be sprinkled directly on the surface to absorb water.

F. Concrete in wall and beam pours shall be deposited in approximately horizontal layers not to exceed 18 inches in thickness. Each layer shall be well worked into the preceding layer while both layers are still soft.

G. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation from rehandling or flowing. The maximum allowable lateral movement of the concrete after

being deposited is 3 feet. Once concreting is started, it shall be carried on as a continuous operation until the placing of the section or panel is completed.

H. All concrete shall be placed with the aid of mechanical vibrating equipment in accordance with ACI 309. In congested areas, vibration shall be supplemented by hand spading adjacent to the forms. Vibration should secure the desired results within 5 to 15 seconds at intervals of 18 inches apart maximum. The vibrator shall penetrate the preceding layer of concrete. Vibrators shall have a frequency of not less than 10,000 impulses per minute when in operation submerged in concrete.

I. A sufficient number of spare vibrators shall be kept in ready reserve to provide adequate vibration in case of breakdown of those in use.

J. In placing concrete in beams where it is intended to be continuous and monolithic with the slab above, a delay to provide for settlement of the deep concrete shall be scheduled before placing the upper concrete in the slab. The length of delay shall be as long as possible and still permit the revibration of the deep concrete.

K. Concrete is not to be placed under water. A suitable means shall be provided for lowering the water level below surfaces upon which concrete is to be placed. This may require excavating approximately 12 inches below the bottom of the concrete surface and refilling with gravel and compacting. The groundwater shall not be allowed to rise to the bottom of the concrete until 24 hours after the concrete pour has been completed. Water shall not be allowed to fall upon or run across the concrete during this period.

L. No extra payment will be allowed for dewatering, undercutting, and gravel fill.

3.04 MOIST CURING

A. All concrete shall be maintained in a moist condition for at least 7 days after being deposited except that for high-early strength concrete, a 3-day period will be sufficient. Moist curing shall be accomplished by one of the following methods:
   1. Wood forms left in place and kept wet at all times. If wood forms are not going to be kept wet or if metal forms are used, they shall be removed as soon as practicable and other methods of moist curing shall be started without delay.
   2. Use of a curing compound conforming to ASTM C309, Type I as approved by ENGINEER. Curing compound shall be applied at a uniform rate as indicated by the manufacturer sufficient to comply with the requirements of the test water retention of ASTM C156. Curing compound applied to vertical concrete surfaces after forms are removed shall be specially adapted to provide required coverage on the vertical surface. On nonformed surfaces, the curing compound shall be applied immediately after the disappearance of the water sheen after finishing of the concrete. Curing compound shall not be used on concrete surfaces that are to be painted, receive ceramic tile or resilient flooring, or be waterproofed. The curing compound for potable water structures shall be certified per NSF/ANSI-61. Care shall be taken not to get curing compound on construction joints, reinforcing steel, and other surfaces against which new concrete will be poured.
   3. Use of plastic film. Plastic film shall have a minimum thickness of 4 mils. It shall be placed over the wet surface of the fresh concrete as soon as possible without marring the surface and shall be weighted so that it remains in contact with all exposed surfaces of the concrete. All joints and edges shall be lapped and weighted. Any tears in the film shall be immediately repaired.
   4. Application of wet coverings weighing 9 ounces per square yard such as burlap, cotton mats, or other moisture-retaining fabrics. The covering system shall include two layers

and shall be kept continuously moist so that a film of water remains on the concrete surface throughout the curing period.

5. Use of an approved waterproof curing paper. Edges of adjacent sheets shall be overlapped several inches and tightly sealed.
6. Ponding of water or continuous sprinkling of water is permitted. Sprinkling at intervals will not be permitted.
7. Construction joints shall be moist cured by one of the methods listed above except by Method “2.”

B. The use of moist earth, sand, hay, or another method that may discolor hardened concrete will not be permitted.

3.05 HOT WEATHER CONCRETING

A. When the atmospheric temperature exceeds 80°F during concrete placement, this section and ACI 305 shall apply in addition to all other sections of the specifications.

B. The temperature of the delivered concrete shall not exceed 85°F.

C. Care shall be exercised to keep mixing time and elapsed time between mixing and placement at a minimum. Ready-mix trucks shall be dispatched so as to avoid delay in concrete placement, and the work shall be organized to use the concrete promptly after arrival at the jobsite.

D. The subgrade, forms, and reinforcing shall be sprinkled with cool water just prior to placement of concrete. Prior to placing concrete, there shall be no standing water or puddles on the subgrade.

E. If approved by ENGINEER, an admixture for retarding the setting of the concrete may be used.

F. Exposed concrete surfaces shall be carefully protected from drying. Continuous water curing is preferred. Curing compounds shall be white pigmented.

3.06 COLD WEATHER CONCRETING

A. Conditions of this section shall apply, in addition to all other sections of the specifications, when placing concrete in cold weather. Cold weather is defined as a period when, for more than three successive days, the average daily temperature drops below 40°F. When temperatures above 50°F occur during more than half of any 24-hour period, the period will no longer be regarded as cold weather. The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight. Cold weather concreting shall conform to all requirements of ACI 306.1, except as modified by the requirements of these specifications.

B. Detailed procedures for the production, placement, protection, curing, and temperature monitoring of concrete during cold weather shall be submitted to ENGINEER. Cold weather concreting shall not begin until these procedures have been reviewed for conformance with ACI 306.1.

C. All concrete materials, forms, ground, mixing equipment, and other surfaces with which the concrete is to come in contact shall be free from frost, and the temperature of contact surfaces shall be 35°F or above. Ground upon which concrete is to be placed shall not be frozen at any depth.

D. The mixing water and aggregates shall be heated and when entering the mixer shall have temperatures not exceeding 175°F and 80°F, respectively. Concrete temperature as mixed shall not exceed 80°F and shall typically be between 55°F and 70°F. Concrete, when placed in the forms, shall have a temperature of not less than 50°F.

E. Freshly placed concrete shall be protected by adequate covering, insulating, or housing and heating. If heating is used, ambient temperature inside the housing shall be maintained at a minimum of 70°F for 3 days or 50°F for 5 days. The maximum ambient temperature during curing shall not exceed 80°F. If insulating methods are used, recommendations contained in ACI 306R shall be followed. Surface temperature shall be maintained at 50°F for 7 days. After the curing period, the temperature of the concrete shall be reduced uniformly at a rate not to exceed 40°F per 24 hours until outside air temperature is reached. Heating of enclosure shall continue if it is anticipated that the outside air temperature will drop more than 20°F in the next 24 hours. The concrete temperature shall be obtained by attaching a thermometer provided by CONTRACTOR to the concrete surface. Concrete shall be kept moist.

F. If heating is used, the housing shall be constructed weathertight and shall be constructed in a manner that will provide uniform air circulation and air temperatures over the complete concrete area that is being cured. Special attention shall be given to the edges and ends of a concrete pour with the housing extending at least 5 feet beyond any concrete surface being protected. The housing shall be in place and heat applied within 2 hours after concrete placement.

G. Heating may be by steam or hot air. Heaters shall be vented to outside of the housing. Open burning salamanders will not be permitted. Heating devices shall not be placed so close to the concrete as to cause rapid drying or discoloration from smoke.

H. If heating is used, CONTRACTOR shall provide sufficient 24-hour inspection of the heaters to provide compliance with the above-specified temperature requirements during the curing period. CONTRACTOR shall provide maximum-minimum thermometers for ENGINEER's use.

I. The use of calcium chloride, salts, or other chemical admixtures for the prevention of freezing is prohibited.

J. Salts or other deleterious materials shall not be used on temporary or permanent structures above concrete surfaces that are being placed, finished, or cured.

3.07 FINISHING

A. Flat Work:
   1. Hard Troweled Finish: Float concrete surface, then power trowel the surface. Hand trowel the surface smooth and free of trowel marks. Continue hand troweling until a ringing sound is produced as the floor is troweled.
   2. Tolerance for concrete floors shall be 1/4 inch within 10 feet in any direction. Straight edge shall be furnished by CONTRACTOR.
   3. Broom or Belt Finish: Immediately after concrete has received a floated finish, give the concrete surface a coarse transverse scored texture by drawing a broom or burlap belt across the surface.
   4. The above finishes shall be used in the following locations:
      a. Hard Troweled Finish: Building floors.
      b. Broom or Belt Finish: Exterior slabs.

B. Formed Surfaces:

1. Within 2 days after removing forms and prior to application of a curing compound, all concrete surfaces shall be observed and any poor joints, voids, stone pockets, or other defective areas shall be patched at once before the concrete is thoroughly dry. Defective areas shall be chipped away to remove all loose and partially bonded aggregate. The area shall be thoroughly wetted and filled with as dry as practical mortar mix placed to slightly overfill the recess. Mortar shall include a bonding agent. After partial set has taken place, the excess mortar shall be removed flush with the surface on the concrete using a wood float. All patching shall be cured, protected, and covered as specified for concrete. All cracks, leaks, or moist spots that appear shall be repaired. No extra compensation will be allowed CONTRACTOR for such work.
2. The exterior or removal portion of nonremovable ties shall be removed with the use of a special tool designed for this purpose. Cutting or chipping of concrete to permit removal of exterior portion will not be permitted.
3. For nonremovable ties, tie rod holes left by the removal of the exterior portion of the tie and cone shall be thoroughly wetted and filled by ramming with as dry as practical mortar mix in such a manner such that it completely fills the hole. Mortar shall include a bonding agent. All patching shall be cured, protected, and covered as specified for concrete. The holes are to be filled immediately after removal of the exterior portion of the tie.
4. Holes left by removable ties shall be filled by installing a neoprene plug near the center of the wall. The balance of the hole shall be filled with mortar as specified above to within 1 inch of the face of the wall. The remainder of the hole shall be filled with a waterproofing compound.
5. All finished or formed surfaces shall conform accurately to the shape, alignment, grades, and sections as shown or prescribed by ENGINEER. All surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness. All sharp angles, where required, shall be rounded or beveled. Any formed surface to be painted shall be free of any material that will be detrimental to the paint. The surface of the concrete shall be given one of the following finishes immediately after form stripping:
    a. Finish A shall be referred to as a sack finish. Surfaces shall be free of contaminants prior to sacking. After wetting the surface, a grout shall be rubbed in using a rubber float or burlap. After the grout hardens sufficiently, it shall be scraped from the surface with the edge of a steel trowel without disturbing the grout in the air holes. After further drying, the surface shall be rubbed with burlap to remove all surface grout. The entire surface shall be finished to secure a continuous, hard, dust-free uniform texture surface free from pinholes and other minor imperfections. Finish A will be required for all unpainted surfaces (See Section 09 91 00–Painting for painted surfaces), interior surfaces of equipment rooms, operation areas, and permanently exposed vertical surfaces. Where steel-faced forms are used to form walls, the portion of wall to receive the sack finish shall first be roughened by brush blasting or other acceptable method to achieve a texture similar to 40 to 60 grit sandpaper.
    b. Finish B shall be the same as Finish A, except that the final burlap rubbing may be omitted, providing the steel trowel scraping removes the loose buildup from the surface. Finish B shall be provided for waterproof- and moistureproof-coated surfaces.
    c. Finish C shall be referred to as a finish that has surface imperfections less than 3/8 inch in any dimension. Surface imperfections greater than 3/8 inch shall be repaired or removed and the affected areas neatly patched. Finish C or smoother shall be provided for interior surfaces of wet wells, tanks, and channels from 1 foot below minimum water surfaces and down and otherwise unfinished interior surfaces.
    d. Finish D shall be the finish for surfaces that may be left as they come from the forms, except that tie holes shall be plugged and defects greater than 1/2 inch in any

dimension shall be repaired. Finish D shall be provided for surfaces to be buried or covered by other construction such as masonry veneer.

C. All precautions shall be taken to protect the concrete from stains or abrasions, and any such damage shall be removed or repaired under this Contract.

3.08 LOADING OF CONCRETE STRUCTURES

A. No concrete structure or portion thereof shall be loaded with its design load until the concrete has obtained its specified 28-day compressive strength. This shall include but not be limited to vertical live load, equipment loading, water loading, groundwater loading, and backfill load. Concrete strength at time of loading shall be determined by testing field-cured concrete cylinders.

B. Extreme care shall be taken so that construction loads do not exceed design loading of the structure.

3.09 TESTING AND SAMPLING

A. The following tests of fresh concrete shall be performed by the SPECIAL INSPECTOR. The SPECIAL INSPECTOR shall prepare, protect, transport, and have tested all cylinders at its expense.
   1. Sampling of concrete for slump tests, air tests, temperature tests, and for making concrete test cylinders shall be performed in accordance with ASTM C172.
   2. Cylinders:
      a. Three test cylinders shall be made for each pour less than 25 cubic yards, four test cylinders shall be made for each pour between 25 and 100 cubic yards, and eight test cylinders shall be made for each pour in excess of 100 cubic yards. Each concrete mix shall be represented by at least four cylinders for the entire job. Concrete for cylinders shall be collected near the middle of the load and/or as requested by ENGINEER.
      b. Cylinders shall be made and tested in accordance with ASTM C31 and ASTM C39, respectively. The cylinders must be kept moist and at temperatures between 60°F and 80°F and shall remain undisturbed and stored in a location free from vibration. In hot weather, the cylinders shall be covered with wet burlap and stored in a shaded area. It is CONTRACTOR's responsibility to provide a suitable protected location for storing cylinders on the jobsite.
      c. After 24 hours, the cylinders shall be transferred to an independent testing laboratory acceptable to OWNER. The cylinders shall be packed in sawdust or other cushioning material for transit to avoid any bumping or jarring of the cylinders.
      d. Cylinders shall be broken at 7 and 28 days or as requested by ENGINEER. Test results shall be transmitted immediately and directly to ENGINEER and OWNER. Test data shall include date and location of pour and concrete mix used.
   3. Slump Test: The SPECIAL INSPECTOR shall make one slump test near the beginning of all pours with two tests being made for all pours in excess of 25 yards or as requested by ENGINEER. Slump tests shall conform to ASTM C143.
   4. Air Test:
      a. When air-entrained concrete is used, the air content shall be checked by The SPECIAL INSPECTOR near the beginning of all pours with at least two checks being made for all pours in excess of 25 cubic yards, or as requested by ENGINEER.
      b. The air contents shall be checked using the pressure method in accordance with ASTM C231. The pocket-sized alcohol air indicator shall not be used unless it is first used in conjunction with the pressure method test.

B. All costs of additional testing and sampling of fresh or hardened concrete needed because of suspected or actual violation of the specifications shall be borne by CONTRACTOR.

3.10 RECORDS

A. A record is to be kept of all concrete work. The record shall include the date, location of pour, concrete mix, slump, air content, test cylinder identification, concrete temperature, and ambient air temperature. In addition, for cold weather concreting the record shall include the daily maximum-minimum thermometer readings of all thermometers during the entire curing period for all concrete pours. The Resident Project Representative will keep this record, and CONTRACTOR shall assist in obtaining needed information.

3.11 SIDEWALKS AND EXTERIOR SLABS

A. Sidewalks shall be constructed where shown on the Drawings. They shall be a minimum of 5 inches thick and shall slope away from buildings or structures at a rate of 1/4-inch per foot. Concrete shall be as previously specified. Sidewalks shall be constructed on 3 inches of compacted granular fill. They shall have tooled joints of 1-inch minimum depth at approximately 5-foot centers with 1/2-inch preformed expansion joint filler at approximately 25-foot centers with one at all corners and located anywhere sidewalks abut structures and buildings.

END OF SECTION

SECTION 04 05 13

MORTAR AND MASONRY GROUT

PART 1–GENERAL

1.01 SUMMARY

A. The work includes mortar and grout for masonry.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. Kentucky Building Code.

B. ASTM C91–Masonry Cement.

C. ASTM C144–Aggregate for Masonry Mortar.

D. ASTM C150–Portland Cement.

E. ASTM C207–Hydrated Lime for Masonry Purposes.

F. ASTM C404–Aggregates for Masonry Grout.

G. ASTM C476–Grout for Masonry

H. ASTM C979–Pigments for Integrally Colored Mortar/Concrete.

1.03 SUBMITTALS

A. Submit under provisions of Section 01 33 00–Submittals.

B. Submit information on Portland cement, integral waterproofing compound, and hydrated lime for mortar. Include design mix with proportions of materials being used. Submit gradation on aggregates.

C. Submit design mix for grout including gradation of aggregates.

D. Manufacturer’s certificate: Certify that products meet or exceed specified requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

A. All cement shall be stored in a dry, weatherproof, properly ventilated structure which will protect it from dampness and freezing.

PART 2–PRODUCTS

2.01 MORTAR

A. Provide Portland cement-lime mortar or masonry cement mortar with proportion restrictions as stated in the Kentucky Building Code. Provide integral waterproofing compound in mortar for all exterior masonry. Provide Type N mortar for exterior non-load bearing brick and split face block veneer. Provide Type S mortar for all other masonry.

B. Portland cement shall conform to ASTM C150, Type I or III; or ASTM C595 Type IL.

C. Hydrated lime shall conform to ASTM C207, Type S.

D. Masonry cement shall conform to ASTM C91.

E. Integral waterproofing compound shall be Dry-Block by W.R. Grace Company, or equal.

F. Mortar aggregate for ordinary tile, brick, stone, and block shall consist of clean, sharp sand, conforming to ASTM C144. The sand shall be graded within the following limits:

Sieve Number	Percent by Weight Passing
4	100
8	95 to 100
16	70 to 100
30	40 to 75
50	10 to 35
100	2 to 15
200	---

G. Sand from any one source shall not vary over the extreme limits shown above. For unusually thin joints, such as occur with a unit having cut or ground edges, the aggregate used shall conform to these specifications except that 95% shall pass a No. 16 sieve.

H. Water used in mixing water shall be clean and free of injurious materials.

I. Mortar shall be thoroughly mixed until of uniform color and consistency. Only sufficient mortar to meet the immediate requirements of the work shall be mixed at one time. No mortar shall be retempered after it has begun to set, and no partially set mortar shall be used. No antifreeze material shall be used in the mortar to lower the freezing point.

2.02 GROUT

A. Grout shall conform to ASTM C476–Mortar and Grout for Reinforced Masonry.

B. Aggregates shall conform to ASTM C404–Aggregates for Masonry Grout.

C. Grout shall have a minimum 28-day compressive strength of 2,500 psi with the following proportions:
   1. Fine Grout: 1 Portland Cement: 0 to 1/10 lime: 2 1/2 to 3 fine aggregate.

2. Coarse Grout: 1 Portland Cement: 0 to 1/10 lime: 2 1/2 to 3 fine aggregate: 1 to 2 coarse aggregate.

D. Fine grout shall be used in spaces with least horizontal dimension greater than 3/4 inch and less than 2 1/2 inches. Coarse grout shall be used in all spaces with least dimensions 2 1/2 inches or greater.

PART 3–EXECUTION

3.01 INSTALLATION

A. Brace masonry for wet grout pressure.

B. Work grout into masonry cores and cavities.

C. Where joints occur in grout, they shall be made 2 inches below the block joint so that a key is provided.

D. Grout full masonry walls from top of floor to underside of all lintels at openings for a distance of 16 inches adjacent to each side of opening, unless shown otherwise on the Drawings.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Shop-Fabricated Carbon Steel, Stainless Steel, and Aluminum Items, Including Lintels, Metal Stairs, Ladders, and Weirs and Baffles.
   2. Stair Treads and Nosings.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ASTM A36–Carbon Structural Steel.

B. ASTM A53–Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

C. ASTM A123–Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A143–Practice for Safeguarding Against Embrittlement of Hot-Dipped Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

E. ASTM A153–Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

F. ASTM A240–Standard Specification for Chromium and Chromium Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

G. ASTM A276–Stainless Steel Bars and Shapes.

H. ASTM A307–Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength.

I. ASTM A384–Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.

J. ASTM A385–Practice for Providing High-Quality Zinc Coatings (Hot-Dip).

K. ASTM A500–Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

L. ASTM A780–Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

M. ASTM A992–Structural Steel Shapes.

N. ASTM A1008–Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable.

O. ASTM A1011–Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

P. ASTM B209–Aluminum and Aluminum-Alloy Sheet and Plate.

Q. ASTM B211–Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire.

R. ASTM B221–Aluminum and-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.

S. AWS A2.0–Standard Symbols for Welding, Brazing, and Nondestructive Examination.

T. AWS A5.4–Stainless Steel Electrodes for Shielded Metal Arc Welding.

U. AWS D1.1–Structural Welding Code–Steel.

V. AWS D1.2–Structural Welding Code–Aluminum.

W. AWS D1.6–Structural Welding Code–Stainless Steel.

X. ASTM F593–Standard Specifications for Stainless Steel Bolts, Hex Cap Screws, and Studs.

Y. ASTM F594–Standard Specification for Stainless Steel Nuts.

1.03 DESIGN REQUIREMENTS

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

1.04 SUBMITTALS FOR REVIEW

A. Comply with pertinent provisions of Section 01 33 00–Submittals.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, sections, elevations, and details where applicable.

C. Mill Test Reports: Submit indicating structural strength and composition.

D. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.05 QUALITY ASSURANCE

A. Fabricate steel members in accordance with AISC Code of Standard Practice.

B. Welders Certificates: Certify welders employed on the work, verifying AWS qualification within the previous 12 months.

1.06 QUALIFICATIONS

A. Qualify welding processes and welding operators in accordance with AWS *Standard Qualifications Procedures*.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver all materials to job site properly marked to identify the structure for which it is intended and at such intervals to allow uninterrupted progress of the work. Marking shall correspond to markings indicated on the shop drawings.

B. Store all members off the ground using pallets, platforms, or other supports.

C. Do not store materials on the structure in a manner that might cause distortion or damage to the members of the supporting structures.

D. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to OWNER.

PART 2–PRODUCTS

2.01 MATERIALS–CARBON STEEL

A. Steel Sections:
   1. ASTM A36 (channels, angles, plates).
   2. ASTM A992 (wide flange sections).
   3. Pipe: ASTM A53, Grade B.
   4. Tubes: ASTM A500, Grade B.
   5. Silicon content of steel members to be hot-dipped galvanized shall be in the range of 0 to 0.04%. Submit mill test reports confirming compliance.

B. Sheet Steel: ASTM A1011.

C. Plain Washers: Round carbon steel complying with FS FF-W-92.

D. Bolts, Threaded Rods, and Nuts: ASTM A307 Grade A, or galvanized to ASTM A153 for galvanized components for exterior use and where built into exterior walls.

E. Lock Washers: Helical spring-type carbon steel complying with FS FF-W-84.

F. Welding Electrodes: Comply with AWS D1.1. E70XX electrodes for carbon steel. For ASTM A992 steel and any other steel with 50 ksi or greater yield strength, use only E7018 or other E70XX electrodes specifically permitted by AWS D1.1.

G. Select fasteners for the type, grade, and class required.

2.02 MATERIALS–STAINLESS STEEL

A. Unless otherwise noted, all stainless steel bars and shapes shall meet the requirements of ASTM A276 and shall be Type 316L.

B. Unless otherwise noted, all stainless steel bolts shall meet the requirements of ASTM F593 and shall be Type 316L.

C. Unless otherwise noted, all stainless steel nuts shall meet the requirements of ASTM F594 and shall be Type 316L.

D. If components are not available in Type 316L, other 300 Series type shall be used as approved by ENGINEER.

E. Welding Electrodes:
   1. Comply with AWS D1.6.
   2. Use ER316L electrodes for 316L stainless steel.
   3. Use ER308L electrodes for 304L stainless steel.

2.03 MATERIALS–ALUMINUM

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

B. Sheet Aluminum: ASTM B209, Alloy 3005.

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

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

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

2.04 ACCESSORIES

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

B. Nosings:
   1. Stair tread nosing shall be provided on all interior concrete and steel pan stairs.
   2. Nosings for interior concrete stairs shall be American Abrasive Metals Company, Type 231-A; Wooster Products, Inc., Type 231, or equal, with continuous apron anchor. Abrasive filler color shall be gray. Hold stair nosings back 3 inches from each side for concrete stairs.
   3. Nosings for steel pan stairs shall be American Abrasive Metals Company, Type 232-A, Wooster Products, Inc., 232, or equal, with continuous arrow anchor. Abrasive filler color shall be gray. Hold stair nosings back 1/8 inch from inside of stringer.

2.05 FABRICATION

A. Fabrication and Assembly:
   1. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on the approved shop drawings.
   2. Properly mark and match-mark materials for field assembly and for identification as to structure and site for which intended.
   3. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
   4. Where finishing is required, complete the assembly, including welding of units, before start of finishing operation.
   5. Provide finish surfaces of members exposed in the final structure free of markings, burrs, and other defects.

B. Connections:
   1. Bolts and washers of all types and sizes shall be provided for completion of all field erection.
   2. Comply with AWS Code for procedures, appearance, and quality of welds used in correcting welded work.
   3. Assemble and weld built-up sections to produce true alignment of axes without warp.
   4. Welding shall be done by the shielded arc process.
   5. All welds shall be chipped, ground smooth, and primed immediately after fabrication.

C. Workmanship:
   1. Use materials of size and thickness shown or, if not shown, of size and thickness to produce strength and durability in the finished product.
   2. Work to dimensions shown or accepted on the shop drawings using proven details of fabrication and support.
   3. Form exposed work true to line and level, with accurate angles and surfaces, and with straight sharp edges.
   4. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing works.
   5. Cap all open ends of pipe and structural tubing.
   6. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush; match and blend with adjoining surfaces.
   7. Provide for anchorage of the type shown. Coordinate with supporting structures. Fabricate and space the anchoring devices to provide adequate support for intended use.
   8. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive hardware and similar items.

2.06 MISCELLANEOUS METAL FABRICATION

A. Metal Stairs:
   1. Fit and shop-assemble components in largest practical sections for delivery to site.
   2. Fabricate components with joints tightly fitted and secured.
   3. Supply components for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
   4. Treads and risers for metal pan stairs shall be fabricated with 14 gauge sheet steel, closed risers, treads ready to receive concrete.
   5. Aluminum grating stair treads shall be bolted to stringers with aluminum or stainless steel bolts.
   6. Aluminum safety treads shall be screwed to aluminum carrier angles.

B. Aluminum Ladder: Provide fixed aluminum ladder. Aluminum ladder shall have serrated surface on rungs.

C. New Safety Climb Equipment:
   1. Safety Climb Equipment: Provide a safety climb device on the ladders in the access tube. Fall protection system components shall be supplied by the same company. System supplied shall conform to OSHA standards.
   2. The top bracket of the safety climb equipment shall extend above the platforms at the tops of the ladders. The top of the usable cable shall be at the top of the ladder above the platform. Where roof hatches prohibit standard extensions, Telescoping Top Bracket

shall be installed. DBI/SALA LAD-SAF galvanized Flexible Cable Ladder System. Provide two DBI/SALA safety sleeves with Saflok carabiner 6160054.

2.07 FINISHES

A. Carbon steel surfaces shall be prepared by abrasive blasting to SSPC-SP10 as specified in Section 09 91 00–Painting.

B. Do not prime surfaces where galvanizing or field welding is required.

C. Immediately after surface preparation, prime paint carbon steel items with one coat in accordance with manufacturer's instructions and Section 09 91 00–Painting.

D. Structural Steel Members: Galvanize after fabrication to the requirements in this section and ASTM A123.

E. Surfaces that will be inaccessible after assembly or erection shall be finish painted prior to assembly or erection.

F. Galvanizing:
1. All items, except piping designated to be galvanized, shall be hot-dipped galvanized in accordance with ASTM Specification A123 and A153. Piping shall be hot-dipped galvanized in accordance with ASTM A53. Furnish a Certificate of Compliance stating that the galvanizing complies with ASTM Specifications and Standards and all other applicable requirements specified herein.
2. Fabrication of items to be galvanized shall be in accordance with ASTM A143, A384, and A385. Structural steel shall be fabricated generally in accordance with Class 1 guidelines as shown in *Recommended Details for Galvanized Structures* as published by the American Hot Dip Galvanizer's Association, Inc.
3. Galvanized items shall be handled, transported, and stored to prevent damage or staining to the coating. Maintain adequate ventilation and continuous drainage.
4. Silicon content for steel to be hot-dipped galvanized shall be in the range of 0 to 0.04%.
5. Steel work shall be precleaned utilizing a caustic bath, acid pickle and flux, or shall be blast cleaned and fluxed. In either case, all surface contaminants and coatings shall be removed.
6. All welding shall be performed in accordance with the American Welding Society publication D19.0-72, *Welding Zinc Coated Steel*. All uncoated weld areas shall be touched up.

G. Aluminum shall have a mill finish unless otherwise specified. Any aluminum in contact with concrete or dissimilar metal shall be coated with multiple coats of bituminous paint, minimum 10 mils dry.

PART 3–EXECUTION

3.01 EXAMINATION

A. Correct conditions detrimental to the proper and timely completion of the work.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages such as concrete inserts, anchor bolts, and miscellaneous items having integral anchors which are to be embedded in concrete construction.

B. Coordinate delivery of such items to project.

C. Clean and strip primed steel items to bare metal where site welding is required.

3.03 INSTALLATION

A. Setting Precast Anchorages:
   1. Clean bearing surfaces free from bond-reducing materials, and roughen to improve bond to surfaces. Clean the bottom surface of bearing plates.
   2. After the bearing members have been positioned and plumbed, tighten and anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.
   3. Pack grout solidly between bearing surfaces and plates so that no voids remain.

B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction including threaded fasteners for concrete inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

C. Cutting, Fitting, and Placement:
   1. Perform cutting, drilling, and fitting for installation of miscellaneous metal fabrications.
   2. Set work accurately in location, alignment, and elevation and make plumb, level, true, and free from rack measured from established lines and levels.
   3. Fit exposed connections accurately together to form tight hairline joints.
   4. Weld connections that are not to be left as exposed joints, grind joints smooth, and touchup shop paint coat or galvanizing repair.

D. Install Safety Climb Equipment:
   1. After all other work is completed, install the new safety climb equipment to all ladders.
   2. Safety climb equipment on the shaft ladders shall extend above the platforms. Provide telescoping brackets as required to accommodate equipment.
   3. Safety climb equipment shall be inspected and the installation shall be approved by a representative of the manufacturer.

3.04 FIELD WELDING

A. Comply with AWS Code for procedures of manual shielded metal arc welding (steel, stainless steel) and gas metal arc welding (aluminum), appearance and quality of weld made, and methods in correcting welding work.

3.05 TOUCH-UP PAINTING

A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting in accordance with Section 09 91 00–Painting.

3.06 GALVANIZING REPAIR

A. Areas damaged by welding, flame-cutting, or during handling, transport, or erection shall be repaired by one of the following methods whenever damage exceeds 3/16 inch in width.
   1. Cold Galvanizing Compound:
      a. Surfaces to be reconditioned with zinc-rich paint shall be clean, dry, and free of oil, grease, and corrosion products.
      b. Areas to be repaired shall be power disc-sanded to bright metal. So that a smooth reconditioned coating can be effected, surface preparation shall extend into the undamaged galvanized coating.
      c. Touch-up paint shall be an organic cold-galvanized compound having a minimum of 94% zinc dust in the dry film.
      d. The paint shall be spray- or brush-applied in multiple coats until a dry film thickness of 8 mils minimum has been achieved. A finish coat of aluminum paint shall be applied to provide a color blend with the surrounding galvanizing.
      e. Coating thickness shall be verified by measurements with a magnetic or electromagnetic gauge.
   2. Zinc-Based Solder:
      a. Surfaces to be reconditioned with zinc-based solder shall be clean, dry, and free of oil, grease, and corrosion products.
      b. Areas to be repaired shall be wire-brushed.
      c. Heat shall be applied slowly and broadly close to but not directly onto the area to be repaired. The zinc-based solder rod shall be rubbed onto the heated metal until the rod begins to melt. A flexible blade or wire brush shall be used to spread the melt over the area to be covered. The zinc-based solder shall be applied in a minimum thickness of 2 mils.
      d. Coating thickness shall be verified by measurements with a magnetic or electromagnetic gauge.

3.07 SCHEDULE

A. The following schedule is a list of principal items only. Refer to Drawing details for items not specifically scheduled.

B. Guard Posts: Steel pipe, concrete-filled, crowned cap, as detailed-galvanized and field finish paint in accordance with Division 09.

C. Lintels: Shop prime paint finish for interior wall lintels; galvanized and field finish paint in accordance with Division 09 for exterior wall lintels. Lintels approved by ENGINEER shall be placed over all masonry openings, even if not shown on the Drawings.

D. Door Frames for Overhead Door Openings: Jamb angle sections-galvanized and field finish paint in accordance with Division 09. Sill angle sections-galvanized finish.

E. Steel stairs, metal pan treads and landings. Shop-primed finish.

F. Aluminum stairs, serrated aluminum treads and landings. Mill finish.

G. Aluminum ladder.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Surface preparation and application of paints and coatings.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. AMPP–Association for Materials Protection and Performance.

B. ASTM B117–Standard Practice for Operating Salt Spray (Fog) Apparatus.

C. ASTM D2247–Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

D. ASTM D3363–Standard Test Method for Film Hardness by Pencil Test.

E. ASTM D4060–Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.

F. ASTM D4541–Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

G. ASTM D4585–Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation.

H. Federal Register–Code of Federal Regulations (CFR).

I. Federal Register–Resource Conservation and Recovery Act (RCRA).

J. Federal Register–Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

K. ICRI–International Concrete Repair Institute.

L. NACE–National Association of Corrosion Engineers.

M. SSPC–The Society for Protective Coatings–Steel Structures Painting Manual.

1.03 SUBMITTALS

A. Submittals shall be in accordance with provisions of Section 01 33 00–Submittals.

B. Shop primer proposed for use shall be submitted with all material and equipment submittals. All shop primers shall be of the same generic type and quality as those specified herein.

C. Submit manufacturer's Safety Data Sheets (SDS) for each type of paint with each shop drawing submittal. SDS sheets shall be posted at the construction site at all times painting is in progress.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. All paints, surface preparation, and application methods shall conform to federal requirements for allowable exposure to lead and other hazardous substances.
   2. All paints shall be NSF Standard 61/600-approved when they are in contact with potable water or within potable water reservoirs.

B. Prepainting Meeting:
   1. A prepainting meeting shall be held immediately following the project preconstruction conference. The prepainting meeting is to be held prior to any material and equipment that requires painting is delivered to the site.
   2. CONTRACTOR, the paint subcontractor, and the paint manufacturer's representative shall be present to review the specifications and project scope.
   3. The paint manufacturer's representative shall review progress at the site as requested by ENGINEER. These are generally expected to be prior to monthly progress meetings.

1.05 FIELD QUALITY CONTROL

A. Furnish testing apparatus as applicable for observing surface preparation, testing atmospheric conditions and testing coatings, prior to beginning surface preparation. Provide the following apparatus:
   1. One set of U.S. Department of Commerce thickness calibration plates, certified by the National Bureau of Standards, to test dry film thickness.
   2. One wet-film thickness gauge.
   3. One dry-film thickness gauge, Mikrotest III, 0 to 40 mils with calibration standard approved by the Bureau of Standards.
   4. One Bacharach Sling Psychrometer, Model 12-7011.
   5. Tinker and Razor Model M-1 Holiday Detector and recommended wetting agent.
   6. One set of SSPC-VIS 1-89 Visual Standards for Abrasive Blast Cleaned Steel.

B. Provide access via scaffolding or staging for inspection.

C. Entire surface of coated submerged concrete shall be tested with holiday detector. Mark and repair all pinholes, then retest until no pinholes are found.

D. CONTRACTOR shall provide documentation to ENGINEER of conditions before and during painting operations for each area and each day's work. Documented conditions shall include the following at a minimum: date, area of work, system used, preparation methods, environmental conditions, quantity and thickness of coating placed, noted conditions, and nonconforming items. ENGINEER can provide sample report form if CONTRACTOR does not have their own.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site in original containers with labels intact and seals unbroken.

B. Drop cloths shall be used in all areas where painting is done to fully protect other surfaces.

C. Oily rags and waste must be removed from the building each night or kept in an appropriate metal container.

1.07 ENVIRONMENTAL REQUIREMENTS

A. CONTRACTOR shall dry-heat, dehumidify, and ventilate to obtain painting conditions recommended by the paint manufacturer during surface preparation, application, and cure.

B. Relative humidity conditions as specified by the paint manufacturer's data sheet shall be adhered to. This includes times in which supplemental heat is used. Supplemental heat shall be indirect-fired hot air furnaces or electric heat. Open-flame heaters shall not be used.

C. No unprotected, unheated exterior painting shall be undertaken when damp weather appears probable, nor when the temperature of the substrate is below 55°F, unless approval in writing is received from the paint manufacturer.

1.08 COLOR SELECTIONS

A. Provide color charts for all coatings being used on the Project. After initial selection of colors by OWNER, provide draw down samples of selected colors for OWNER's final approval. For stained wood, provide specified wood species sample with selected color for final approval.

B. CONTRACTOR shall provide a summary sheet at the completion of the project listing the finish paint products used and the manufacturer's color identification for each item painted. This summary sheet should be submitted to ENGINEER and OWNER for review.

PART 2–PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. All materials required for painting shall be types and quality as manufactured by Tnemec Company, Inc., Carboline, Rustoleum, International, or equal, unless noted otherwise in the schedule.

B. Where thinning is necessary, only the products of the manufacturer furnishing the paint will be allowed. All such thinning shall be done strictly in accordance with the manufacturer's instructions.

C. Paint and paint products of Tnemec Company, listed in the following specifications, are set up as standard of quality. Carboline, Rustoleum, International have preapproved equivalent products that shall be used. Other manufacturer's products will be considered as a substitution if CONTRACTOR and paint manufacturer certify that the products offered are recommended for the service intended, are compatible with the shop primers used, are equal in solids content and composition, and are of the same type. Submittal shall include the following performance data as certified by a qualified testing laboratory. ASTM Specifications shall be the latest revision:
   1. Abrasion–ASTM D4060, CS-17 Wheel, 1,000 grams load.
   2. Adhesion–ASTM D4541.
   3. Hardness–ASTM D3363.
   4. Humidity–ASTM D2247 and D4585.
   5. Salt (Fog) Spray–ASTM B117.

PART 3–EXECUTION

3.01 SURFACE PREPARATION

A. General:
1. All surfaces to be painted shall be prepared as specified herein and by the manufacturer's published data sheet and label directions. The objective shall be to obtain a uniform, clean, and dry surface.
2. No field painting shall be done before the prepared surfaces are observed by ENGINEER. Surfaces painted without such observation shall be abrasive-blast-cleaned and repainted.
3. Prior to field-blasting, a sample of the blast abrasive shall be provided to ENGINEER for pH testing. Additional samples of subsequent deliveries or batches of blast abrasive shall be provided to ENGINEER for pH testing.
4. For on-site abrasive-blasting, low-dust, low-silica content material shall be used. Coal slag abrasive shall be used on pipe and ferrous materials. Staurolite abrasive shall be used on concrete and concrete block.
5. Quality of surface preparations listed below are considered a minimum. If paint manufacturer requires a better preparation for a particular application, it shall be considered a requirement of this specification.
6. All concrete surfaces shall be tested for moisture in accordance with ASTM D4263 and, if necessary, F1869. Surfaces shall also be verified that the pH of the cleaned concrete surface to be coated is within the range of 8 to 11.

B. Ferrous Metal:
1. All ferrous metal to be primed in the shop shall have all rust, dust, and mill scale, as well as all other foreign substances, removed by abrasive blasting. Cleaned metal shall be primed or pretreated immediately after cleaning to prevent new rusting.
2. All ferrous metals not primed in the shop shall be abrasive-blasted in the field prior to application of the primer, pretreatment, or paint.
3. Abrasive blasting of metals in the shop shall be in accordance with SSPC-SP 10 Near White Blast Cleaning. Abrasive blasting of metals in the field for immersion service shall be in accordance with SSPC-SP 10 Near White Blast Cleaning. Abrasive blasting of metals in the field for nonimmersion service shall be in accordance with SSPC-SP6 Commercial Blast Cleaning.
4. Solvent cleaning in accordance with SSPC-SP1 shall precede all abrasive-blasting operations.
5. Ductile iron pipe shall be prepared by abrasive blasting per National Association of Pipe Fabricators NAPF 500-03-04 Abrasive Blast Cleaning.
6. Prior to finish coating, all primed areas that are damaged shall be cleaned and spot-primed.

C. Galvanized: Where galvanized items are not submerged or buried, they shall be cleaned with nonhydrocarbon solvent cleaner (such as Clean N Etch, or equal) in accordance with SSPC-SP1 and shall be abrasive-blasted in accordance with SSPC-SP16 Brush-Off Blast Cleaning.

D. Copper: Where copper piping is not submerged or buried, it shall be solvent-cleaned in accordance with SSPC-SP1 and shall be lightly sanded.

E. PVC and CPVC: All PVC and CPVC to be painted shall be solvent-cleaned in accordance with SSPC-SP1 and shall be lightly sanded.

F. Aluminum: Where listed in the Schedule to be painted, it shall be solvent-cleaned in accordance with SSPC-SP1 and shall be lightly sanded.

G. Wood:
   1. Wood surfaces shall be thoroughly cleaned and free of all foreign matter. Cracks and nail holes and other defects shall be properly filled and smoothed.
   2. Wood trim shall be sandpapered to a fine finish and wiped clean of dust.

3.02 APPLICATION

A. All materials shall be used as specified by the manufacturer's published data sheets and label directions.

B. No paint shall be applied on a wet or damp surface and in no case until the preceding coat is dry and hard. Each coat shall be allowed to dry in accordance with manufacturer's data sheets before the next coat is applied.

C. Drying time shall be construed to mean "under normal conditions." Where conditions are other than normal because of the weather or because painting must be done in confined spaces, other drying times will be necessary.

D. Additional coats of paint shall not be applied, nor shall units be returned to service until paints are thoroughly dry and cured.

E. Steel that will be inaccessible in the completed work shall receive the final coat before enclosure.

F. Paint shall be applied to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable. Tops and bottoms of walls and areas that are "cut-in" by brush prior to rolling shall have a uniform appearance in comparison with adjoining surfaces.

G. Concrete block walls shall be back-rolled to achieve a pinhole-free surface coat.

H. Walls and ceiling surfaces shall receive a minimum of one coat of paint before surface-mounted items such as conduits, boxes, piping, etc., are installed on these surfaces.

I. Crevices and other hard-to-apply areas shall be back-rolled/back-brushed in conjunction with application of the first field coat of primer or intermediate coat. This includes, but is not limited to, between pipe flanges, pipe flange/pipe barrel joints, equipment fittings, and other narrow openings.

J. For PVC and CPVC piping, unions and valves shall not be painted.

K. No field coating of paint shall be applied to ductile iron piping until the piping has been tested, the pipe gaps or joints have been caulked, and the caulk has fully cured, as specified.

3.03 FIELD QUALITY CONTROL

A. Examination of work on the site by the manufacturer's representative shall be performed when requested by ENGINEER.

3.04 CLEANING

A. All stains and marks shall be removed from other surfaces upon completion of the work.

3.05 SCHEDULE

A. General:
   1. At the completion of the project, all painted surfaces which have been damaged shall be repainted or touched-up.
   2. See Finish Schedule on the Drawings for an additional reference for areas to be painted.
   3. The painter shall use some discretion in what should and should not be painted. Do not paint over labels and other information, bronze, machined surfaces, moving parts where painting may impair movement, hot surfaces which may peel, etc. If in doubt whether a part should be painted, ask ENGINEER.
   4. Products listed first are Tnemec and second are Sherwin-Williams.

B. New Work–Pump Station:
   1. All new work done by all trades shall be painted by CONTRACTOR in accordance with the following schedule and in accordance with paint manufacturer's recommendation. It is the intent of these specifications that all non-galvanized ferrous metal items scheduled for painting be shop-primed. If items are not shop-coated, surfaces shall be prepared and painted in the field as specified. If any items of new construction are not listed, CONTRACTOR shall request paint system from ENGINEER, and the items shall be painted as part of this Contract without additional cost.
   2. All exposed concrete ceilings (ceilings of water-containing tanks are not considered exposed): Two coats of Series N69 Hi-Build Epoxoline, Macropoxy 646 Fast Cure.
   3. Cast or ductile iron, submerged–For areas in contact with potable water–Tnemec Products:
      a. One shop coat of Series 94-H20 as primer.
      b. One intermediate stripe coat on all weld seams of Series 21.
      c. One finish coat of Series 21 (tank white).
   4. Steel, machinery, and equipment; not submerged (including pipes to be insulated):
      a. One shop coat of N69-1255 Hi-Build Epoxoline, Macropoxy 646 Fast Cure Beige as primer.
      b. Touch-up primer prior to finish coat, and either:
         (1) Two coats of N69 Hi-Build Epoxoline II, Macropoxy 646 Fast Cure for interior surfaces; or
         (2) One coat of N69 Hi-Build Epoxoline II, Macropoxy 646 Fast Cure; and one coat of 1094 Endura-Shield, Acrolon 218HS for exterior surfaces.
   5. Motors, gear drives, and doors delivered with nonepoxy primers:
      a. Degrease per SSPC-SP1.
      b. Lightly hand-sand per SSPC-SP2.
      c. Apply one coat 135-1255 Chembuild Beige, Macropoxy 646 Fast Cure Beige.
      d. Apply two finish coats as follows:
         (1) Two coats of N69 Hi-Build Epoxoline II, Macropoxy 646 Fast Cure for interior surfaces, or
         (2) One coat of N69 Hi-Build Epoxoline II, Macropoxy 646 Fast Cure, and one coat of 1094 Endura-Shield, Acrolon 218HS for exterior surfaces.
   6. Steel, machinery, and equipment, submerged:
      a. One shop coat Series 1 Omnithane (N69-1255 Epoxoline), Dura-Plate 235 Beige as primer.

b. Touch-up prime coat prior to finish coating, and one stripe coat on all edges of N69 Hi-Build Epoxoline, Dura-Plate 235.
c. Two coats of N69 Hi-Build Epoxoline, (one coat) Sher-Glass FF.

7. Galvanized (except for metal building framing), copper, brass, CPVC, and PVC; not submerged or buried:
   a. Two coats of N69 Hi-Build Epoxoline, Macropoxy 646 Fast Cure for interior surfaces, or
   b. One coat of N69 Hi-Build Epoxoline, Macropoxy 646 Fast Cure, and one coat of 1094 Endura-Shield, Acrolon 218HS for exterior surfaces.
   c. For galvanized items that are embedded in construction, provide one coat before installing.
8. Insulation of equipment, pipes, and ductwork:
   a. Two coats of Series 1029 Endurotone, DTM Acrylic.
   b. Colored PVC jacketing shall not be painted.
9. Galvanized, copper, CPVC, and PVC; submerged or buried: Not painted.
10. Aluminum items:
    a. Exposed areas of structural items such as railings and grating shall not be painted.
    b. For structural items in contact with concrete, see Division 05.

C. Coverage–Pump Station:
1. Dry mil thickness shall conform to those specified. Mil test measurement shall conform to SSPC Steel Structures Painting Manual. Dry Film Thickness (DFT) shall be verified in accordance with SSPC-PA2.
2. The coatings listed will provide the mil thickness given when applied at the coverages listed. Upon the request of ENGINEER, such surfaces shall be checked by the painter with a calibrated mil thickness gauge and any deficiencies found in the film shall be remedied by additional coat(s) at the expense of CONTRACTOR.
3. On masonry, application rates will vary according to surface texture; however, in no case shall the manufacturer's stated coverage rate be exceeded. On porous surfaces, it shall be the painter's responsibility to achieve a protective and decorative pinhole-free finish either by decreasing the coverage rate or by applying additional coats of paint.
4. Coverages reflect manufacturer's recommendations using spray application techniques. Where brushing or rolling is specified or performed at the discretion of the painter, one additional coat, minimum, will be required to achieve total DFT as specified and recommended by the manufacturer.

	Min. Sq. Ft.** Coverage	Min. Dry Mil** Thickness Per Coat
Products		
1029 Endurotone, DTM Acrylic	200	
N69 Hi-Build Epoxoline II, Macropoxy 646 Fast Cure		
Steel or Impervious Substrate Primer Coat	---	4.0
Steel or Impervious Substrate Intermediate Coat(s)	---	5.0
Steel or Impervious Substrate Finish coat	---	5.0
135-1255 Chembuild, Macropoxy 646 Fast Cure	335	4.0
Steel Doors	---	3.0
20HS Pota-Pox, Macropoxy 646 Fast Cure		
Steel or Impervious Substrate Primer	---	4.0
Steel or Impervious Substrate Intermediate Coat(s)	---	5.0
Steel or Impervious Substrate Finish Coat	---	5.0
1094 Endura-Shield II, Acrolon 218HS	---	2.5
201 Epoxoprime, ArmorSeal 1000 HS Epoxy	250	

	Min. Sq. Ft.** Coverage	Min. Dry Mil** Thickness Per Coat
280 Tneme-Glaze, ArmorSeal 1000 HS Epoxy	250	
Epoxoblock WB 1254, Kem Cati-Coat HS	80	
N69 Hi-Build Epoxoline, Macropoxy 646 Fast Cure (Masonry and Concrete)	250	
Series 1 Omnithane, DuraPlate 235 (Primer)		3.0, 5.0
N69 Hi-Build Epoxoline II (Submerged)		6.0
Sher-Glass FF (Submerged)		12.0
Macropoxy 5500 LT (potable water system)		
Stripe Coat	---	5.0
Tnemec Series 94-H20, Sherwin Williams Corothane I Galvapac 1k		
Potable Water System Primer	---	3.0
Insulating Coating System Primer	---	3.0
Tnemec Series 21,		
Potable Water Stripe and Finish Coat	---	12.0
Sherwin Williams SherPlate 600		
Potable Water Intermediate and Finish Coats	---	6.0
Tnemec Series 1224 Epoxoline		
Insulating Coating Tie-Coat	---	6.0
Tnemec Series 971 Aerolon		
Insulating Coating	---	50.0
Tnemec Series 1028 Enduratone		
Insulating Coating Topcoat	---	3.0
Sherwin Williams Heat-Flex® Hi-Temp 3500		
Insulating Coating	---	20.0
Sherwin Williams Shercryl HPA		
Insulating Coating Topcoat	---	3.0

** Roller or brush application requires two or more coats to obtain recommended film thickness. No allowance is made here for overspray, waste in handling, mixing, or application. Final, minimum total DFT shall be equal to that specified. Paint submittals shall note where roller or brush application is proposed and the paint manufacturer's recommendations of number of coats to achieve the required thickness shall be noted.

Primer, intermediate and/or final surface colors shall be of contrasting colors to promote coverage.

END OF SECTION

SECTION 11 26 80

HYDRODYNAMIC MIXING SYSTEM

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: This section includes furnishing, installing, and placing into successful operation a Hydrodynamic Mixing System (HMS) by Tideflex Red Value Company. The HMS is a supplemental system installed within a potable water storage reservoir that passively utilizes the energy provided by the inlet water supply (via pumped or gravity head) and generates a sufficient inlet momentum to achieve a complete homogeneous blending of the water volume within the reservoir with the inlet supply flow. The HMS and appurtenances shall be furnished by the same supplier for a complete system. The complete system shall be defined as all piping and appurtenances within the tank downstream of the tank penetration. Appurtenances include piping, fittings, horizontal and vertical pipe supports, expansion joints, variable orifice duckbill check valves, and any other equipment specified within this section of the specifications.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SYSTEM DESCRIPTION

A. Design Requirements:
   1. The HMS shall only require one reservoir penetration for tanks that operate in fill-then-draw.
   2. The HMS shall be comprised of one manifold pipe with duckbill inlet nozzles and outlet check valves to minimize the amount of pipe, fittings, and appurtenances required to separate the inlet and outlet.
   3. The HMS shall be passive operating and not require any outside energy source.
   4. The HMS shall utilize the existing differential pressure between distribution system pressure and tank head to fill the reservoir through the inlet nozzles and draw fluid from the reservoir through the outlet check valves.
   5. The HMS shall have outlet check valves separated spatially from the inlet nozzles to mitigate short circuiting.
   6. The HMS shall be designed to provide complete homogeneous blending which shall be defined by the modeling requirements and supporting hydraulic analysis as conducted by each individual manufacturer for its specific system configuration. If complete blending is not possible, optimal blending shall be desired.

1.03 WARRANTY

A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

PART 2–PRODUCTS

2.01 MANUFACTURERS

A. The Hydrodynamic Mixing System shall be manufactured by Tideflex Technologies. This listed equipment is part of the Base Bid as indicated on the Bid pages and will be considered as establishing the type, function, appearance, and quality required, as defined in the General Conditions.

2.02 MATERIALS

A. All materials used in the manufacture assembly and painting of piping and valves in contact with water shall be compatible with potable water supplies. Materials in contact with chemical feed systems shall be compatible with the chemicals being used. All glues, solvents, and solders shall likewise be compatible. For instance, no lead-base solders shall be used. All materials shall be National Sanitation Foundation (NSF)-approved

2.03 CARBON STEEL PIPING AND FITTINGS

A. Unless otherwise shown or specified, all interior piping 4 inches in diameter or larger shall be steel conforming to AWWA C200.

B. Interior piping shall conform to ASTM A139 Grade B with a minimum rated working pressure of 250 psi. Wall thickness shall be minimum 0.375 inch.

C. Steel fittings shall be fabricated in accordance with AWWA C208.

D. Flanges, where required, shall be per AWWA C207 or as shown on the Drawings. Flanges shall conform to applicable portions of AWWA C115 and ANSI B16.1, Class 125 standard.

E. Flanged gaskets shall be minimum 1/8-inch-thick full face rubber ring gaskets. Thicker gaskets shall be provided as recommended by the manufacturer to meet joint tolerances.

F. Flange bolts shall be standard 316 stainless steel with hex head and hex nuts for the rated working pressures and installation conditions specified or shown.

G. All welds shall be made in the shop prior to painting. Shop welds shall be made in accordance with AWWA C206 and shall be of the butt joint design.

H. All couplings shall be tied with a joint harness. Harness design shall be as shown in the AWWA M11 Steel Pipe Manual and as shown on the Drawings.

I. All taps as shown shall be made at the factory.

J. All steel piping shall be shop primed and completely shop painted inside in accordance with the painting requirements of Division 09 prior to shipment to the job site. Steel piping exterior shall be painted with the tank interior paint.

2.04 VARIABLE ORIFICE INLET NOZZLES

A. Inlet ports/nozzles shall be duckbill-style check valves that allow fluid to enter the reservoir during fill cycles and prevent flow in the reverse direction through the nozzle during draw periods. Inlet ports/nozzles may not be fixed-diameter ports or pipes.

B. All materials shall be NSF61 certified.

C. Inlets ports/nozzles shall have a variable diameter versus flow hydraulic profile that provides a nonlinear jet velocity vs. flow characteristic and a linear head loss versus flow characteristic.

D. Manufacturer shall have conducted a hydraulic test where multiple valves (at least four) of the same size and construction (stiffness) were tested to validate the submitted head loss characteristics and to prove the repeatability of the manufacturing process to produce the same hydraulic characteristics.

E. Manufacturer shall have conducted in-house backpressure testing on duckbill valves ranging from 3/4 inch to 48 inches.

F. Manufacturer shall have at least five years of experience in the manufacturing of “duckbill” style elastomeric valves.

G. Manufacturer must have duckbill valves installed on manifold piping systems in at least 50 distribution system reservoirs.

H. The duckbill style nozzles shall be one-piece elastomer matrix with internal fabric reinforcing designed to produce the required discharge velocity and minimum head loss requirements as stipulated in the Submittals section.

I. The elastomer used in construction of the duckbill valves must have been tested by an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine and chloramine according to ASTM D471 *Standard Test Method for Rubber Property-Effect of Liquids*.

J. The manufacturer’s name, plant location, serial number, and product part number that designates nozzle size, material, and construction specifications shall be bonded onto the surface of the nozzle.

2.05 OUTLET CHECK VALVES

A. The outlet flow valves shall be perforated disc type with an elastomeric membrane.

B. All materials shall be NSF61 certified.

C. The membrane shall be circular, one piece rubber construction with fabric reinforcement. The diameter of the membrane shall allow adequate clearance between the membrane OD and the pipe ID. The membrane shall allow the membrane to seal against the pipe opening at low reverse differential pressure.

D. The support rod shall be stainless steel and drilled with three longitudinal holes to allow fastening of rod to membrane.

E. When line pressure inside the valve exceeds the backpressure outside the valve, the line pressure forces the membrane to open, allowing flow to pass through. When backpressure exceeds the line pressure, the membrane sits on the pipe opening preventing backflow.

F. The valve shall provide forward flow of the fill water and prevent flow in the reverse direction through the valve during draw periods.

G. The elastomer used in construction of the membrane must have been tested by an accredited independent laboratory that confirmed there is no degradation in the elastomer when exposed to chlorine and chloramine according to ASTM D471.

H. The manufacturer's name, plant location, serial number, and product part number that designates membrane size, material, and construction specifications shall be bonded onto the surface of the membrane.

2.06 FASTENERS

A. Refer to Section 05 50 00–Metal Fabrications for applicable provisions.

2.07 PIPE SUPPORTS

A. Refer to Section 05 50 00–Metal Fabrications for applicable provisions.

B. The bracket assemblies shall consist of four components:
   1. A base plate (when required). For concrete tanks, the base plate will have four through holes for expansion anchors.
   2. A top-works weldment that consists of structural channel and angle iron. The TMS piping shall rest on the angle iron. The angle iron has predrilled holes for the U-bolt.
   3. U-bolt with four hex nuts.
   4. An 1/8-inch-thick EPDM strip with a length equivalent to the circumference of the pipe. The strip shall be placed between the pipe and the angle iron and U-bolt.

2.08 FINISHES

A. It is the intent of this specification that all equipment, supports, and appurtenances shall be furnished factory shop-primed, clean, and ready to accept finish painting by CONTRACTOR, with a minimal amount of surface preparation. Preparation and painting shall conform to all requirements and provisions specified in Division 09. Unless otherwise specified, mechanical equipment and accessories shall be furnished with all surfaces (except galvanized, stainless steel, rubber, copper, PVC) prepared in accordance with near white grade SSPC Specification No. 10 removing all dirt, rust scale, and foreign materials. Surface preparation shall be done at such time during the assembly process as to preclude damage to the equipment once assembled. Cleaned surfaces shall then be factory shop-primed. Factory shop priming shall be with one coat of Tnemec 140-1255 Beige Pota-Pox Primer (NSF-approved), or equal, applied to a minimum of 5.0 mils dry thickness. Primer used shall be compatible with proposed finish coats; CONTRACTOR to verify.

B. Factory standard prime finish for valves and meters is acceptable if material is compatible with epoxy finish coat specified in Division 09. Primer used shall be compatible with proposed finish coats; CONTRACTOR to verify.

C. Inlet and outlet valves shall not be coated. The valves shall either be masked or mounted after coating of the tank and piping. CONTRACTOR shall remove masking materials after coating.

D. Refer to Section 13 20 00–Steel Elevated Water Tank for applicable provisions.

PART 3–EXECUTION

3.01 GENERAL

A. Refer to requirements specified in Division 01 for equipment installation quality control, testing, supervision, start-up, and operator training.

3.02 EQUIPMENT INSTALLATION AND COORDINATION

A. Size, Type, and Joining: All materials shall conform to the size and type given in the specifications. In joining two dissimilar types of pipe, standard fittings shall be used when available. In the event fittings are not available, the method of joining shall be selected by CONTRACTOR and submitted to ENGINEER for review.

B. Layout:
   1. Exposed piping shall run in straight, neat, parallel lines and shall be located far enough from walls, ceilings, and floors to permit access for covering of pipe and painting work.
   2. Care shall be taken in laying out piping that there is no interference with the proper location of piping for other purposes or other equipment and shall be run with regard to the requirements of each service.
   3. Piping shall not interfere with headroom or clear floor space.
   4. An ample number of unions shall be provided in all threaded, soldered, and glued pipelines and at all equipment to facilitate removal and replacement.
   5. CONTRACTOR shall provide 3/8-inch tapped and plugged connections in suction and discharge of all pumps for testing.
   6. The appropriate number, size, and lengths of spool pieces and flange fillers needed for plumbing and leveling any existing piping shall be included in the price bid.
   7. Valves shall be located on all branches of water supply lines where shown on the drawings. Position valves to facilitate access and operation.

C. Refer to Section 01 31 00–Coordination, Field Engineering, and Meetings and Section 01 60 00–Materials and Equipment for applicable provisions.

3.03 FIELD QUALITY CONTROL AND DEMONSTRATION

A. Site Tests:
   1. CONTRACTOR shall include the cost of all testing, cleaning, and disinfection in the Price Bid.
   2. All piping, interior or exposed, shall be subject to test before being covered with insulation or paint. All piping and appurtenances shall be watertight or airtight and free from visible leaks.
   3. All piping shall be flushed or blown out after installation prior to testing.
   4. CONTRACTOR shall provide all necessary piping connections, water, air, test pumping equipment, water meter, bulkheads, valves, pressure gauge and other

equipment, materials, and facilities necessary to complete the specified tests. CONTRACTOR shall provide all temporary sectionalizing devices and vents as required for testing.

5. Pressure Tests: The test pressure in all lines shall be held for one hour during which time the leakage allowance shall not exceed that specified. In case repairs are required, the pressure test shall be repeated until the pipeline installation conforms to the specified requirements. Pumps, air compressors, instrumentation, and similar equipment shall not be subjected to the pressure tests.
6. Test Requirements:

Fluid Abbreviation or Name	Minimum Test Pressure in psi	Test Medium	Leakage Allowance Designation
Potable Water	150	Water	"A"[1]

1. Leakage allowance Designation "A" shall mean zero leakage for unburied pipe.

3.04 CLEANING AND DISINFECTION

A. All equipment and materials shall be clean before installation. CONTRACTOR shall disinfect and flush the system before it is placed on-line.

B. CONTRACTOR shall obtain water samples and arrange for analysis of water in potable systems for bacteria as part of the Lump Sum Bid Item. Copies of test results shall be submitted to OWNER and ENGINEER.

3.05 START-UP AND TESTING

A. Refer to Section 01 91 00–Starting of Systems for applicable provisions.

B. Additionally, the HMS manufacturer shall provide one day start-up services by a factory representative to verify that the system has been installed in accordance with the design specifications and requirements listed within this section.

C. Start-Up Flow Testing
   1. Following installation of the complete manifold piping system, CONTRACTOR shall open the upstream isolation valve to allow flow into the tank through the manifold system. The isolation valve must be opened slowly to prevent surge or overpressurization of the manifold system. The isolation valve must be fully opened to inspect the flow characteristics of the manifold system.
   2. CONTRACTOR and factory representative shall visually inspect the entire piping system for leakage.
   3. CONTRACTOR and factory representative shall visually inspect all inlet nozzles to verify flow is being discharged into the tank through all nozzles.

3.06 OPERATION AND MAINTENANCE MANUALS

A. The manuals shall include the listed required information as a minimum:
   1. Table of Contents.
   2. Copy of design calculations for the manifold system as defined in the previous section.

3. Copy of complete set of the installation drawings.
4. Copy of NSF61 Certified Listing for the valves.
5. Parts and equipment list with specification numbers for ordering of replacement parts.
6. Product specification sheets for nozzles, outlet valves, expansion joints, concrete anchors, and any other specialized items supplied with the system.
7. Installation guidelines for the HMS manifold system.
8. Operational procedures for the HMS manifold system.
9. Guidelines for repair of system components.
10. Schedule for suggested periodic maintenance of the manifold system.

B. Refer to Section 01 33 00–Submittals for additional information.

END OF SECTION

SECTION 13 20 00

STEEL ELEVATED WATER TANK

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Provide all materials, equipment, tools, and labor necessary for the designing, manufacturing, and erecting a 200,000-gallon, multi-leg, steel, elevated water tank with foundation, 28-inch by 30-inch manway with davit arm and appurtenances.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

C. Payment Procedures:
1. Any rock excavation, if encountered, shall be included in the Lump Sum Bid Item.
2. For the Contract, all excavation needed to accommodate CONTRACTOR's foundation design shall be included in the Lump Sum Bid Item.
3. Field density, proctor tests, and concrete tests shall be performed by the Testing Firm.
4. Tests for soundness of rock shall be conducted by the Testing Firm.
5. All lean mix concrete required on top of sound bedrock to bring the bearing surface to the elevation of the bottom of tank foundations shall be included in the Lump Sum Bid.
6. CONTRACTOR shall include in its Bid the cost of providing permanent electrical service installation.
7. The costs for welding inspection shall be included in the Lump Sum Bid Item.

1.01 REFERENCES–LATEST EDITIONS OF EACH REFERENCE AT THE TIME OF BIDDING SHALL APPLY

A. American Concrete Institute (ACI) 301–Specifications for Structural Concrete for Buildings.

B. ACI 318–Building Code Requirements for Reinforced Concrete.

C. ACI 371R–Guide for the Analysis, Design, and Construction of Concrete Pedestal Water Towers.

D. American Society for Testing and Materials (ASTM) B117–Practice for Operating Salt Spray (FOG) Apparatus.

E. ASTM D1186–Test Methods for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base.

F. ASTM D2247–Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

G. ASTM D3363–Test Method for Film Hardness by Pencil Test.

H. ASTM D4060–Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.

I. ASTM D4214–Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.

J. ASTM D4417–Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel.

K. ASTM D4541–Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

L. ASTM D4585–Practice for Testing the Water Resistance of Coatings Using Controlled Condensation.

M. ASTM D5064–Practice for Conducting a Patch Test to Assess Coating Compatibility.

N. American Water Works Association (AWWA)–Standard D100–Welded Carbon Steel Tanks for Water Storage.

O. AWWA–Standard C652–Disinfection of Water Storage Facilities.

P. AWWA–Standard D102–Coating Steel Water–Storage Tanks.

Q. AWWA-Standard D107-Composite Elevated Tanks for Water Storage.

R. FAA–Federal Aviation Administration (FAA) Circular 70/7460–IH, Obstruction Marking and Lighting.

S. NAPF–National Association of Pipe Fabricators 500-03–Surface Preparation Standard for Ductile Iron Pipe and Fittings Receiving Special External Coatings and/or Special Internal Linings.

T. NSF–NSF International Standard 61–Drinking Water Components.

U. SSPC–Society for Protective Coatings–Steel Structures Painting Manual.

1.03 QUALITY ASSURANCE

A. CONTRACTOR shall have a minimum of 5 years experience of the tank fabrication and erection, with a minimum of 10 tanks constructed of each type proposed.

B. Regulating Requirements: The materials, design, fabrication, and erection of the elevated tank and its foundation shall conform to the current:
   1. AWWA D100-American National Standards for Welded Carbon Steel Tanks for Water Storage.
   2. Federal Aviation Administration (FAA).
   3. NSF International Standards for Protective Materials. All coatings shall be NSF Standards 61 and 600 approved when they are in contact with potable water.
   4. All paints shall conform to OSHA requirements for allowable exposure to lead, chromate, and other substances regulated as hazardous by the EPA.
   5. Elevated tank and appurtenances shall meet all code requirements of the Kentucky Division of Water and Kentucky Building Code.
   6. The design of the elevated tank and foundation shall conform to the requirements of the State of Kentucky for seismic conditions and design loads.

C. Prepainting Meeting:
   1. A prepainting meeting shall be held prior to start of painting.
   2. CONTRACTOR, paint subcontractor, and paint manufacturer's representative shall be present to review the specifications and project scope.
   3. The paint manufacturer's representative shall review progress at the site as requested by ENGINEER. These are generally expected to be prior to monthly progress meetings.

1.04 SUBMITTALS

A. Submittals shall be in accordance with provisions of Division 01.

B. Shop primer proposed for use shall be submitted with all material and equipment submittals. All shop primers shall be of the same generic type and quality as those specified herein.

C. Submit two copies of manufacturer's Material Safety Data Sheets (MSDS) for each type of paint with the shop drawings. MSDS sheets shall be shipped with the paint and available at the construction site at all times painting is in progress.

D. Substitution submittals shall include performance test data, as certified by a qualified testing laboratory, for the ASTM tests specified.

E. Submit four copies of manufacturer's Operation and Maintenance Manuals in accordance with Division 01 requirements.

F. Color charts shall be submitted for all paint.

G. Caulking materials shall be submitted.

H. All other materials and equipment shall be submitted.

1.05 SITE CONDITIONS

A. Existing Conditions:
   1. Soil borings were made, and the logs are shown in the Appendix of these specifications. The information on the borings does not eliminate CONTRACTOR's responsibility to make their own investigations.
   2. The complete soil report is available for review at Strand Associates, Inc.® 325 West Main Street, Suite 710, Louisville, KY 40202 and the South Hopkins Water District, 129 South Main Street, Dawson Springs, Kentucky.
   3. After excavations are complete, the excavation shall be thoroughly cleaned and compacted with a large backhoe mounted vibratory plate and/or self-propelled vibratory roller compactor. The existing soil shall be densified a minimum of 24 inches to achieve uniformity. CONTRACTOR shall have field density tests conducted to verify that the subgrade has been compacted to at least 95% of the maximum dry density as determined by ASTM Test Designation D1557.
   4. All backfill, compaction, and testing shall be in accordance with Division 33.

1.06 FAA DETERMINATION

A. The height and location of the elevated tank may exceed the requirements to submit an application to the FAA as outlined in the FAA application form. An FAA Determination is may be required for this tank. CONTRACTOR shall complete and submit this form for approval.

1.07 WARRANTY

A. Standard 1-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of 1 year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the Project.

B. Extended Warranty: Manufacturer shall warrant equipment and appurtenances for a period of two years from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the Project.

C. Warranty: CONTRACTOR shall provide a one 2 year minimum warranty on all aspects of work performed on the Project. INSPECTOR shall conduct the warranty inspection. Any deficiencies shall be corrected at no cost to OWNER; all costs for repair shall be incurred by CONTRACTOR and shall include the use of outside inspection personnel to verify to OWNER that repair work has been completed as needed.

PART 2–PRODUCTS

2.01 COMPONENTS

A. Design Requirements: The following information is in accordance with Section III 8 of AWWA D100 and D107, is made part of this specification, and refers to all tank alternatives unless noted otherwise:
   1. Standard-ANSI/AWWA D100, Welded Carbon Steel Tanks for Water Storage.
   2. Compliance-NSF/ANSI 61, Drinking Water System Components-Health Effects and the Safe Drinking Water Act.
   3. Capacity: 200,000 gallons.
   4. Height to High Water Line, above top of foundation: 241.3 feet.
   5. Head Range: 35 feet minimum–28 1/4 feet.
   6. Riser Pipes: One 60-inch wet riser.
   7. Location of Site: See Drawings.
   8. Time of Completion: See Bid.
   9. Nearest Community: Madisonville, Kentucky.
   10. Nearest Railroad: To be determined by the Bidder, if desired.
   11. Access to Site: Access to site from.
   12. Electric Power: Permanent power is not readily available at site for construction. Contact electrical utility for temporary service, if desired. Permanent service shall be provided by CONTRACTOR.
   13. Compressed Air: Not available at site.
   14. Weld Detail Submittal: Not required.
   15. Mill Test Reports: Not required.

16. Pipe Materials: Riser pipe and overflow pipe, A53 steel. Stainless steel is an acceptable alternate material. Water main to tank shall be ductile iron.
17. Snow Loading: 30 psf.
18. Wind Loading:
    a. Basic Wind Speed, V = 90 mph.
    b. Exposure C.
    c. CONTRACTOR shall design tank and foundation system for two additional 2,500-pound cellular antenna wind load forces to be imposed, 25-foot above access tube hatch or to railing specified herein.
19. Corrosion Allowance: None.
20. Balcony: Required, 30-inch-wide with a handrail not less than 42-inches. The floor shall be perforated for drainage.
21. Pipe Connections: 8-inch-diameter, ductile iron by CONTRACTOR.
22. Safety Grill: Required.
23. Removable Silt Stop: Required, 6 inches high minimum on riser pipe in tank. Provide two 3/4-inch-diameter safety bars welded to top of the silt stop.
24. Overflow: Minimum 6-inch-diameter pipe with a weir box designed for 300 gpm flow. An inverted siphon will not be acceptable as an overflow device. Overflow to terminate in a 90-degree elbow 12 inches above foundation wall. Provide stainless steel No. 4 mesh screen on outlet.
25. Handrails: A roof handrail will be required. See Section 05 50 00–Metal Fabrications.
26. Safety Climb Equipment: Provide a safety climb device on the ladders along the leg, exterior of the bowl, and water-containment portion of the tank. Cable system fall protection system shall be supplied by the same company and shall be equal to DBI/SALA LAD-SAF galvanized Flexible Cable Ladder System. Cable systems shall extend 3 feet above each platform and hatches shall be designed to not interfere with the equipment. Where roof hatches prohibit standard extensions, Telescoping Top Bracket L120 shall be installed. System supplied shall conform to OSHA standards.
27. Special Vent: Required with a stainless steel No. 16 mesh screen to meet the Kentucky Division of Water requirements. Screen shall be fail-safe designed to operate if screen frosts over. Screens shall be reinforced with steel frames designed to lift off the bearing surfaces in the event the screens frost over and either positive or negative tank pressure is experienced. Screen blowout provisions during frost conditions shall not be provided. Vent shall be weather protected type. Entrance of rain or snow shall be prevented by overhanging or overlapping protective cap to below the vent side openings.
28. Additional Accessories: See Accessories as specified.
29. Welding Procedure Specifications: Not required.
30. Butt-Joint Welds: Complete joint penetration required.
31. Seal Welding: Required for roof plates that are lap welded.
32. Mill or Shop inspection: Not required.
33. Written Report: required. CONTRACTOR shall also certify that the tank and foundation has been designed and constructed in accordance with AWWA D100 and D107 and these specifications.
34. Welding Inspection: Radiographic film shall become the property of OWNER at completion of project. Complete joint penetration welded shell butt joints shall be inspected by radiographic methods.
35. Painting: See Painting.
36. Soil Investigation. See boring logs.
37. Pile Foundation: Not applicable.
38. Earth Cover Over Water Main: 3 1/2 feet minimum.
39. Seismic Data: Seismic Use Group III. Site Class D.

40. Site Specific Procedures: Not Required.
41. Third Party Inspection: Construction observation will be provided by Wet or Dry Tank Inspection (INSPECTOR).

B. Chart: Provide OWNER with two copies of gauging chart which tabulates the volume of water in the tank in 0.1-foot increments throughout the head range.

2.02 CONCRETE FOUNDATION

A. CONTRACTOR shall design and construct a reinforced concrete foundation for the elevated tank. All concrete shall be in accordance with Division 03–Concrete.

B. CONTRACTOR shall construct a trapezoidal concrete splash pad with ends of 4 feet and 8 feet, 12 feet that are apart, 5 inches thick at grade under the overflow. Reinforce with 6 by 6 by W2.9 by W2.9 welded wire fabric.

C. CONTRACTOR shall provide two copies of the foundation design calculations to ENGINEER along with the shop drawings. These shall not be shop drawings. They will be retained for the project files. These shall be stamped by Kentucky Engineer.

D. CONTRACTOR shall incorporate all penetrations as specified.

2.03 ABRASIVES

A. Shop abrasives shall provide a blast profile in accordance with the coating manufacturer's recommendations.

B. Exterior field abrasives shall be fine-grained, low-dust, and silicon-free. Abrasive shall be Staurolite, or equal.

C. Interior field abrasives shall be silicon-free.

PART 3–EXECUTION

3.01 CONSTRUCTION

A. CONTRACTOR is responsible for all clearing and grubbing within the "area of site" as shown on the drawings. All construction activities with respect to the elevated tank shall be contained within the area of site.

B. Excavation for the foundation shall continue through the weathered portion of the bedrock until sound bedrock is reached.

C. After the bedrock surface is reached, the excavation shall be cleaned of loose soils and be tested for soundness with a 1-inch-diameter pneumatic drill-hammer for a minimum vertical distance of 5 feet below the bedrock surface. Tests shall be uniformly placed in staggered rows around the foundation footing.

D. Elevated tank foundations shall be founded directly on sound bedrock, or lean mix concrete (2,500 psi) shall be placed on the sound bedrock to an INSPECTOR-approved elevation of bottom of tank foundations.

E. The tank foundation shall be backfilled and compacted to 4 inches below final grade by this CONTRACTOR. All backfill, compaction, and testing shall be in accordance with these Specifications.

F. CONTRACTOR shall topsoil, final grade, and seed the entire “area of the site” and all other areas disturbed by CONTRACTOR.

3.02 FIELD QUALITY CONTROL

A. Welder Certification:
   1. A copy of each welder's certification shall be provided prior to start of erection.
   2. Erection personnel not certified shall be identified.

B. Welding Inspection:
   3. CONTRACTOR shall perform the inspection of the welded joints as specified in AWWA D100, Section 11.
   4. Inspection shall be made by the radiographic method. The number, location, and procedure for the spot radiographs shall be as stated in the above-referenced standard specification. Provide a radiograph schedule to ENGINEER before start of erection.
   5. CONTRACTOR may perform the above inspection using its own staff if, they are qualified, experienced, and have proper equipment. If not, CONTRACTOR shall engage an independent testing laboratory that is qualified.
   6. CONTRACTOR shall send ENGINEER two copies of all welding inspection reports. The report shall include date of radiograph, location, plate thickness, and interpretation of radiograph.
   7. The radiographs shall be provided to ENGINEER for forwarding to OWNER at the completion of the project.
   8. It is intended that all steel interfaces shall be full penetration butt welds or seal welded lap welds to prevent rust staining from surfaces which are not accessible to paint.

3.03 PAINTING

A. General: It shall be CONTRACTOR’s responsibility to determine the most appropriate means for applying coatings to the interior and exterior of the tank (with exception of the specified roll coat to all interior welds). If tank surfaces are rolled, roller nap inclusions in the coating shall not be allowed. All roller nap and other foreign objects shall be removed (scraped, sanded, ground, etc.) followed by the application of another coat of finish, primer, or both if required. All runs, drips, sags, curtains, etc. shall be brushed out during application or removed (scraped, sanded, ground, etc.) followed by the application of another coat of finish, primer or both if required. All touched up areas shall color match exactly to the surrounding coatings.
   1. Interior/Exterior: Abrasive/wash blast and paint as specified.
   2. Concrete Protection: All concrete consisting of tank foundation, tank supports, etc. shall be protected from drips, splashes, and overspray always. All coatings spilled shall be promptly removed and/or cleaned.
   3. All interior welds above and below the high water will be seal welded.

B. Interior Tank Coating:
   1. Rust-Oleum Industrial: All weld seams shall receive an additional roll coat to a DFT of 12.0 Mils prior to finish coat application. The roll coat is to be applied prior to the

application of the finish coat. A minimum of one full day (24 hours) shall pass prior to the application of the finish coat. Color: white: roller applied only.

Primer	Color
Rust-Oleum W 9200 to a DFT of 4.0-6.0 Mils	White
Intermediate (2 Coats)	Color
Rust-Oleum W 9200 to a DFT of 4.0-6.0 Mils	Gray
Final	Color
Rust-Oleum W 9293 to a DFT of 4.0-6.0 Mils	White

2. Tnemec Co.:
   a. Primer: Tnemec AK01 Hold primer: red.

Primer	Color
Tnemec L140 to a DFT of 3.0-5.0 Mils	White
Intermediate	Color
Tnemec L 140 to a DFT of 6.0-9.0 Mils	Beige
Final	Color
Tnemec L 140 to a DFT of 6.0-9.0 Mils	White

   b. All weld seams shall receive an additional 5 mil roll coat to a prior to finish coat application. The roll coat is to be applied prior to the application of the finish coat. A minimum of one full day (24 hours) shall pass prior to the application of the finish coat. Color: white: roller applied only.
3. Carboline:
   a. Hold Primer: gray.

Primer	Color
Hydroplate 1086 to a DFT of 6.0-9.0 Mils	White
Intermediate (2 Coats)	Color
Hydroplate 1086 to a DFT of 6.0-9.0 Mils	Gray
Final	Color
Hydroplate 1086 to a DFT of 6.0-9.0 Mils	White

   b. All weld seams shall receive an additional 5 mil roll coat to a prior to finish coat application. The roll coat is to be applied prior to the application of the finish coat. A minimum of one full day (24 hours) shall pass prior to the application of the finish coat. Color: white; roller applied only.
   c. CONTRACTOR shall provide a holiday free coating system.
   d. Interior Liner: This is OWNER's preference for the interior of the tank liner.
4. Polibrid 705 E or Reactamine 760:
   a. The tank interior shall be shop coated with carboline or Tnemec AK01 hold primer prior to shipment to the field. 100% of the shop primer shall be abrasive blasted, to create a surface profile of 3 to 5 mils.
   b. Polibrid 705E shall be applied to a minimum of 60 mils.
   c. Reactamine 760 shall be applied to a minimum of 60 mils.
   d. The use of hold-tite would be accepted.

C. Exterior Tank Coating:
   1. Rust-Oleum Industrial:

Primer	Color
Rust-Oleum 9100 to a DFT of 3.0-5.0 Mils	Beige
Intermediate (2 Coats)	Color
Rust-Oleum 9100 to a DFT of 3.0-5.0 Mils per coat	White/Gray
Final	Color
Rust-Oleum 9800 to a DFT of 3.0-5.0 Mils	OWNER's Choice
Logos: Rust-Oleum Modern Maters Color Fast EX Urethane applied at 2-3 Mils DFT. Various colors.	
Final DFT shall not be less than 9-15 Mils, plus logo	

2. Tnemec:

Primer	Color
Tnemec 94-H20 HYDRO-ZINC to a DFT of 2.5-3.5 Mils	Gray Green
Intermediate	Color
Tnemec Series 69 to a DFT of 6.0-9.0 Mils	Gray
Final	Color
Tnemec Series 1094 Gloss to a DFT of 2.0-3.0 Mils	OWNER's Choice
Final DFT shall not be less than 10.5-15.5 Mils, plus logo	

3. Carboline:

Primer	Color
Carbo zinc 621 PW to a DFT of 2.5-3.0 Mils	Green
Intermediate	Color
Carboguard 60 to a DFT of 6.0-9.0 Mils	Gray
Final	Color
Carbothane 134 HG to a DFT of 2.0-3.0 Mils	OWNER's Choice
Final DFT shall not be less than 10.5-15.5 Mils, plus logo	

4. The final DFT specified shall be obtained through complete additional coats and shall be applied at CONTRACTOR's expense.
5. In all cases, surfaces shall be primed and or treated as specified, the same day they are prepared. A prepared surface, which becomes corroded or contaminated, shall be re-prepared before painting at no additional cost to OWNER.
6. Dust from cleaning operations shall be properly removed by dry methods such as vacuuming or dry air blasting, while not reducing the quality of the cleaned surface.
7. CONTRACTOR shall have on the job, always, at least one copy of the latest SSPC pictorial standards, which shall be followed.
8. Abrasives utilized for blasting operations shall contain less than 0.01% free silica during and following blasting operations. CONTRACTOR is responsible for all cleanup and removal of blasting media following operations, as well as total removal from

OWNER's site. Media shall be profiled, and documentation submitted to ENGINEER prior to media leaving site.

D. Equipment and Procedures: At least 10 days prior to commencing field painting, CONTRACTOR shall submit to ENGINEER for review and acceptance a list of major items of equipment and procedures he proposes for painting. CONTRACTOR's procedure for painting shall include the chronological sequence of operations. An equipment list shall include make and capacity of compressor, as well as make and capacity of abrasive blasting and spraying equipment. Compressor shall be capable of delivering a minimum of 100 psi at the nozzle, at maximum working height of tank during blasting operations. Effective oil and water separators, and an air drier shall be used in all lines serving spray painting and abrasive blasting operations to remove oil and moisture from the compressed air.
   1. Mixing of Coatings: OWNER shall designate an area where all coatings shall be stored and mixed only. All mixing shall be done over a double tarped area. Any and all spills shall be reported to OWNER immediately at the time of incidence. CONTRACTOR shall bear responsibility, as well as all costs associated with cleanup and removal of any contaminated area(s).
   2. Painting: Skilled, experienced painters shall do all painting properly. All surfaces, which are not to be coated, shall be protected. CONTRACTOR shall be responsible for the compatibility of all paints used in work.
   3. Ventilation:
      a. Ventilation is essential to remove vapors during application and curing of coatings. Ventilation shall be exhausted from lowest portion of tank with top openings kept clear. During coating applications, the capacity of the ventilation fans shall be at least 400 cfm per gallon of coating applied per hour. The ventilation requirements are to provide proper curing of the applied coatings and are not to be taken as requirements to provide worker safety.
      b. Following the application of the final interior coating, the tank shall be force ventilated by mechanical means from the lowest possible point for a minimum of 48 hours. Ventilation shall be such that it creates a total turn-over on the interior of the tank at least once per hour.

E. Quality Assurance:
   1. Provide products manufactured by the following:

Manufacturer	Company Contact	Phone
Rust-Oleum	Mark Sholtes	(502) 552-3569
Tnemec	Nex Gen	TN
Carboline	Joel Womac	(502) 648-7802

   2. Alternate products may be considered. CONTRACTOR shall submit in writing a detailed explanation for requesting a product change, along with pricing of product. If the product is accepted, all savings shall revert to OWNER. CONTRACTOR shall bear any, and all costs associated with evaluation of product by ENGINEER, which may include, but is not limited to, research and testing by independent laboratories for product performance, and equality of those specified.
   3. Only approved thinners from listed coating manufacturers shall be used. All spills shall be reported to OWNER immediately at the time of incidence. CONTRACTOR shall bear responsibility, as well as all costs associated with cleanup and removal of any contaminated area(s).

F. Applicator Qualifications: All coatings and related work shall be performed only by competent blasters and painters. They shall be qualified, skilled, experienced craftsmen. In the acceptance or rejection of completed painting, no allowance will be made for lack of skills on the part of the craftsmen. If workmen exhibit lack of experience, they may not be allowed to continue work on the project.

G. Field Quality Control: Paint film thickness shall be subject to measurement by INSPECTOR with Dry Mil Gauges, wet film gauge, low or high voltage meter, and/or applicable measuring instruments acceptable to ENGINEER. If dry film thickness is found to be less than specified, or coverage is not uniform, CONTRACTOR shall apply additional paint to correct thickness or appearance at no additional cost to OWNER.

H. Compatibility:
   1. CONTRACTOR shall be responsible for the compatibility of all paints used in the work. A compatible paint will be considered a paint which precludes adverse effects related to bonding, drying delamination, scaling, lifting, and bleeding.
   2. In cases where shop-applied primers and coatings on materials and equipment furnished by suppliers are products different from those described in the specifications, the contractor shall verify compatibility with the specified field-applied coating system.
   3. Where thinning is necessary, only the products of the manufacturer furnishing the paint, and products for thinning purposes only, will be allowed.

I. Thickness and Spreading Rates:
   1. Minimum dry mil thickness per coat (mdmtpc) and/or spreading rates in square feet per gallon shall be governed by the manufacturer's current data sheets or literature containing recommendations or instructions regarding these values. These recommended dry mil thickness and/or spreading rate values will be considered requirements to be met, same as if set out herein these Specifications and Contract Documents and must be included with material list submittals before ENGINEER approves any paint materials. Do not exceed manufacturer's recommended coverage rates.
   2. The number of coats to be applied is specified herein and shall govern. Where the total dry film thickness is specified, this thickness shall govern over the MDMTPC.

J. Product Delivery, Storage, and Handling:
   1. Delivery of Materials: Deliver all materials to job site in original, new and unopened containers, bearing the manufacturers name and the following labels:
      a. Name of material.
      b. Manufacturers stock number and date of manufacture.
      c. Manufacturers name.
      d. Contents by volume.
      e. Thinning instructions.
      f. Application instructions.
      g. Color name and number.
   2. Storage of Materials:
      a. Store only acceptable project materials on the Project Site. Store according to the manufacturer’s recommendation. Comply with all state and federal health and fire hazard regulations. Store only in a suitable and designated area restricted to the storage of paint materials and related equipment. Comply with all applicable health and fire regulations regarding the storage of paint materials.

b. Storage of material shall comply with the manufacturer's specifications; however, storage shall be at a minimum temperature of 50°F.
c. SDS sheets shall always be in a bound set on jobsite, available to emergency personnel if required.

K. Environmental Requirements for Application of Coatings:
1. Apply paints only when temperature of surfaces to be painted and surrounding air temps are between 55 and 90°F unless otherwise permitted by paint manufacture's printed instructions. Application of coatings will not be permitted in snow, rain, fog, mist or when the relative humidity exceeds 85%, or when the surface temp of substrate is less than 5°F above the dew point; or to damp or wet surfaces. Painting will not be allowed during periods of inclement weather.
2. CONTRACTOR always shall provide adequate illumination in areas where painting operations are in progress. Lighting shall be OSHA approved and explosion proof. Comply with manufacturer's recommendations as to environmental conditions under which painting systems can be applied. Do not apply finish to areas where dust and/or mist is being generated.

3.04 SAFETY CLIMB EQUIPMENT

A. Install equipment on all ladders as specified and in accordance with manufacturer's instructions.

B. Install all identifications and labels provided with the equipment.

C. Deliver the soft equipment specified in the number specified to OWNER.

3.05 REPAIR/RESTORATION

A. All surface improvements and underground utilities to remain in place that are disturbed by this Contractor shall be restored to their original condition under this Contract. Replacement methods shall be approved by OWNER of such improvements and underground utilities.

3.06 CLEANING AND DISINFECTION

A. CONTRACTOR shall sterilize tank to provide tank surface which is free from bacteria. The sterilization procedure shall conform to Chlorination Method 3 as described in AWWA C652 and shall be performed in conformance with the paint manufacturer's recommended cure times.

B. In general, the tank shall be filled to 5 percent capacity and chlorine added to achieve an initial solution of 50 mg/L available chlorine. This solution shall be held for at least six hours. The tank shall then be filled to overflow level and held for at least 24 hours.

C. OWNER will take water samples for bacterial analysis. Two safe samples will be required to be obtained for conformance with sterilization procedure.

D. The interior of the riser pipe shall also be flushed and sterilized. Riser pipe shall be flushed extensively prior to filling and sterilizing. CONTRACTOR shall select the method and submit it to ENGINEER for review.

E. OWNER will provide, at no charge, water to sterilize, fill, and test the tank. Water will be provided from proposed connection point to distribution system or from the nearest distribution system hydrant to the tank. Means of transporting the water from the hydrant to the tank shall be provided by CONTRACTOR as required. It is the intent that the new water main will be installed before tank completion and that water will be available at the site when testing and sterilizing is required.

END OF SECTION

SECTION 26 05 00

GENERAL ELECTRICAL REQUIREMENTS

PART 1–GENERAL

1.01 SUMMARY

A. Work includes general requirements for all electrical work.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ANSI/NFPA 70–National Electrical Code (NEC).

B. ANSI/IEEE C2–National Electrical Safety Code.

1.03 CONTRACT DOCUMENTS

A. Any equipment roughed in improperly and/or not positioned on implied centerlines or as dictated by good practice shall be repositioned at no cost to OWNER.

B. The Drawings are generally diagrammatic, and CONTRACTOR shall coordinate the work so that interferences are avoided. Provide all offsets in conduit, fittings, etc., necessary to properly install the work. All offsets, fittings, etc., shall be provided without additional expense to OWNER.

C. Hazardous or classified locations, where referenced in the Specifications or shall be as defined in the NEC.

1.04 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 70.

B. Conform to ANSI/IEEE C2.

C. The rules and regulations of the federal, state, local, and civil authorities and utility companies in force at the time of execution of the Contract shall become a part of this Specification.

D. Obtain electrical permits and inspections from authority having jurisdiction. Costs for permits and inspections shall be paid by CONTRACTOR.

1.05 CODES AND ORDINANCES

A. CONTRACTOR is expected to know or to ascertain, in general and in detail, the requirements of all codes and ordinances applicable to the construction and operation of systems covered by this Contract. CONTRACTOR shall know or ascertain the rulings and

interpretations of code requirements being made by all authorities having jurisdiction over the work to be performed by them.

B. In preparing a Bid, CONTRACTOR shall include the cost of all items and procedures necessary to satisfy the requirements of all applicable codes, ordinances, and authorities, whether or not these are specifically covered by the Drawings and Specifications. All cases of apparent conflicts between the Drawings, Specifications, and codes shall be brought to ENGINEER's attention, as herein before specified. CONTRACTOR shall carry out work and complete construction as required by applicable codes and ordinances and in such a manner as to obtain approval of all authorities whose approval is required.

C. When requested by ENGINEER, CONTRACTOR shall provide written calculations to show compliance with applicable codes or the Contract Documents. This shall include, but not be limited to, conduit and wire sizing, junction and pull box fill and sizing, manhole/handhole sizing, conductor derating, and voltage drop. CONTRACTOR shall indicate calculation method used as well as compliance with applicable code, Drawing, or Specification.

1.06 EQUIPMENT PROVIDED UNDER OTHER DIVISIONS

A. Included in this Contract are electrical connections to equipment provided under other divisions. CONTRACTOR shall refer to final shop drawings for equipment being furnished under other divisions, for exact location of electrical equipment, and the various connections required.

1.07 ELECTRICAL DISTRIBUTION SYSTEM

A. Provide a complete electrical distribution system consisting of components indicated on the Drawings or specified herein including, but not limited to:
   1. All miscellaneous equipment coordination and related appurtenances required by power company.
   2. 240-volt, three-phase, 4-wire service entrance conductors.
   3. Feeders, branch wiring, and electrical distribution equipment.
   4. All control wiring.
   5. Wiring between system components if equipment is not prewired.
   6. Support system design and supports for electrical raceways.
   7. Code-required disconnects.

B. Provide a standby power system consisting of components indicated on the Drawings (see Section 26 32 13–Standby Power System–Portable).

C. CONTRACTOR shall connect all equipment furnished by other Divisions consisting of components indicated on the Drawings or specified herein.

D. Provide balancing and adjusting of electrical loads.

E. CONTRACTOR shall instruct OWNER's representative in the operation and maintenance of all equipment. The instruction shall include a complete operating cycle on all apparatus.

F. Provide miscellaneous items for a complete and functioning system as indicated on the Drawings and specified herein.

G. A partial list of work not included in Division 26 is as follows: Painting (except as otherwise specified herein).

1.08 NOISE

A. Eliminate any abnormal noises that are not considered by ENGINEER to be an inherent part of the systems as designed. Abnormal buzzing in equipment components will not be acceptable.

1.09 DRAWINGS

A. The Drawings indicate approximate locations of the various items of the electrical systems. These items are shown approximately to scale and attempt to show how these items should be integrated with building construction. Locate all the various items by on-the-job measurements in conformance with Contract Documents and cooperation with other trades.

B. Prior to locating equipment, confer with ENGINEER as to desired location in the various areas. In no case should equipment locations be determined by scaling drawings. Relocate equipment and bear cost of redoing work or other trades' work necessitated by failure to comply with this requirement.

C. In certain instances, receptacles, switches, light fixtures, or other electrical devices and equipment, etc., may be relocated. Where relocation is within 10 feet of the location shown on the Drawings, and when CONTRACTOR is informed of necessary relocation before work has begun on this portion of the job, the relocation shall be at CONTRACTOR's expense.

D. The Drawings are schematic in nature and are not intended to show exact locations of conduit but rather to indicate distribution, circuitry, and control.

E. Where locations of future structures are shown on the Drawings, CONTRACTOR shall not route any conduit or install any materials or equipment within 30 feet of the boundaries shown.

1.10 EXISTING UNDERGROUND UTILITIES

A. Record Drawings of existing underground utilities are not available for this facility. CONTRACTOR shall excavate and verify the location of all underground utilities prior to installing new electrical equipment and prior to making modifications to existing electrical. This shall include, but not be limited to, feeders to structures and equipment, branch circuit wiring, phone and communication cabling, instrument wiring, and control wiring. CONTRACTOR shall temporarily relocate existing underground utilities to keep the existing facility in operation and for any new construction, and all costs for relocating existing electrical shall be included in the Bid.

1.11 SUBMITTALS

A. CONTRACTOR shall submit to ENGINEER for approval prior to beginning work, shop drawings on the equipment and materials proposed to be furnished and installed. See Section 01 33 00–Submittals for requirements.

B. CONTRACTOR shall, in addition, submit drawings and/or diagrams for review and for job coordination in all cases where deviation from the Contract Drawings are contemplated

because of job conditions, interference or substitution of equipment, or when requested by ENGINEER for purposes of clarification of CONTRACTOR's intent.

C. These drawings and diagrams shall show applicable electrical switch and breaker sizes as well as the manufacturer's name and catalog number for each piece of equipment used.

D. Equipment and material submittals must show sufficient data to indicate complete compliance with Contract Documents as follows:
   1. Proper sizes and capacities.
   2. That the item will fit in the available space in the manner that will allow proper service. Provide 1/4-inch scale plan view and elevations of all electrical equipment showing equipment layouts and clearances.
   3. Construction materials and finishes.

E. When the manufacturer's reference numbers are different from those specified, provide correct cross-reference number for each item. The shop drawings shall be clearly marked and noted accordingly.

F. When fixtures, equipment, and items specified include accessories, parts, and additional items under one designation, shop drawings shall be complete and include all components.

G. See additional requirements of shop drawings under Division 01–General Requirements.

PART 2–PRODUCTS

2.01 STANDARD PRODUCTS

A. All equipment and products shall be of new manufacture per applicable specifications.

B. All equipment shall be UL and NEMA approved.

C. Unless specified otherwise, major distribution equipment such as panelboards, switchboards, motor starters, VFDs, SPD, transformers, etc., shall each be by the same manufacturer.

D. All equipment and wiring shall be selected and installed for conditions in which it will perform (e.g., general purpose, weatherproof, raintight, dusttight, or any other special type).

2.02 SUBSTITUTION OF MATERIALS AND EQUIPMENT

A. While it is not the intention of OWNER to discriminate against any manufacturer of equipment which may be equivalent to specified equipment, a strict interpretation of such equivalency will be exercised in considering any equipment offered as a substitute for specified equipment. CONTRACTOR shall submit with each request for approval of substitute material or equipment sufficient data to show conclusively that it is equivalent to that specified in the following respects:
   1. Performance:
      a. Capacity at conditions and operating speeds scheduled shall be equal to or greater than that of the specified equipment.
      b. Energy consumption at the point of rating shall not exceed that of the specified equipment.

c. Vibration and noise production at the point of rating shall not exceed that of the specified equipment.

2. Materials of construction.
3. Gauges, weights, and sizes of all portions and component parts.
4. Design arrangements, methods of construction, and workmanship.
5. Coatings, finishes, and durability of wearing parts.
6. National reputation of the manufacturer as a producer of first quality equipment of the type under consideration.
7. Availability of prompt, reliable, and efficient service facilities franchised by or affiliated with the equipment manufacturer. This shall include the maintenance of local stocks of critical replacement parts equal to those maintained for the specified equipment.

B. Requests for substitution shall include CONTRACTOR's reason for the request.

C. If ENGINEER does not consider the items equivalent to those specified, CONTRACTOR shall provide those specified.

D. See General Conditions for additional requirements.

2.03 LOW-VOLTAGE WIRING (LESS THAN 100 VOLTS)

A. Low-voltage wiring specified in this section shall be applicable to all systems installed that utilize low-voltage wiring where such wiring is not specified in other technical sections.

B. All wiring shall have copper conductors with 300-volt insulation rating and meet the requirements of NEC Article 725.

C. All conductors must be suitable for the application intended. Conductors 16 AWG and larger shall be stranded. Conductors 18 AWG and smaller may be solid or stranded.

D. Control Cable for Class 1 Remote Control and Signal Circuits: Individual conductors twisted together, shielded, and covered with an overall PVC jacket. Cable shall be UL listed, temperature rated, and plenum or nonplenum rated for the application as required in the National Electrical Code.

E. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits shall be constructed, UL listed, temperature rated, and plenum or nonplenum rated for the application as required in the NEC Article 725.

PART 3–EXECUTION

3.01 UTILITY SERVICES

A. Utility connection requirements shall be determined. All costs for coordinating utility service shall be included in the price bid as described in Section 26 21 00–Electrical Service System of these Specifications.

B. All costs for temporary service, temporary routing of piping, or any other requirements of a temporary nature associated with the utility service shall be included in the Base Bid.

C. It is the intent that in the latter stages of construction, the permanent electrical service will be used and the temporary construction service discontinued. The following requirements shall govern the use of the permanent services:
   1. No permanent service shall be available until structure is enclosed, watertight, and heated.
   2. Only permanently connected and protected circuits and outlets shall be available.
   3. Temporary wiring shall not be connected to permanent distribution equipment.
   4. Under the above conditions, the use of permanent service equipment shall in no way affect the Contract conditions of the guarantee.

D. It shall be CONTRACTOR's responsibility to police this situation and protect its equipment.

3.02 CONTINUITY OF SERVICE

A. CONTRACTOR shall provide and maintain continuous services (power, controls, alarms, etc.) during the entire construction period.

B. No service shall be interrupted or changed without permission from OWNER. Written permission shall be obtained before any work is started.

C. When interruption of service is required, all persons concerned shall be notified and a prearranged time agreed upon. Notice shall be a minimum of 72 hours prior to the interruption.

3.03 CLEANUP AND REMOVAL OF RUBBISH

A. All lighting and appliance panelboards, switchboards, MCCs, VFD enclosures, motor starter and disconnect switch enclosures, junction boxes, and pullboxes shall be cleaned of debris and wires neatly arranged with surplus length cut off before installation of covers.

B. Where louvers are provided in switchgear, MCCs, or transformer enclosures, louvers shall be vacuumed free of all dust and dirt. Where air filters are provided in equipment such as control panels, motor control centers and transformers, CONTRACTOR shall replace all filters with new at the time of final completion.

C. All lighting fixture lenses and lamps (interior and exterior fixtures) shall be cleaned at the time of installation, and all lens exteriors shall be cleaned just prior to final inspection.

D. Equipment shall be thoroughly cleaned of all stains, paint spots, dirt, and dust. All temporary labels not used for instruction or operation shall be removed.

3.04 CONCRETE WORK

A. All cast-in-place concrete for new electrical equipment bases shown on the Drawings shall be provided by CONTRACTOR, except where specifically noted to be provided by others. All new equipment shall be set on 3 1/2-inch minimum leveling slabs including MCCs, free-standing enclosures, switchgear, etc. Pads shall be 3 inches larger than equipment being supported.

B. Concrete shall comply with Section 03 30 00–Cast-In-Place Concrete.

C. Provide all anchor bolts, metal shapes, and templates to be cast in concrete or used to form concrete for support of electrical equipment.

3.05 PAINTING

A. All painting of electrical equipment shall be done by CONTRACTOR unless equipment is specified to be furnished with factory-applied finish coats.

B. All electrical equipment shall be provided with factory-applied prime finish, unless otherwise specified.

C. If the factory finish on any equipment furnished by CONTRACTOR is damaged in shipment or during construction, the equipment shall be refinished by CONTRACTOR.

D. One can of touch-up paint shall be provided for each different color factory finish which is to be the final finished surface of the product.

3.06 CAULKING

A. Caulk with a caulking sealant where indicated on the electrical drawings or hereinafter specified.

B. Caulking sealant shall be silicone construction sealant as manufactured by General Electric or two-part polysulfide conforming to the requirements and bearing the seal of Thiokol Chemical Corporation.

C. Caulking sealant shall contain no acid or ingredients that will stain stone, corrode metal, or have injurious effect on painting. It shall be colored to match adjacent surroundings.

3.07 BUILDING ACCESS

A. CONTRACTOR shall arrange for the necessary openings in the building to allow for admittance of all apparatus.

B. When the installation requires openings and access through existing construction and the openings are not provided, CONTRACTOR shall provide the necessary openings.

3.08 COORDINATION

A. Provide wiring for all motors and all electrically powered or electrically controlled equipment.

B. All starters, VFDs, disconnects, relays, wire, conduit, push buttons, pilot lights, and other devices for the power and control of motors or electrical equipment shall be provided by CONTRACTOR except as specifically noted elsewhere in these specifications or on the Drawings.

C. Where starters, VFDs, or other devices are provided by others, they shall be connected and wired by CONTRACTOR.

D. CONTRACTOR’s drawings and specifications shall show number and horsepower rating of all motors furnished, together with their actuating devices. Should any change in size, horsepower rating, or means of control be made to any motor or other electrical equipment

after the Contract is awarded, any additional costs because of these changes shall be the responsibility of CONTRACTOR.

E. All motors shall be provided for starting in accordance with local utility requirements and shall be compatible with starters or VFDs as specified herein or under the various trades' sections of these specifications.

F. CONTRACTOR shall provide all line voltage power and control wiring (100 volts and above), including temperature control wiring for operation, control, and supervision of all motorized equipment, including wiring between motor starters, VFDs, and control devices as specified herein and as shown on the Drawings. Low-voltage control wiring (below 100 volts) shall be provided by CONTRACTOR supplying the equipment that has low-voltage wiring, unless otherwise noted. CONTRACTOR shall provide raceways for all low-voltage wiring.

G. CONTRACTOR shall connect and wire all apparatus according to approved wiring diagrams furnished by the various trades.

H. Motors 1/2 hp and larger shall be NEMA rated 460volts, three-phase, 60 Hz, unless otherwise shown. Motors 1/3 hp and below shall be 115 volts, single-phase, 60 Hz, unless otherwise shown.

3.09 EXCAVATION AND BACKFILL

A. Backfilling of all trenches beneath concrete floor and stair slabs within building shall be accomplished with gravel fill and shall be specially compacted to same density as surrounding area. Backfill of exterior trenches shall be compacted granular fill, unless otherwise noted. Refer to Section 26 05 33–Conduit for additional requirements associated with PVC conduit installed in earth.

B. Lines passing under foundation walls shall have a minimum of 1 1/2-inch clearance.

C. Care shall be taken so that there is no disturbance of bearing soil under foundations.

D. CONTRACTOR shall follow underground pipe runs where possible to avoid additional rock excavation.

3.10 EQUIPMENT ACCESS AND LOCATION

A. CONTRACTOR shall coordinate work of this division with that of other divisions so that all systems, equipment, and other components of the building will be installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. This means adequate access to all equipment, not just that installed under this division. Any components for the electrical systems that are installed without regard to the above shall be removed and relocated as required to provide adequate access at CONTRACTOR's expense.

B. Where various items of equipment and materials are specified and scheduled, the purpose is to define the general type and quality level, not to set forth the exact trim to fit the various types of ceiling, wall, or floor finishes. Provide materials that will fit properly the types of finishes actually installed.

C. All equipment, junction and pull boxes, and accessories shall be installed to permit access to equipment for maintenance. Any relocation of conduits, equipment, or accessories to provide maintenance access shall be accomplished by CONTRACTOR at no additional cost.

D. Electrical equipment, devices, instruments, hardware, etc., shall be installed with ample space allowed for removal, repair, calibration, or changes to the equipment. Ready accessibility to equipment and wiring shall be provided without moving other equipment that is to be installed or that is already in place.

E. Locate electrical outlets and equipment to fit the details, panels, decorating, or finish of the space. ENGINEER shall reserve the right to make minor position changes of the outlets before the work has been installed. Verify door swings before installing room lighting switch boxes, and install boxes on the latch side of door unless noted otherwise.

3.11 WORKMANSHIP

A. All work shall be performed in compliance with the NEC.

B. Install work using procedures defined in NECA Standard of Installation.

C. Locations of utilization equipment and control devices as shown on the Drawings are within 10 feet of actual positions. Any mounting of this equipment within this 10-foot distance shall be performed at no additional cost.

D. Unless otherwise noted, conduit shall be fastened to building structure or equipment framework and not placed on the floor.

E. Where materials, equipment apparatus, or other products are specified by manufacturer, brand name, and type or catalog number, such designation is to establish standards of desired quality and style and shall be the basis of the Bid.

F. Materials and equipment of the types for which there are National Board of Fire Underwriters Laboratories (UL) listing and label service shall be so labeled and shall be used by CONTRACTOR.

3.12 AREA CLASSIFICATIONS

A. Where referenced herein, damp and wet locations shall include, but not be limited to structures and areas below grade, and exterior locations.

END OF SECTION

SECTION 26 05 19

WIRE

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Wire.
   2. Wiring Connections and Terminations.
   3. Terminal Blocks and Accessories.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 QUALITY ASSURANCE

A. Manufacturers of Wire: Firms regularly engaged in the manufacture of electrical wire products of the types and ratings needed whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL Labels: Provide electrical material, which has been listed and labeled by Underwriters Laboratories.

E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.03 SUBMITTALS

A. Submit shop drawings and product data under the provisions of Section 01 33 00–Submittals.

B. Submit shop drawings for wiring system including layout of distribution devices, branch circuit conduit and cables, circuiting arrangement, and outlet devices.

C. Submit manufacturer's instructions.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Provide factory-wrapped, waterproof, flexible-barrier material for covering wire on wood reels, where applicable, and weather-resistant fiberboard containers for factory-packaging of wire, connectors, outlets, boxes, lamps, fuses, etc., to protect against physical damage in transit. Do not install damaged wire or other material; remove from project site.

B. Store wire and other material in factory-installed coverings in a clean, dry, indoor space which provides protection against the weather.

PART 2–PRODUCTS

2.01 WIRE

A. All wire for permanent installation shall be new stranded copper delivered to project in unopened cartons or reels, except where specifically noted and be UL listed for the use intended. No wire smaller than 12 AWG shall be used unless specifically noted. The use of multiconductor cable is not allowed.

B. Motor circuit branch wiring and associated control wiring:
   1. Insulation type shall be THHN (indoors, nonVFD application).
   2. Minimum size for motor control wiring shall be 14 AWG.
   3. Control wiring for supervisory equipment shall be shielded, sized per equipment manufacturer's recommendations, or as shown on Drawings.

C. All power wiring to motors utilizing Variable Frequency Drives (VFDs) shall be Type XHHW-2.

D. All wiring within control panels, supervisory control centers, and motor control centers that does not extend outside of the enclosure or the motor control center bucket shall be insulation-type MTW, minimum size 16 AWG.

E. Wiring in dry locations shall be THHN. Wiring in damp and wet locations shall be XHHW-2.

F. Refer to Section 26 05 53–Electrical Identification for required wire insulation color coding and conductor labeling requirements. Initial phase color shall be used throughout the run, even for switch legs. Colors must meet code requirements for each class voltage. Do not duplicate colors, including neutral, on different voltages.

2.02 WIRING CONNECTIONS AND TERMINATIONS

A. Provide crimp type UL or ETL listed terminations for 6 AWG and smaller stranded conductor connections to electrical devices and equipment such as receptacles, switches, and terminal strips. Crimp devices shall be Sta-kon, or equal.

B. Provide insulated, silicone-filled spring wire connectors with plastic caps for 8 AWG conductors and smaller. Connectors shall be King Silicone-Filled Safety Connectors, or equal. Spring wire connectors shall only be allowed in junction, outlet, or switch boxes. Spring wire connectors are not allowed for terminating motor conductors.

C. All feeder cable connections to motor leads up to 600 volts shall be insulated and sealed with factory-engineered kits. Motor connection kits shall consist of one-hole copper compression lugs for 6 AWG and larger, split-bolt connector for 8 AWG and smaller, and motor-lead pigtail splice kit. Individual components shall be as follows:
   1. Split-bolt connectors shall be for use with copper conductors only.
   2. One-hole copper compression lugs shall be as manufactured by 3M, or equal, 30000 series. Lug size shall be selected based on motor and feeder wire sizes installed.

3. Pigtail splice kit shall consist of one-hole lug cover, silicone grease, and mastic sealing strip. Pigtail splice kit shall have locking pins for conductors 2 AWG and larger. Kit shall be as manufactured by 3M, or equal, 5300 series, and be selected based on motor, feeder, and lug sizes installed.

D. No splices will be allowed unless reviewed by ENGINEER. Where allowed, provide in-line splices for all conductor connections, 6 AWG and larger. Splice compression connectors for installation above grade shall be UL listed in-line copper barrel-type as manufactured by Burndy Type YS-TC, or equal, with heat shrink tubing to match the conductor size. Splice compression connectors for installation below grade shall be UL listed in-line copper barrel-type as manufactured by Burndy Type YS, or equal, with heat shrink tubing to match the conductor size. Splice compression shall be made with a manufacturer-recommended crimp tool.

E. Above-ground reducing adapters shall be UL listed in-line copper barrel reducers as manufactured by Burndy Type YSR-TC, or equal, with heat shrink tubing to match the conductor size.

F. Heat shrink tubing for splices and reducing adapters shall be UL listed, heavy wall type as manufactured by Burndy Type HS-H-PF, or equal, to match the conductor size.

2.03 TERMINAL BLOCKS AND ACCESSORIES

A. Terminal Blocks: ANSI/NEMA ICS 4: UL listed or UL recognized under UL 467, UL 486E, UL1059, and UL 1953 (power terminals only).

B. Power Terminal Blocks: Unit construction type, closed-back type, with tubular pressure screw connectors, rated 600 volts as manufactured by Allen-Bradley 1492-PDL, or equal.

C. 600-Volt Fuse Holders: Fuse holders for circuits rated up to 30 amps and 600 volts AC shall be finger safe, UL Listed, DIN-rail mountable, and shall include blown-fuse indicating lights. Fuse holders shall be as manufactured by Allen-Bradley Bulletin 1492-FB, or equal.

D. Signal and Control Terminal Blocks:
   1. General-Purpose Terminal Blocks:
      a. Terminal blocks shall be rated up to 600 volts AC/DC.
      b. Terminal blocks shall accept center-mounted jumper bars without increasing the installed space.
      c. Terminal blocks shall be Allen-Bradley Bulletin 1492-J, or equal.
      d. Terminal block color shall be gray.
   2. Grounding Terminal Blocks:
      a. Terminal blocks shall be Allen-Bradley Bulletin 1492-JG, or equal.
      b. Terminal block color shall be green/yellow.
   3. Disconnect-type Terminal Blocks (300-Volt Class):
      a. Terminal blocks shall be feed-through type with a knife-blade disconnect.
      b. Terminal blocks shall be Allen-Bradley Bulletin 1492-JKD, or equal, depending on the application.
      c. Terminal block color shall be gray.
   4. Fuse-type Terminal Blocks with Indicator (300-Volt Class):
      a. Terminal blocks for applications from 100 to 300 volts AC shall be Allen-Bradley Bulletin 1492-H4, or equal, with neon blown-fuse indicator.

b. Terminal blocks for applications from 10 to 50 volts AC/DC shall be Allen-Bradley Bulletin 1492-H5, or equal, with LED blown-fuse indicator.
c. Terminal block color shall be black.

5. Terminal blocks shall have self-locking screw compression clamps rated for the size of conductors being terminated and upstream overcurrent protection for each application.
6. The same manufacturer and style of terminal block shall be used throughout the entire project for all applications.
7. Terminal blocks shall have tin-plated copper current bars and tin-plated steel screws. Terminal housings shall be completely finger safe from all live circuits and be constructed of self-extinguishing material with minimum UL 94-V0 flammability rating.
8. Terminal blocks shall accept pre-printed, snap-in labeling cards on both sides without increasing the installed space. Provide terminal block manufacturer's end barriers and screw-type retainers for all terminal block groupings.
9. Terminal blocks shall mount on standard DIN rail and shall be able to be removed without removing adjacent terminal blocks.
10. Multi-level terminal blocks and stacked, single-level terminal block installations are not acceptable.

E. Refer to Section 26 05 53–Electrical Identification for terminal block labeling requirements.

PART 3–EXECUTION

3.01 GENERAL WIRING METHODS

A. Install electrical wire and connectors in accordance with the manufacturer's written instructions, applicable requirements of the NEC, the National Electrical Contractors Association's "Standard of Installation," and in accordance with recognized industry practices so that products serve the intended functions. Use appropriate wiring methods and materials for the equipment or environment.

B. Stranded conductors shall be terminated using crimp-type devices specified herein. Conductors may not be wrapped around a terminal screw.

C. Place an equal number of conductors for each phase of a circuit in the same raceway.

D. Torque conductor connections and terminations with calibrated torque wrench to manufacturer's recommended values. Provide permanent marking on lug, bolt, nut, or connection for conductors larger than 4 AWG.

E. Splice only in junction or outlet boxes. Splicing is not allowed in disconnects, manholes, motor control centers, panelboards, control panels, equipment, etc. Avoid splices between terminals of interconnecting power and control wiring.

F. Spring wire connectors shall only be used in junction, outlet, or switch boxes. Equipment wireways (e.g., motor control centers, panelboards, disconnects, switchgear, etc.), and control panels shall not have any spring-wire connectors installed; all terminations shall be on terminal strips.

G. Neatly train, lace, and tie wrap all wiring inside boxes, equipment, control panels, MCCs, and panelboards.

H. Make conductor lengths for parallel circuits equal.

I. The same color shall be used for each numbered wire throughout its entire length.

J. Terminate all wiring on terminal blocks in control panels, VFD enclosures, starter cubicles, and similar equipment. This shall include all spare or unused wires.

K. Provide a dedicated neutral for each branch circuit or feeder requiring a neutral. Ampacity of neutral conductor shall match that of the branch circuit or feeder.

L. Do not use a pulling means that can damage the raceway.

M. Signal wiring (below 100 volts) must be in a conduit separate from power and/or control wiring (over 100 volts). Signal wire shall include, but not be limited to, loop-powered devices, voice and data communications, and communication wiring (i.e., Ethernet, serial, etc.). Analog wiring shall be in a conduit separate from all other wiring.

N. Control wiring (e.g., internal thermal overloads, lockout stops, etc.) to motors utilizing VFDs shall be in a conduit separate from motor power wiring.

O. Provide junction or pull boxes to facilitate the “pulling in” of wires or to make necessary connections. All raceways and apparatus shall be thoroughly blown out and cleaned of foreign matter prior to pulling in wires.

P. Thoroughly clean wires before installing lugs and connectors.

Q. Make splices, taps, and terminations to carry full capacity of conductors without perceptible temperature rise.

R. Terminate spare conductors within equipment, MCCs, control panels, etc., on terminal strips and label as “SPARE.” Spare wiring in pull or junction boxes may be terminated with electrical tape and labeled as “SPARE.” All spare conductor labels shall indicate where the conductors terminate. Refer to Section 26 05 53–Electrical Identification, for additional requirements.

S. Feeder connections to motors shall be installed within the motor junction box utilizing factory engineered kits as specified herein. Spring wire connectors are not allowed for connections to motors.

3.02 GENERAL LOW-VOLTAGE WIRING METHODS (LESS THAN 100 VOLTS)

A. Low-voltage wiring installation requirements specified herein shall be applicable to all systems installed that utilize low-voltage wiring where such wiring installation is not specified in other technical sections.

B. Low-voltage wiring shall be installed in conduit.

C. Control wiring for HVAC and lighting equipment shall be installed in conduit.

D. Do not use wire smaller than 14 AWG for control wiring greater than 60 volts, or 18 AWG for voltages less than 60 volts. All sizes subject to NEC 725 requirements.

E. Low-voltage cable splices shall only be allowed in junction boxes.

3.03 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at the same time. Use UL-listed wire-pulling lubricant for pulling 4 AWG and larger wires. Wax-based pulling lubricant is not allowed unless it includes a Teflon additive.

B. Install wire in raceway after interior of building is enclosed, watertight, and dry, and all mechanical work likely to injure conductors has been completed.

C. Completely and thoroughly swab raceway system before installing conductors.

D. Conductors No. 6 AWG and larger shall be pulled into conduits by hand or by utilizing a tugger with built-in tension meter. Other motorized machines of any type are not allowed for any wire pulling. CONTRACTOR shall provide a report to ENGINEER for each pull indicating maximum tension reached during the pull along with manufacturer's maximum pulling tension.

E. Conductors shall be installed in conduit system in such a manner that insulation is not damaged, conductors are not overstressed in pulling, and walls are not damaged. No splices are permitted except in junction boxes or outlet boxes.

F. CONTRACTOR shall observe code limitation on the number and size of wires in an outlet box. CONTRACTOR shall either lay out work so that the wires do not exceed the particular box limitation or provide larger boxes approved for additional capacity.

G. Panel riser feeder conductors shall be identified with colored tape at panel lugs. The same phase relation shall be maintained throughout.

H. Circuiting is indicated diagrammatically on the Drawings.

3.04 TERMINAL BLOCK INSTALLATION

A. A maximum of one conductor shall be installed on the field-wired side of each terminal block. If rated to accept more than one conductor, a maximum of two conductors shall be installed on the enclosure-wired side of each terminal block. Provide additional terminal blocks and shorting jumpers as required.

B. Provide a separate ground-type terminal block for each shielded-cable drain conductor.

C. Provide ten percent spare terminal blocks for each type of connected terminal block, minimum five spare terminal blocks total. For each grouping of terminal blocks, provide 25% spare DIN rail space.

D. Maintain a minimum of 1 1/2 inches between terminal blocks and adjacent devices and enclosure wireways.

E. For current transformer shorting terminal blocks, the short-circuit slider shall cover the terminal block conductor screws on the meter-side of the terminal blocks when in the non-shorting position, and expose the terminal block conductor screws when slid into the shorting position.

3.05 FIELD QUALITY CONTROL

A. Inspect wire for physical damage and proper connection.

B. Prior to energizing, check conduit, raceways, outlet boxes, and wire for continuity of circuitry and for short circuits. Correct malfunction when detected.

C. Subsequent to wire hookups, energize circuitry and demonstrate functionality in accordance with these specifications.

D. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

E. Perform field inspection and testing according to provisions of this section.

3.06 ACCEPTANCE TESTS

A. CONTRACTOR shall furnish all materials, labor, and equipment necessary for the acceptance tests specified herein. Acceptance tests shall be performed in the presence of OWNER or OWNER's representative and must be passed before final acceptance of the work.

B. CONTRACTOR shall be responsible for powered tests of each field-installed device unless specifically noted otherwise. CONTRACTOR shall be responsible for device operation as powered from its power source and signals as received at the I/O modules.

C. Operation Test: By operational testing, OWNER will give final acceptance of the wiring system when all of the wiring is considered a complete system. All equipment shall function and operate in the proper manner as indicated in the details of the specifications and on the Drawings. All motors shall be properly connected to protective devices, and motor rotation shall be in the correct direction.

D. A written record of performance tests on electrical and control and instrumentation systems and equipment shall be supplied to OWNER. Such tests shall show compliance with governing codes.

E. The transformer, feeder, and subfeeds to the lighting panels shall be completely phased out as to sequence and rotation. Phase sequence shall be A-B-C as follows:
   1. Front-to-rear, top-to-bottom, or left-to-right when facing equipment.
   2. Phasing shall be accomplished by using distinctive colors for the various phases. The same color or variation of it shall be used for a particular phase throughout the building and project.

3.07 WIRE INSTALLATION SCHEDULE

A. Install all wiring in raceways except as otherwise noted. This includes all low-voltage wiring such as temperature control, instruments, phone, network, fiber optic, etc.

END OF SECTION

SECTION 26 05 23

INSTRUMENT AND COMMUNICATION WIRE AND CABLE

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: This specification contains the requirements for instrument wire and cable as opposed to electrical power wire and cable.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 QUALITY ASSURANCE

A. Standards: Comply with standards specified in this section as listed in Division 01.

B. Qualifications of Installers: Workers who are thoroughly trained and experienced in the necessary crafts, and who are completely familiar with the specified requirements and the methods needed for proper performance of the work.

1.03 PRODUCT HANDLING

A. Instrument cable shall be furnished in lengths as necessary.

B. Reels, coils, or package rolls of instrument cable shall be identified with the project name and other tagging identification as called for.

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

1.05 QUALIFICATIONS

A. CONTRACTOR shall have at least 10 years of experience in the installation of similar systems. CONTRACTOR shall provide documentation upon request to certify that all assigned staff have attended training courses corresponding to the type of cabling and equipment specified herein.

B. CONTRACTOR shall currently be licensed to install low voltage electronic cabling systems in the state of the project.

C. CONTRACTOR shall currently meet all manufacturer’s requirements for the provision and installation of all equipment specified herein.

PART 2–PRODUCTS

2.01 SHIELDED PAIR CABLING FOR ELECTRONIC INSTRUMENTS

A. Shielded cabling shall have stranded, tinned-copper conductors, No. 16 AWG, twisted with 2-inch lay.

B. Insulation of conductors shall be 15 mil, 90°C minimum PVC, rated for 300 volts. Materials shall equal or exceed UL 13 requirements for physical properties.

C. Color coding shall be manufacturer's standard or as stated.

D. The outer jacket shall be flame-retardant and weather- and ultraviolet-resistant PVC, 35 mils thick for shielded pair cables and 42 mils thick for shielded triad cables, with an 80°C minimum rating. The outer jacket shall contain a ripcord and shall equal or exceed the requirements of UL 1277. Cable shall be UL labeled as power-limited circuit cable.

E. A 100% coverage shield shall be applied over the insulated conductors. The shield shall consist of a 0.85 mil minimum thickness aluminum mylar tape. A stranded, tinned-copper drain wire shall be furnished in continuous electrical contact with the shield.

F. Single-pair shielded cables installed in above-grade conduits shall be Belden 9316, or equal.

G. Single-pair shielded cables installed in below-grade conduits shall be Belden 9342, or equal.

2.02 SHIELDED MULTICONDUCTOR CABLING FOR ELECTRONIC INSTRUMENTS

A. All multiconductor cables for instruments shall be in accordance with this section unless there are unusual requirements by the instrument vendor.

B. Multiconductor cables shall have No. 20 AWG, stranded tinned-copper conductors, arranged in pairs or triples, twisted with 1 1/2 inches to 2 1/2 inches staggered lay.

C. Insulation of conductors shall be 15 mil, 90°C minimum PVC rated for 300 volts. Materials shall equal or exceed UL 13 requirements for physical properties. Pairs or triples shall be numbered consecutively.

D. Color coding shall be manufacturer's standard or as stated.

E. An overall 100% coverage shield consisting of 2.35 mil aluminum mylar tape shall cover the conductors with a No. 20 AWG, 7-strand, tinned copper drain wire in continuous electrical contact with the shield.

F. The outer jacket shall be flame-retardant and ultraviolet-resistant PVC, 50 mils minimum thickness and 80°C minimum rating. The outer jacket shall contain a ripcord and shall equal or exceed the physical characteristics of UL 1277. Cable shall be UL labeled as power-limited cable.

G. For flow meters or other signals requiring low cross-talk characteristics, each pair or triple shall have a separate, insulated, 100% coverage-shield consisting of an 0.85 mil minimum thickness aluminum mylar tape with No. 22 AWG, 7-strand, tinned copper drain wire in continuous electrical contact with the shield.

2.03 HEAT SHRINK TUBING FOR SHIELDED INSTRUMENT CABLES

A. Heat shrink tubing for sealing the ends of all shielded instrument cables shall be heavy-wall, low-voltage tubing as manufactured by Raychem Type WCSM, or equal.

2.04 INDUSTRIAL ETHERNET CABLE

A. 600-Volt Rated Shielded Cable:
   1. For communication with plant SCADA Systems and equipment in supervisory control centers, motor control centers, switchgear, switchboards, control panels, etc., over 300 volts, and other areas or raceways with power wiring over 300 volts, provide 600-volt-rated, 4-pair, shielded (F/UTP), twisted-pair cables. Transmission characteristics of the cables shall meet full Category 6 performance criteria as defined by the ANSI/TIA-568.2-D standard.
   2. Cable conductors shall be minimum 23 AWG with PVC jacket and aluminum foil shield with 100% coverage. The cable outer jacket shall be industrial-grade PVC with a maximum overall cable diameter of 0.34 inch. Cable shall be CMR rated, UL listed, 600 V UL AWM rated, and be Belden 7953A, or equal.
   3. Cable jacket color shall be red.
   4. Provide a shielded RJ45 connector on one end of each cable and an unshielded RJ45 connector on the other end of each cable.

B. 300-Volt Rated Shielded Cable:
   1. For communication with SCADA Systems and equipment in supervisory control centers, motor control centers, switchboards, control panels, etc., under 300 volts, and other areas or raceways with power wiring under 300 volts, provide 300 volt-rated, 4-pair, shielded (F/UTP), twisted-pair cables. Transmission characteristics of the cables shall meet full Category 6 performance criteria as defined by the ANSI/TIA-568-C.2 standard.
   2. Cable conductors shall be minimum 23 AWG with PVC jacket and aluminum foil shield with 100% coverage. The cable outer jacket shall be industrial-grade PVC with a maximum overall cable diameter of 0.29 inch. Cable shall be CMR rated, UL listed, and shall be CommScope 1271B, or equal.
   3. Cable jacket color shall be slate.
   4. Provide a shielded RJ45 connector on one end of each cable and an unshielded RJ45 connector on the other end of each cable.

C. 300-Volt Rated Unshielded Cable:
   1. For communication with SCADA Systems and equipment in communication racks, supervisory control centers, and control panels without VFDs, etc., under 300 volts, and other areas or raceways with power wiring under 300 volts, provide 300-volt safety voltage rated, 80-volt operating voltage rated, 4-pair, unshielded (U/UTP), twisted-pair cables. Transmission characteristics of the cables shall meet full Category 6 performance criteria as defined by the ANSI/TIA-568.2-D standard.
   2. Industrial Ethernet cable shall be minimum 23 AWG with PVC jacket. The cable outer jacket shall be industrial-grade PVC with a maximum overall cable diameter of 0.24 inches. Cable shall be CMR rated, ETL verified, and shall be CommScope 1071E, or equal.
   3. Cable jacket color shall be light blue.
   4. Provide unshielded RJ45 connectors on both ends of each cable.

PART 3–EXECUTION

3.01 INSTALLATION REQUIREMENTS AND SPECIAL CONSIDERATIONS

A. Shielded pair and industrial Ethernet specified in this section shall be installed in conduit and may not be run in free-air or in nonmetallic tubing such as innerduct.

3.02 GROUNDING

A. The shielded connection for shielded network cabling shall be connected at the network switch or patch panel and not at the field device connection. Ground patch panels and network switches accepting shielded network cables.

B. Shielded cabling shall be installed in accordance with manufacturer's instructions and to minimize electrical noise and interference to associated instruments. Refer to instrument manufacturer's instructions for additional requirements.

C. Ends of signal wires shall be sealed to prevent the migration of moisture into the cable and to prevent unintentional grounding of the shield at the open end. Seal signal wires using a minimum 1-inch piece of heat-shrink tubing installed over PVC jacket and individual wires, and heat-shrink to a watertight fit.

D. All shields must be grounded.

E. Shields shall be grounded at one point only. Shielded cabling shall be isolated and left open at the instrument. The single-pair electronic instrument cable shields shall be connected to the multipair electronic instrument cable overall shield in the field junction box. The multipair electronic cable overall shield shall be grounded to the control room instrument ground.

F. When multipair electronic instrument cable is specified with individual shielded pairs to minimize crosstalk on flow meters or other pulsating signal applications, the shielding and grounding of the individual pair shields and the multipair overall shield shall be the same as for thermocouple applications.

G. Cable shield grounds shall be isolated from control system signal grounds, except at instrument system grounding electrodes.

END OF SECTION

SECTION 26 05 26

SECONDARY GROUNDING

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Power System Grounding.
   2. Electrical Equipment and Raceway Grounding and Bonding.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

A. Indicate location of system grounding electrode connections and routing of grounding electrode conductor.

B. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

PART 2–PRODUCTS

2.01 MATERIALS

A. Ground Rods: Copper-bonded, 5/8-inch diameter; minimum length 10 feet.

B. Ground Connections Below Grade: Exothermic type by Cadweld, compression type by ABB (Thomas & Betts), or equal. Compression connectors shall be prefilled with an oxide inhibitor.

C. Ground Fittings: O-Z/Gedney, Type ABG, CG, TG, GBL, or equal.

PART 3–EXECUTION

3.01 INSTALLATION

A. Compression-type connectors shall be installed with the manufacturer recommended tools. Compression dies shall emboss an index on the connector when installed correctly. An indenter crimp shall be made on ground rods prior to connection of grounding conductor.

B. Provide a separate insulated equipment grounding conductor for each feeder and branch circuit. Terminate each end on a grounding lug, bus, or bushing.

C. Bond together system neutrals, service equipment enclosures, exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and cold water plumbing systems.

D. Connect grounding electrode conductors to metal water piping, metal frame of building or structure, structural reinforcing bars, and lightning protection system ground conductors using suitable ground clamps. Make connections to flanged piping at a point ahead of meter or service shutoff valve. Provide jumper connection across meter or service shutoff valve.

E. Ground system, transformer neutrals, and equipment as required by code and local ordinances.

F. All feeder neutrals shall be connected to neutral at only one point in the MCC or switchgear.

G. All bare copper conductors installed outdoors shall be buried a minimum of 2 feet below grade.

H. Water system grounds and a minimum of three ground rods at 15-foot separations near service or feeder entrance of each building shall be provided and ground wires must attach to point ahead of meter or service shutoff valve. These shall be connected to ground bus by conductors sized to code requirements. The above are minimum requirements.

I. Bends in grounding electrode conductors shall not exceed 90 degrees and shall have a minimum 8-inch bend radius.

J. Grounding electrode conductor terminations on ground rods shall be made at a minimum depth of 2 feet below grade.

K. Ground rods shall be installed a minimum of 2 feet horizontally from any below-grade footing or wall.

L. All grounding electrode conductors shall be installed in PVC conduit. All conduit bends shall be made using sweep elbows. Conduit bodies and 90-degree bends are not allowed.

M. Include ground for grounded receptacles, light fixtures, telephone system, motors, and equipment items shown on the Drawings.

N. Flexible connections do not qualify for ground. All flexible connections must have separate green ground wire from motor base, lighting fixture, or equipment frame to conduit system.

O. Provide a separate grounding conductor system for the grounding of all lighting fixtures and devices installed in the same conduit as the branch circuit conductors. Ground conductors shall be individually connected at each fixture or device.

P. Separately derived systems as defined by the National Electrical Code shall be grounded as such. This shall include, but not be limited to, 4-wire transformers and 4-wire standby generators.

Q. Refer to Section 26 05 23–Instrument and Communication Wire and Cable for additional grounding requirements.

R. Exposed exterior terminations of grounding electrode conductors shall be completely sealed with the same anti-corrosion joint compound specified in Section 26 05 33–Conduit to be used on conduit threads.

3.02 TESTING

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

B. Provide ground system resistance test report for each ground grid. Test reports shall document ground system resistance following the three-point “Fall-of-Potential” test. The test results shall include a graph of the results plus a diagram of the testing layout. The remote current probe (C2) shall be placed a minimum of 100 feet from the ground system potential/current probe (P1/C1) or as required to provide sufficient spacing to demonstrate a resistance plateau on the graph. The ground resistance shall be tested with the potential probe (P2) between the P1/C1 probe and the C2 probe at 10% intervals starting at 0% and ending at 100% of the distance between P1/C1 and C2, 11 points total. A single point of measurement is not acceptable, and the two-point method of ground system testing shall only be used where there is no or insufficient “open earth” area to use the three-point Fall-of-Potential method. Resistance at any point in the grounding system shall not exceed 5 ohms. All ground system tests shall be witnessed by ENGINEER or OWNER. ENGINEER shall be notified a minimum of 72 hours in advance of all ground system testing.

C. The test meter shall be Associated Research Vibroground test set with null balance, or equal. All ground system tests shall be performed in accordance with the procedures outlined in the instruction manuals of the ground system test equipment.

D. Ground resistance testing shall be performed with all rods connected and shall be isolated from all metallic connections, such as from the ground rod to other grounded structures and electrical system neutrals.

E. Multiple ground rod grids shall be isolated from all metallic connections such as from grid under test to other grounded structures and electrical system neutrals.

F. Provide test report using the attached Form 26 05 26. Each ground grid, including service entrance transformers, switchgear, etc., shall have a form submitted.

END OF SECTION

FORM 26 05 26

GROUND ROD RESISTANCE TO EARTH TEST RECORD

1. DATE _____

2. PROJECT NAME _____

3. LOCATION OF TEST _____

4. GROUND ROD TYPE _____

   DIAMETER _____ LENGTH _____

5. TEST METHOD _____

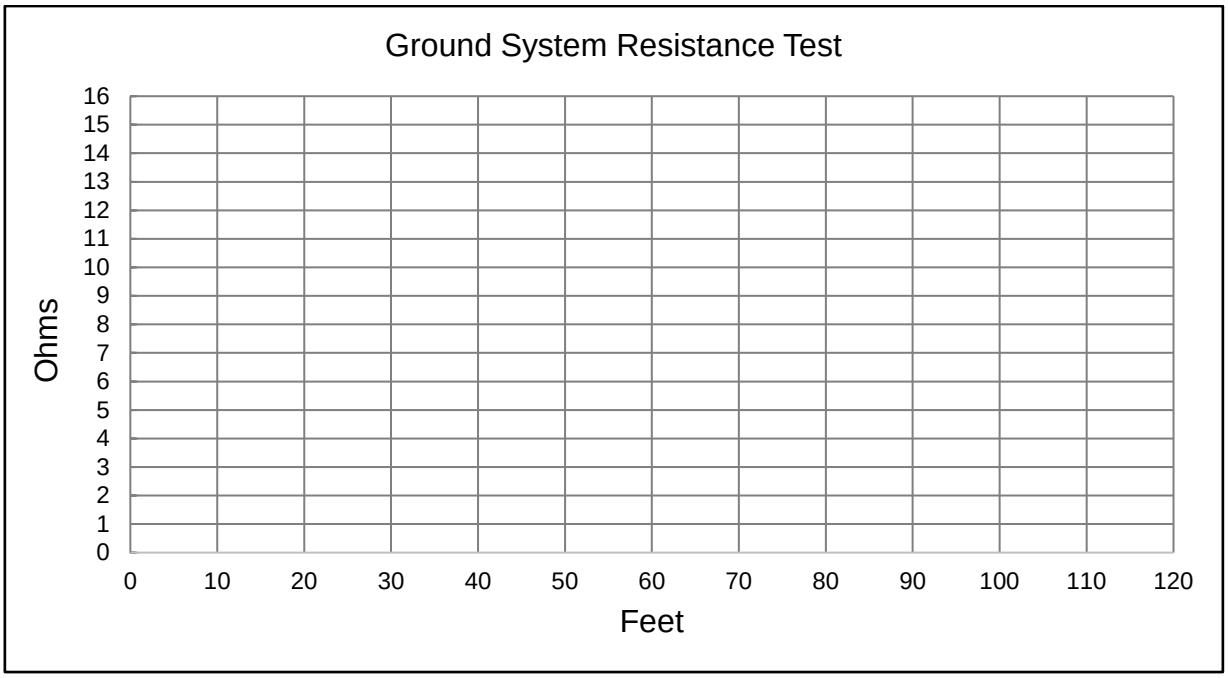
   INSTRUMENT TYPE _____

   SERIAL NO. _____

6. REQUIRED MAXIMUM RESISTANCE TO EARTH _____

7. MEASURED RESISTANCE TO EARTH

   GROUND ROD SYSTEM _____



TEST PERFORMED BY: _____
Signature

TEST WITNESSED BY: _____
Signature

SECTION 26 05 29

SUPPORTING DEVICES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Conduit and Equipment Support Members.
   2. Fastening Hardware.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 QUALITY ASSURANCE

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

PART 2–PRODUCTS

2.01 MATERIAL

A. Support Members:
   1. 316 stainless steel in exterior locations and damp and wet locations.
   2. Hot-dipped galvanized steel in all other areas.

B. Hardware:
   1. 316 stainless steel in exterior locations and damp and wet locations.
   2. PVC-coated steel clamps and stainless steel hardware with 316 stainless steel members where used to support PVC-coated rigid steel conduits.
   3. Hot-dipped galvanized steel in all other areas.

C. Manufacturers: Unistrut P-1000, B-line, Superstrut, or equal.

PART 3–EXECUTION

3.01 INSTALLATION

A. All supporting devices and support structures shall be constructed such that the structure adequately supports the load of the equipment installed on it including any wind and/or snow loads. Provide additional support members to those shown on the Drawings to adequately support load.

B. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors or support members. Do not use spring steel clips and clamps. Provide standoffs as specified in other technical sections.

C. Use toggle bolts or hollow wall fasteners in hollow masonry; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchors on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.

D. The ends of all support members shall be ground smooth.

E. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.

F. Do not use powder-actuated anchors.

G. Do not drill structural steel members.

H. Fabricate supports with welded end caps and all welds and surfaces ground smooth for neat appearance. Use hexagon head bolts with steel spring-lock washers under all nuts.

I. In wet locations, install free-standing electrical equipment on concrete pads. Anchor all equipment to adjacent walls with standoffs and caulk.

J. Install surface-mounted cabinets and panelboards with a minimum of four anchors.

K. Do not use chain, wire rope, or perforated strap hangers.

L. All welds shall be continuous and ground smooth.

END OF SECTION

SECTION 26 05 33

CONDUIT

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
1. Rigid Metal Conduit and Fittings.
2. Rigid Aluminum Conduit and Fittings.
3. Polyvinyl Chloride (PVC) Externally and Internally Coated Galvanized Rigid Metal Conduit and Fittings.
4. PVC Conduit and Fittings.
5. Liquidtight Flexible Conduit and Fittings.
6. Conduit Seals and Special Fittings.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ANSI C80.1–Electrical Rigid Steel Conduit (ERSC).

B. ANSI C80.3–Steel Electrical Metallic Tubing (EMT).

C. ANSI C80.5–Electrical Rigid Aluminum Conduit (ERAC).

D. ANSI/NEMA FB 1–Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.

E. NEMA RN 1–Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal.

1.03 QUALITY ASSURANCE

A. Manufacturers of Raceways: Firms regularly engaged in the manufacture of electrical raceways of the types and capacities required whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that for the project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL Labels: Provide electrical materials, which have been listed and labeled by Underwriters Laboratories.

E. Prior to shipment to the site, all conduit provided shall be new, unused material, and shall not have been stored outdoors or exposed to weather.

F. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Provide color-coded thread protectors on the exposed threads of threaded rigid metal conduit.

B. Handle conduit carefully to prevent end damage and to avoid scoring the finish.

C. Store conduit inside and protect from weather. When necessary to store outdoors, elevate well above grade and enclose with durable, waterproof wrapping.

PART 2–PRODUCTS

2.01 RIGID METAL CONDUIT AND FITTINGS

A. Rigid Steel Conduit: ANSI C80.1 and UL6. Heavy wall seamless tubing with hot-dipped galvanized coating.

B. Conduit bodies for rigid steel conduit shall be as manufactured by Appleton, Form 35, or equal, and be constructed of stamped steel for sizes 2 inches and under, and cast malleable iron for sizes over 2 inches. Conduit bodies shall have domed neoprene gasketed covers and stainless steel screws. Conduit bodies sizes 1 1/4-inch and larger shall have built-in pulling rollers. Covers for conduit bodies must have bolts that thread into the conduit body. Snaptight and wedgenut covers are not allowed. CONTRACTOR shall select body style and size according to application.

C. Rigid Aluminum Conduit: ANSI C80.5 and UL6A. Heavy wall.

D. Conduit bodies for rigid aluminum conduit shall be as manufactured by Appleton, Form 85, or equal, and be constructed of pressure-cast, copper-free aluminum for sizes 2 inches and under, and sand-cast, copper-free aluminum for sizes over 2 inches. Conduit bodies shall have domed neoprene gasketed covers, and stainless steel screws. Covers for conduit bodies must have bolts that thread into the conduit body. Snaptight and wedgenut covers are not allowed. CONTRACTOR shall select body style and size per application.

E. PVC-coated conduit and fittings shall be internally and externally hot dipped galvanized rigid metal conduit with hot dipped galvanized threads and PVC coating. PVC coating shall be UL listed with rigid metal conduit as the primary means of corrosion protection for the conduit, and PVC coating shall have an external 40 mil thickness with an internal 2 mil urethane coating. Acceptable manufacturers shall be Plasti-bond RedH_2OT by Robroy Industries, Ocal-Blue by ABB (Thomas & Betts), Calbond, or equal. All installers shall

be field-certified from the factory for installation and shall provide proof of certification. PVC-coated conduit and fittings shall meet the following listings and manufacturing standards, without exception:

1. ANSI C80.1.
2. UL6.
3. NEMA RN1.

F. Conduit bodies for PVC-coated rigid conduit shall be as manufactured by Plasti-bond RedH_2OT by Robroy Industries, Ocal-Blue by ABB (Thomas & Betts), Calbond, or equal, and have a 40 mil PVC exterior coating and 2 mil red urethane interior coating. Conduit bodies shall be Form 8 style or pulling elbow and include domed, gasketed covers and stainless steel screws. Covers for conduit bodies must have bolts that thread into the conduit body. Snaptight and wedgenut covers are not allowed. CONTRACTOR shall select body style and size according to application.

G. Fittings and Conduit Bodies: ANSI/NEMA FB 1 and UL 514B; threaded-type material to match conduit. For hazardous locations, fittings and conduit bodies shall meet the requirements of UL 886. Split couplings are not allowed.

H. Supports: One-hole straps with conduit clamps and backspacers shall be used for surface-mounted conduit. Where standoffs are required, provide conduit clamps and supporting devices as specified in Section 26 05 29–Supporting Devices. One-hole straps with conduit clamps and backspacers for PVC-coated rigid steel conduit shall be PVC-coated rigid steel material.

2.02 PVC CONDUIT AND FITTINGS

A. Conduit: Heavy wall rigid, Schedule 40, Schedule 80 where noted, UL listed for underground, encased, and aboveground applications. PVC conduit installed in exterior locations shall be UV resistant.

B. Conduit bodies for PVC conduit shall be as manufactured by Carlon, or equal, and be suitable for use with Schedule 40 or Schedule 80 PVC conduit. Conduit bodies shall have smooth hubs, textured lids, and foam-in-place gaskets. CONTRACTOR shall select body style and size per application.

C. Supports: Two-hole nonmetallic clamps shall be used for surface-mounted conduit. Where standoffs are required, provide pipe straps and supporting devices as specified in Section 26 05 29–Supporting Devices. Support material shall match that of the conduit type being provided.

2.03 LIQUIDTIGHT FLEXIBLE CONDUIT AND FITTINGS

A. Liquidtight Flexible Metal Conduit:
   1. Conduit: Spiral-wound, electrogalvanized, single-strip steel with integral grounding conductor continuously enclosed within the entire length of the convolutions. The flexible PVC jacket shall be sunlight-resistant, flame-retardant, and resistant to damage from mild acids. Conduit shall be UL Listed and be rated for installation in Class I, Division 2, Groups C and D locations and Class II, Group G locations. Conduit shall be Liquatite Type LA, or equal.
   2. Fittings: UL listed with thermoplastic elastomer sealing gasket.

a. Provide stainless-steel fittings in exterior, NEMA 4X, Class I, Division 2, Class II, and damp and wet locations, unless noted otherwise.
b. Provide electro-zinc plated steel fittings in all other areas, unless noted otherwise.

2.04 CONDUIT SEALS AND SPECIAL FITTINGS

A. Conduit Seals: Duct sealing compound, OZ Gedney Type DUX, or equal.

B. Expansion Fittings: Crouse Hinds or Robroy Type XJG (non-hazardous location) or Type UNY/UNF (hazardous location), or equal, for rigid, IMC, or PVC-coated rigid conduit. Carlon E945 Series, or equal for PVC conduit.

C. Expansion Deflection Fittings: O-Z type “DX,” Crouse Hinds, Type XD, or Appleton.

D. Ground Bushings: Crouse Hinds Model GLL, or equal.

E. Mechanical Seals: 316 stainless steel, Link Seal, or equal. Link seals shall be provided with 316 stainless steel bolts, nuts, and fasteners.

F. Watertight Hubs: Diecast, insulated and gasketed, rated for wet or dry locations indoors or outdoors. Watertight hubs shall be Appleton HUBXXXDN, Crouse-Hinds Myers Hubs, or equal.

G. Conduit Plugs: Kwik N Sure pipe plug as manufactured by Cherne Industries, or equal. Plug shall include natural rubber O-ring with galvanized wing nut and hex nut.

H. Conduit Threads Joint Compound: Kopr-shield conductive, anti-corrosion joint compound as manufactured by Thomas & Betts, or equal.

PART 3–EXECUTION

3.01 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

A. Size conduits for branch circuit conductors, control wires, and instrumentation cables so as to have not less than 25% spare capacity after installation; 3/4 inch minimum size. Minimum size for flexible metal conduit is 1/2 inch except 3/8 inch for lighting fixtures. Minimum size for liquidtight flexible metal conduit is 1/2 inch.

B. Maintain at least 1 inch of separation between conduit sizes to 1 1/2 inches and 2 inches between conduits 1 1/2 inches or larger. Maintain 1 foot of separation between signal conduits (below 100 volts) and power conduits (100 volts and above).

C. All conduit shall be supported in accordance with the NEC and as specified herein. This shall apply to all conduit types, including flexible conduit.

D. Provide for the proper application, installation, and location of inserts, supports, and anchor bolts for a satisfactory raceway system. Where any component of the raceway system is damaged, replace or provide new raceway system.

E. Run conduits to permit drainage, and to avoid all materials and equipment of other trades.

F. Conduits shall be attached to building surfaces and not suspended unless installed in a Unistrut-type conduit rack as specified herein. Individual conduits shall not be suspended. Clevis hangers are not allowed.

G. Independently support or attach the raceway system to structural parts of construction in accordance with good industry practice. Conduits through roofs shall be rigid metal conduit and be equipped with pitch pockets.

H. Conduit attached to building surfaces that may be damp or wet shall be spaced out to avoid rust and/or corrosion using fittings approved for the use. Use back straps on all conduit in damp and wet locations, or mount conduit with Unistrut straps, or equal. Watertight hubs shall be used in all damp and wet locations.

I. Conduits shall be securely fastened to building structure at intervals not exceeding 8 feet or closer, if necessary. Where hangers are necessary, 3/8-inch rod/eyelets/rings/or trapeze type in Unistrut channel and pipe clamps shall be used. Wire or perforated strap iron is not acceptable. PVC conduit shall be securely fastened to building structure at intervals not exceeding 3 feet.

3.02 GENERAL CONDUIT INSTALLATION REQUIREMENTS

A. Run exposed conduit grouped and parallel or perpendicular to construction.

B. All conduit installed below grade shall be buried a minimum of 2 feet 0 inches. All conduit installed below floor slabs shall be buried a minimum of 1 foot below slab.

C. PVC-coated rigid steel conduit and PVC conduit installed in earth (interior and exterior) shall be bedded in compacted sand with a minimum of 6-inch cover on all sides.

D. In all PVC conduit runs below grade 200 feet and longer, PVC coated rigid steel conduit shall be used for all 90 degree bends.

E. Ream conduit smooth at ends, cap upon installation, rigidly attach to structural parts of the building, and securely fasten to all outlet boxes, panel cabinets, junction boxes, pull boxes, splicing chambers, disconnect switches, and all other components of the raceway system.

F. Where conduits installed through roofs serve heating, ventilating, and air-conditioning equipment, conduits shall not be routed through ductwork or chases; conduits shall penetrate the roof and be equipped with pitch pockets.

G. Provide all empty raceways 2 1/2 inches and over with No. 10 galvanized fishwire, and nylon cord for conduits smaller than 2 1/2 inches. Empty raceways and fishwire/nylon cord shall be identified with permanent label, and label shall include conduit termination point. All empty conduits shall be threaded, capped and flush with finished floor or wall. Exposed conduits shall be threaded and capped.

H. Provide conduit raceway for exposed cables that are not UV resistant. This shall include, but not be limited to, instrument wiring, motor terminators, pump cables, float cables, etc.

I. Liquidtight flexible conduit shall be installed in such a manner that liquids tend to run off the surfaces and not drain toward the fittings.

J. All runs of flexible conduit and flexible conduit couplings to equipment and devices shall be as short as practicable, of the same size as the conduit it extends, and with enough slack to reduce the effects of vibration to a minimum. A minimum of 18 inches of flexible conduit shall be installed for each motor.

K. Provide conduit expansion-deflection fittings as specified herein in all conduit runs where movement perpendicular to axis of conduit may be encountered.

L. Conduits shall be pitched so that drainage is away from all structures.

M. Conduit bends for PVC conduit shall be made using a hot box, heat blanket, or glycol bender. Open flame or point heat sources of any type are not allowed.

N. The PVC-coated rigid conduit manufacturer's touch-up compound shall be used on all conduit interior and exterior bare steel exposed because of nicks, cuts, abrasions, thread cutting, and reaming; minimum six coats.

O. Where below-grade PVC conduit is connected to rigid metal conduit, the length of PVC conduit shall be a minimum of 10 feet. For short, below-grade conduit runs where required lengths of rigid metal conduit limit the length of PVC conduit to less than 10 feet, rigid metal conduit shall be used for the entire run.

P. Conduit bodies shall not be used for antenna cable and fiber optic cable routing. Provide pull boxes sized as required for antenna cable and fiber optic cable bending radius.

Q. Routing of conduits on exterior of buildings shall be avoided to the extent possible and shall not cover or interfere with lighting, louvers, or other openings. All conduit routing on exterior walls shall be reviewed with ENGINEER for approval prior to installation.

R. Conduits installed in damp and wet locations shall have all threads coated with conduit threads joint compound.

3.03 CONDUIT PENETRATIONS AND TERMINATIONS

A. Where fittings are brought into an enclosure with a knockout, a gasket assembly consisting of an O-ring and retainer shall be installed on the outside. Fittings shall be insulated throat type.

B. Conduit penetrations for control panels or enclosures containing electronic equipment shall utilize watertight hubs and, if entering the top of the enclosure, shall be located at the front of the enclosure and not over any electronic equipment (e.g., PLC, power supplies, etc.).

C. Conduit penetrations for all exterior enclosures (e.g., disconnects, junction boxes, control panels) shall utilize watertight hubs and enter the sides or bottom of the enclosure. Conduits shall not penetrate the top of the enclosure.

D. Provide conduit expansion fittings as specified herein in all conduit runs that cross a structural expansion joint, for conduits protruding from duct banks that are routed above grade and into structures, and for conduits protruding from earth.

E. All conduits that protrude from poured concrete shall be PVC-coated rigid conduit. Conduit shall extend continuously (i.e., no joints) a minimum of 4 feet beyond the poured concrete (both sides). Where an underground conduit joint or coupling is located within 4 feet of the

face of the penetration, the conduit shall be provided with reinforced concrete encasement doweled into the structure wall and continuing a minimum of 1 foot past the connection. The encasement construction shall conform with the encasements indicated for duct banks. PVC-coated rigid conduit 4-foot minimum projection requirement shall begin at, and extend from, the end of the encasement. The intent of this paragraph is to permit CONTRACTOR to use couplings at the inside face of the formwork.

F. Conduits passing through masonry, concrete, or similar construction shall be cast in place using PVC-coated rigid conduit extending completely through the construction.

G. Where above-grade conduits pass through cores in existing structures or through masonry walls, grout openings between conduit and walls or floors with sand cement mortar.

H. All spare conduits that terminate in a building or structure below grade shall be plugged with conduit plugs as specified herein.

3.04 CONDUIT INSTALLATION FOR EMERGENCY LIGHTING AND POWER CIRCUITS

A. All emergency egress lighting and power circuits shall be installed in dedicated conduits.

B. Conduits for emergency egress lighting and power circuits shall be installed and permanently marked in accordance with the NEC.

3.05 CONDUIT INSTALLATION SCHEDULE

A. The following schedule lists specific conduit types allowed in designated areas. Those areas not listed under a specific conduit type shall not have that type of conduit installed:
   1. Rigid steel: Concealed and exposed interior locations.
   2. Rigid aluminum:
      a. Exposed interior locations.
      b. Exterior locations (except in earth) and locations exposed to weather.
      c. All locations where attached to aluminum railings or aluminum structural members.
      d. Where noted on the Drawings.
   3. PVC-coated rigid steel:
      a. Conduits protruding from concrete.
      b. Interior and exterior locations.
      c. Earth.
      d. Within 4 feet of a manhole/handhole or building/structure footing or wall.
      e. Conduits within manholes.
   4. PVC:
      a. Earth within 4 feet of a manhole/handhole or building/structure footing or wall. PVC conduit under pavement or roadways shall be Schedule 80.
      b. Grounding electrode conductors.
      c. Buried below slabs on grade.
      d. Concrete encased duct banks (Schedule 40 or Schedule 80).
      e. Structural slabs.
      f. Where noted on the Drawings.
   5. Liquidtight flexible metal conduit not over 3 feet in length for final connections to:
      a. Equipment with sliding bases or flexible positioning.
      b. Equipment with vibration isolation mounting.
      c. Equipment housing ferromagnetic cores or with integral moving components capable of generating noise or vibrations, including transformers and motors.

d. All pumps and associated equipment.

END OF SECTION

SECTION 26 05 35

BOXES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Switch, Outlet, and Small Junction Boxes.
   2. Pull and Junction Boxes.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern Work in this section.

1.02 REFERENCES

A. ANSI/NEMA OS 1–Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

B. ANSI/NEMA OS 2–Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.

C. NEMA 250–Enclosures for Electrical Equipment (1000 Volts Maximum).

1.03 QUALITY ASSURANCE

A. Manufacturers of switches, outlets, boxes, lamps, fuses, lugs, etc.: Firms regularly engaged in the manufacture of these products, of the types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation Work similar to that in this project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL Labels: Provide electrical cable, boxes, raceways, wire, connectors, outlets, switches, etc. that have been listed and labeled by Underwriters Laboratories.

E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

PART 2–PRODUCTS

2.01 SWITCH, OUTLET, AND SMALL JUNCTION BOXES

A. Sheet Metal Boxes: ANSI/NEMA OS 1; galvanized steel, 4-inch square or octagon, minimum 2 1/8 inches deep, Raco, Appleton, or equal. Boxes with knockouts for multiple size conduits are not allowed.

B. Masonry and Partition Boxes: Galvanized steel, nongangable. ABB (Thomas & Betts), MB Series, or equal. Provide number of gangs for devices shown on the Drawings.

C. Cast Boxes: Aluminum or cast feraloy, deep-type, neoprene gasketed cover, threaded hubs, Eaton FD Series, or equal.

D. PVC-Coated Cast Boxes: Boxes shall be deep type and be by the same manufacturer as the conduit.

E. Covers for junction boxes shall have covers that match box type.

2.02 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: ANSI/NEMA OS 1: Code gauge steel with galvanized or sheradised finish, secured by galvanized machine screws. Hoffman ASG Series without knockouts, or equal. Boxes of this type are not allowed to have any dimensions equal to or greater than 12 inches.

B. Cast Boxes: NEMA Type 3/3R/4X/7/9, surface-mounted junction box rated for Class I, Divisions 1 and 2, Groups C and D locations and Class II, Division 1, Group G locations. Box material shall be copper-free, cast aluminum and include a hinged cover with ground flange, neoprene gasket, and stainless-steel cover bolts. Boxes shall be Crouse-Hinds ECB Series, or equal. All box hardware shall be stainless steel, and the aluminum parts shall have an external epoxy powder-coat finish to achieve a NEMA 4X rating.

C. PVC-Coated Cast Boxes: Boxes shall be by the same manufacturer as the conduit.

D. NEMA 12 Boxes: Painted steel with hinged cover, recessed quarter-turn padlocking latches, gasket, and locking system. Boxes shall be Hoffman CSD, or equal.

E. Where terminal blocks or other devices are mounted in a pull or junction box, provide a 14-gauge steel back panel with a white enamel finish for mounting.

F. All enclosures with double doors or that are free-standing shall have a three-point latch.

G. Boxes specified in this section are not allowed to have knockouts and are not allowed to be used as enclosures for control panels.

PART 3–EXECUTION

3.01 COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes as shown on the Drawings and as necessary for splices, taps, wire pulling, cable bending radii, equipment connections, and code compliance.

B. Electrical box locations shown on the Drawings are approximate. Verify location and size of outlet boxes in all work areas prior to rough-in.

C. Where dedicated raceways are provided for different voltage systems or wiring, (e.g., motor power wiring and motor space heaters), separate boxes shall also be provided unless acceptable to ENGINEER. Where acceptable to ENGINEER, combined boxes shall be physically divided to separate the wiring.

D. Locate and install boxes to allow access. Where installation is inaccessible, coordinate locations and sizes of access doors.

E. Locate and install to maintain headroom and to present a neat appearance.

F. All boxes attached to building surfaces that may be damp or wet shall be spaced to avoid rust and/or corrosion. All boxes in damp and wet locations shall be on 1/2-inch standoffs.

3.02 SWITCH, OUTLET, AND SMALL JUNCTION BOX INSTALLATION

A. Locate boxes in masonry walls for cutting of masonry unit corners only. Coordinate masonry cutting to achieve neat openings for boxes.

B. Provide knockout closures for unused openings.

C. Support boxes independently of conduit.

D. Use multiple gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

E. Install boxes in walls without damaging wall insulation.

F. Position outlets to locate luminaires.

G. Switch and outlet boxes provided for branch circuits and feeders shall not contain control wiring. Control wiring, wiring for emergency egress lighting, shall have dedicated pull and junction boxes provided. Wiring for different voltage systems (e.g., 24 V, 120 V, 480 V) shall have dedicated pull and junction boxes for each voltage.

H. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

I. In concrete walls, single receptacle, single- or double-switch outlets, use 4-inch-square masonry boxes fitted with raised plaster covers. In poured concrete walls belowgrade, use cast boxes.

J. In brick or block walls, use masonry boxes.

K. For weatherproof switches, devices, and exterior fixtures, use cast boxes with proper cover and gasket.

L. All interior exposed wall and ceiling outlet boxes shall be cast boxes, unless otherwise noted.

M. Knockout punches or saws shall be used for holes; boxes with prepunched holes are not acceptable, except for masonry boxes.

N. Boxes shall be of a depth to accommodate wires and splices and shall be equipped with both fixture hanging studs and tapped fixture ears. Boxes shall be installed so that they will support the weight of the fixture. Conduit will not be considered as adequate supports.

O. Cast boxes with 3/4-inch hubs and aluminum fittings and enclosures may be used with all conduit types.

3.03 PULL AND JUNCTION BOX INSTALLATION

A. Locate boxes above accessible ceilings or in unfinished areas.

B. Support pull and junction boxes independent of conduit.

C. Knockout punches or saws shall be used for holes; boxes with prepunched holes are not acceptable.

D. Refer to Section 26 05 53–Electrical Identification for junction box labeling requirements.

E. All interior exposed boxes and all interior boxes with a dimension equal to or greater than 12 inches, including boxes above suspended ceilings, shall be NEMA 12, unless noted otherwise.

END OF SECTION

SECTION 26 05 53

ELECTRICAL IDENTIFICATION

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Nameplates.
   2. Labeling Tags.
   3. Wire and Cable Markers.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

B. Provide schedule for nameplates and labeling tags with shop drawings. Reference Drawings for type used.

PART 2–PRODUCTS

2.01 NAMEPLATES

A. Nameplate material shall be multi-color, two-layer, nonconductive engraving plastic suitable for permanent installations in indoor and outdoor locations. The material shall be UV-resistant and suitable for installation in direct sunlight.

B. Type “A”:
   1. Use:
      a. Motor starters.
      b. Each separately mounted circuit breaker or disconnect switch.
      c. Each device in main distribution panels.
      d. Each device in switchboards and switchgear.
      e. SPD.
      f. SCADA System computers.
      g. Each device on Supervisory Control Center exterior.
      h. Cabinets, enclosures, pull, and junction boxes.
      i. Field devices (flowmeter transmitters, level transmitters, chemical scales, chemical leak detectors, etc.).
      j. Communication and Network Cable Tray.
      k. Panelboards.
   2. Size: 2 inches by 4 inches.
   3. Background Color: Black.
   4. Character Color: White.
   5. Character Size: 1/2-inch.

6. Engraving: See MCC schedule, one-line, and I/O list for labels, or as requested by ENGINEER. Label shall include equipment number and description (i.e., SCAL-60-01, Fluoride Scale).
7. Mounting Location: Front exterior.

C. Type “B”:
1. Use:
   a. Standby power systems.
   b. Automatic Transfer Switches.
2. Size: 2 inches by 4 inches.
3. Background Color: Red.
4. Character Color: White.
5. Character Size: 1/4-inch.
6. Engraving: See MCC schedule and one-line for labels, or as requested by ENGINEER.
7. Mounting Location: As requested by ENGINEER.

D. Type “C”:
1. Use:
   a. Switchboards.
   b. Supervisory Control Centers.
   c. Integrated Power Centers.
   d. Transformers.
   e. Power Cable Tray (Emergency-type label required).
2. Size: 4 inches by 4 inches.
3. Background Color: Black.
4. Character Color: White.
5. Character Size: 2 1/4 inches.
6. Engraving: Equipment label, Emergency shall be red with white letters. Label shall include equipment number and description (i.e., LP-10-01, First Floor Power Panel).
7. Mounting Location: Equipment: Top wire way.

E. Type “D”:
1. Use: Control stations, thermostats, conduit fittings, etc.
2. Size: 1/2-inch by 4 inches.
3. Background Color: Black.
4. Character Color: White.
5. Character Size: 1/4-inch.
6. Engraving: Control station number and equipment description (e.g., T-15-01, Chlorine Room).
7. Mounting Location: Device front at top.

2.02 WIRE AND CABLE MARKERS

A. Wire and cable markers shall be permanently-attached, heat-shrink type labels.
1. Sleeve: Permanent, PVC, white, with legible machine-printed black markings.
2. Acceptable Manufacturers: Raychem Model D-SCE or ZH-SCE, Brady Model 3PS, or equal.
3. Grounding Conductor: Provide green wire marker; minimum 2 inches wide.

B. Wire or cable numbering preprinted on the conductor or cable insulation, flag-type labels, and individual wraparound numbers (such as Brady preprinted markers) are not acceptable. All permanently-attached, heat-shrink type wire markers shall be the same throughout the project.

C. Wire and cable markers provided within control panels, motor control panels, motor control centers, and electrical enclosures by equipment manufacturer or enclosure fabricator on in-factory installed wiring shall be laminated, wrap-around type labels. Wire and cable markers provided outside of the fabrication factory shall be permanently-attached, heat-shrink type labels as specified above.

PART 3–EXECUTION

3.01 INSTALLATION

A. Degrease and clean surfaces to receive nameplates.

B. Install nameplates parallel to equipment lines.

C. Affix nameplates with weatherproof, UV-resistant adhesive in outdoor locations and sticky back adhesive in indoor locations.

D. Prepare and install neatly-typed circuit directories and schedules in all panels, including, but not limited to, panelboards where Work is done under this Contract.

3.02 WIRE IDENTIFICATION

A. Provide wire markers on each conductor, including neutral and spare conductors, in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Neutral conductor labels shall include the associated branch circuit number. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams for control wiring. Spare conductors shall have control wire number or shall indicate termination point of wire.

B. Conductors in pull boxes, motor control centers, supervisory control panels, control panels, cabinets, and panelboards shall be grouped as to circuits and arranged in a neat manner. All conductors of a feeder or branch circuit shall be grouped, bound together with nylon ties, and identified. Phase identification shall be consistent throughout the system. All wiring labels shall be able to be read without removing wire management (i.e., wiring trough covers, spiral windings, etc.) or twisting the wire/cable.

C. Where terminal blocks are factory provided with non-project-specific labels by equipment manufacturers in MCC buckets, combination starters, VFDs, motor control panels, control panels, and similar equipment and are wired to terminal blocks in control panels with project-specific labels, the interconnecting wiring shall be labeled at both ends to match the project-specific terminal blocks in the control panel. Provide an additional label on the end of each wire that is connected to a terminal block with a non-project-specific label to indicate the associated terminal block.

D. Power Conductor Insulation Color Code:
   1. 6 AWG and Larger: Provide general-purpose, flame-retardant, permanent tape at each termination and at accessible locations such as manholes, handholes, junction and pull boxes, panelboards, motor control centers, switchboards, switchgear, etc. Apply tape with at least six full, overlapping wraps; minimum 2 inches wide.
   2. 8 AWG and Smaller: Provide conductors with color-coded insulation.
   3. Colors:

System	Conductor	Color
All Systems	Equipment Grounding	Green
120/240 Volts Single-Phase, Three-Wire	Grounded Neutral One Hot Leg Other Hot Leg	White* Black Red
120/208 Volts Three-Phase, Four-Wire	Grounded Neutral Phase A Phase B Phase C	White* Black Red Blue
277/480 Volts Three-Phase, Four-Wire	Grounded Neutral Phase A Phase B Phase C	White* Brown Orange Yellow
Note: Phase A, B, C implies direction of positive phase rotation.		
* When installed as part of a 120-volt or 277-volt branch circuit, provide a color-coded stripe on the white neutral conductor insulation matching the branch circuit insulation.		

E. Control Panel and Field-Installed Control Conductor Insulation Color Code:
   1. All conductors shall have color-coded insulation.
   2. Colors:

System	Conductor	Color
Supply Voltage	Ungrounded Circuit Conductors Neutral	Black White
Discrete 120-volt AC Input/Output	Control Circuit Conductor Neutral	Red White
Discrete 12/24-volt DC Input/Output	Control Circuit Conductor Common	Blue White with Blue Stripe
Conductors energized when the main disconnect is in the "off" position (e.g., foreign supply voltages)	Control Circuit Conductor AC Neutral DC Common Ground	Orange White White with Blue Stripe Green
Intrinsically Safe	Control Circuit Conductor DC Common	Light Blue White with Two Light Blue Stripes

F. Circuit Identification:
   1. Identify power, instrumentation, and control conductors at each termination and at accessible locations such as manholes, handholes, junction and pull boxes, panelboards, motor control centers, switchboards, switchgear, etc.
   2. Conductors for panelboard circuits shall identify circuit matching the circuit directory designations, including the neutral conductor.
   3. Control conductor identification shall match the associated terminal block label.
   4. Circuits Not Listed in Circuit Directories:
      a. Assign circuit name based on unique device or equipment at load end of circuit.
      b. Where unique device or equipment names are not available or apparent, add a unique number or letter modifier to each otherwise identical circuit name.

3.03 JUNCTION BOX IDENTIFICATION

A. All junction boxes shall be labeled with permanent nameplates. Nameplates shall indicate circuit or load served, as well as the power source and highest voltage present on any conductor.

3.04 CONDUIT FITTINGS IDENTIFICATION

A. All conduit fittings that contain splices of any kind shall be labeled with permanent nameplates indicating “splice within.” Nameplates shall be clearly visible at location installed. Nameplates shall be fastened to each conduit fitting with heavy duty, UV-resistant, cold weather cable ties.

3.05 TERMINAL BLOCK IDENTIFICATION

A. Terminal blocks shall be labeled on both sides of each terminal block. Terminal block numbering shall match the numbers shown on the project-specific wiring diagrams.

B. Fused terminal blocks labels shall be located on top of the terminal blocks and include the fuse voltage and ampere rating.

3.06 COMPONENT IDENTIFICATION

A. All components (e.g., relays, timers, power supplies, transformers, etc.) within enclosures shall be identified with sticky-back adhesive, self-laminating, machine-printed marking labels. Labels shall be installed on the enclosure back panel and not on the device itself, wireway covers, or any other removable devices. Labels shall be included on the as-built drawings.

3.07 LABELING FONT REQUIREMENTS

A. The font for all conductor, cable, and device labels shall be Arial with black characters on white background, and minimum font size 12.

B. The text for all conductor, cable, and device labels shall be machine printed. Handwritten labels are not acceptable.

END OF SECTION

SECTION 26 09 00

CONTROLS AND INSTRUMENTATION

PART 1–GENERAL

1.01 SUMMARY

A. Related Sections and Divisions:
   1. Applicable provisions of Division 01 shall govern work in this section.
   2. All other sections of Division 26.

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1.02 SYSTEM DESCRIPTION

A. The work includes furnishing, delivering, installing all items furnished, and placing in operation modifications to the Supervisory Control and Data Acquisition (SCADA) System for the South Hopkins Water District water treatment and distribution system.

B. System Supplier shall be defined as the fabricator, assembler, and supplier of all system components. This shall include, but not be limited to, all instrumentation as specified, all PLC cabinets and required interface hardware and internal wiring, hardware, system drawings, system software, and modifications to existing SCADA components.

C. System Supplier shall be responsible for development of the SCADA System computer HMI graphics and updates to existing SCADA system. System supplier shall be responsible for all OIP graphics programming.

D. CONTRACTOR shall inspect all work. The Bid shall include everything necessary to obtain a complete installation operating in accordance with these specifications and the Bidder's proposal, whether necessary items and equipment are contained in, or are remote from the enclosures furnished under this Contract. All responsibility for this system ultimately lies with CONTRACTOR.

E. CONTRACTOR shall be responsible for the placing of circuits and making of electrical and hydraulic connections in accordance with System Supplier-furnished drawings, instructions, and field supervision to provide proper connection. CONTRACTOR shall include the services of a System Supplier factory engineer to supervise the making of connections to power supplies, communication circuits, existing control equipment, and any other connections external to the new control equipment; adjust the equipment; initiate and check operation; instruct OWNER's electrician on operation and maintenance of the equipment; and place the equipment in operation in an acceptable manner. This shall include on-site review of software/hardware controls from the central control point.

F. Any auxiliary interface relays and controls needed for completion of this project, if not specifically called for, shall be by System Supplier.

1.03 QUALITY ASSURANCE

A. System Suppliers: Firms regularly engaged in the design and manufacture of SCADA systems of the size and complexity specified herein, and whose systems have been in satisfactory use in similar service for not less than 10 years.

B. Installer: A firm with at least 10 years of successful installation experience on projects with SCADA System design and installation work similar to that required for the project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL Labels: Provide control panels, power supplies, controllers, relays, wire, and connectors that have been listed and labeled by Underwriters Laboratories.

E. NECA Standards: Comply with applicable portions of National Electrical Contractor's Association's Standard of Installation.

1.04 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's data, specifications, and installation recommendations for each item specified herein.

B. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

C. Provide product data on all equipment and devices specified herein as well as wiring schematics for all systems.

1.05 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provision of Section 01 33 00–Submittals.

B. Include spare parts data listing, source and current prices of replacement parts and supplies, and recommended maintenance procedures and intervals.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect equipment from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle equipment carefully to avoid damage to SCC components, enclosure, and finish.

1.07 SYSTEM ENGINEERING

A. System Supplier shall provide all engineering necessary to accomplish and document the requirements of this specification and be in accordance with the system configuration. The engineering to be performed by System Supplier on this project shall include, but not be limited to, the following categories:
   1. PLC.
   2. Panel layouts.
   3. I/O configuration and wiring diagrams.
   4. PLC programming.
   5. Network configuration. Coordinate system IP addresses with OWNER and ENGINEER.
   6. OIP programming.

B. Installation: CONTRACTOR shall install all system equipment, including PLCs and interconnecting cabling, as required. This work shall include all interconnection wiring from new and existing equipment as required for the completion of the system.

C. It shall be the responsibility of System Supplier to ascertain that all field devices are compatible and consistent with the new system design. This includes reviewing drawings and data to ascertain the compatibility and consistency of the system with the field devices on such considerations as:
   1. Equipment size and available space.
   2. Power levels.
   3. Power sources.
   4. Logic schemes.
   5. Signal types and levels.
   6. Interface devices where required.
   7. All other aspects of field devices impacting the design of the system.

D. The system shall be programmed to implement the control sequences and to provide monitoring according to this specification. It shall be the responsibility of System Supplier to include all inputs and outputs required to meet all aspects of this specification, regardless of whether they are specifically included in the I/O listing in this specification.

E. System Supplier shall provide a complete list of spare parts required and where they may be obtained for operating the system for 3 years from startup.

1.08 DESCRIPTION OF THE SOUTH HOPKINS HIGH SCHOOL TANK AND BOOSTER PUMP STATION SCADA SYSTEM

A. The South Hopkins Water District distribution system is monitored and controlled through an existing SCADA system utilizing radio communications from remote locations. This project includes the following major components.
   1. New SCADA RTU panel located in the new Hopkins High School booster pump station.
   2. Replacement of radio, antenna, coax cable and connectors in eight existing SCADA RTUs.
   3. New Transducer Panel for new tank site to monitor tank water level.
   4. Frequency Coordination and licensing for new SCADA RTU.
   5. Programming updates to existing water treatment plant MTU PLC and HMI system to accommodate the new RTU.

1.09 CONTRACTOR AND SYSTEM SUPPLIER GENERAL REQUIREMENTS

A. This specification, along with the Contract Drawings, defines the requirements of a PLC-based process monitoring and control system. System Supplier shall construct a process monitoring and control system specifically for the demanding requirements of a real-time municipal water distribution and treatment system.

B. It is the intent of this specification to define modifications to an existing a fully integrated open-type process monitoring and control system, with new equipment, as specified, factory tested, delivered to the site, and ready to function upon connection of a power source and field instrument wiring. Components, peripherals, interconnections, cabling, power supplies, software, and services necessary to form a complete, integrated system shall be identified and provided by CONTRACTOR. CONTRACTOR shall be responsible for reviewing the wiring diagrams and control sequences for equipment provided under other divisions of these specifications and coordinating all interface requirements. CONTRACTOR shall submit to ENGINEER, in writing, any deficiencies noted during this review. Any changes required by CONTRACTOR because of a failure to complete this review shall be the responsibility of CONTRACTOR, at no increase in cost to OWNER.

C. CONTRACTOR shall be responsible for complete coordination in providing all equipment, sensors, and meters supplied with input and output signals, and contacts that are compatible with the systems as specified herein and existing systems. CONTRACTOR shall also be responsible for complete coordination with manufacturers of other systems specified in other divisions of these specifications with which an interface is required. The Contract Drawings and I/O Listing are symbolic representatives of the required work. It is not intended that the Drawings show all appurtenances. CONTRACTOR shall provide a complete and working system according to the true intent and meaning of the Drawings, Specifications, and standard industry practices.

D. To provide a complete and totally integrated system, a single manufacturer who has experience in furnishing similar networked PLC-based monitoring and control systems of the same complexity and size for municipal water distribution and treatment systems shall provide the specified equipment and services. The system proposed to meet this specification shall be of field-proven design incorporating manufacturer’s standard equipment and software. Service of all peripheral devices shall be provided by the manufacturer of the process monitoring and control system.

E. Design and specification of devices and the completed system shall conform to the applicable portions of the latest edition of the National Electrical Code (NEC).

F. Control panels shall bear a serialized UL label indicating that it is UL approved as an assembled unit. Panels that have individual components that are UL labeled, but do not have UL approval as an assembled unit are not acceptable.

G. Training Program:
   1. Submit a training plan including course syllabus, personnel who will be conducting the training, and schedule.
   2. Provide materials, instructors, and workbooks to complete the training.
   3. Training courses shall include operator and maintenance training: The course shall consist of one 2-hour sessions. Training shall utilize equipment specified herein following installation and field testing. Training sessions shall occur at a minimum of 2-week intervals.
   4. Refer to Section 01 91 00–Starting of Systems for additional training requirements.

H. All components shall be standard make acceptable to OWNER, with one manufacturer to provide all similar components. The Base Bid System Supplier shall be CITCO. See General Conditions and Supplementary Conditions regarding substitutions to the Base Bid system suppliers.

1.10 TESTING AND START-UP

A. All elements of the Telemetry system upgrade shall be tested to demonstrate that the total system satisfies all of the requirements of this Specification. All special testing materials and equipment shall be provided by the Systems Integrator. The Systems Integrator shall coordinate and schedule all of his testing and startup work with OWNER. As a minimum, the testing shall include both a factory test and a field test. Testing requirements are as follows:
   1. Factory Tests: PLC's and all other associated hardware shall be tested at the integrator's shop, prior to shipment, so as to demonstrate that each component is operational and meets the requirements of these Specifications. Test results shall be certified, with written documentation provided to OWNER upon test completion. Factory testing will not be witnessed by OWNER or ENGINEER.
   2. Field Tests:
      a. All system components shall be checked to verify that they have been installed properly and that all terminations have been made correctly. Witnessed field tests shall be performed on the complete system. Each function shall be demonstrated to the satisfaction of OWNER and ENGINEER on a paragraph-by-paragraph basis.
      b. Each test shall be witnessed and signed off by CONTRACTOR and ENGINEER upon satisfactory completion. CONTRACTOR shall notify OWNER at least one week prior to the commencement date of the field tests.

1.11 WARRANTY

A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from Substantial Completion of the project.

PART 2–PRODUCTS

2.01 FUNCTIONAL REQUIREMENTS

A. SCADA system expansion and modification include the following:
   1. New High School Booster & Tank Remote Telemetry Unit (RTU).

2. Programming modifications of the existing Water Plant MTU PLC and the SCADA Computer HMI to accept and graphically display the new remote unit.
3. Replacement of radios and accessories at eight existing RTU sites.

B. Equipment panels and instrumentation includes the following:
1. One Water Booster Station/Tank Remote Transceiver Unit (RTU)–High School Booster/Tank RTU Panel.
2. One transducer panel for new tank site to obtain tank level through a pressure transducer.
3. Eight additional new radios to replace existing radios at existing RTU sites (tanks, boosters, MTU and WTP).

2.02 RADIO TELEMETRY UNIT (RTU)

A. The radio telemetry panel shall monitor and control the South Hopkins High School Pump Station, and shall monitor water elevation in the South Hopkins High School Elevated Water Storage Tank. The pumps shall be controlled to maintain water level within operator adjustable setpoints.

B. The Tank/Booster Station Remote Telemetry (RTU) shall operate as follows: RTU will integrate with the pump control panel to start and stop booster pumps when the pump H-O-A selector switches are in the Auto position. The RTU will have setpoints and will turn the pumps on/off based on the tank level. The RTU will operate from 120VAC incoming service and housed in a painted steel enclosure. All data from the tank and the Booster RTU will be transmitted back to the plant MTU panel and SCADA Computer.

C. The Booster/Tank Station Remote Telemetry Unit (RTU) shall consist of the following components, mounted within a Nema 12 painted steel or polycarbonate enclosure:
1. One Control Power Circuit Breaker, 15 amp.
2. One Programable Logic Controller.
3. One C-More CM5-T7W Operator Interface Touchscreen (OIT).
4. One 120-volt AC Surge Arrestor, A-B 4983-DS120-402.
5. One DC Power Supply, 24-volt, A-B 1606-XLE120E.
6. One Ethernet Switch 5 ports.
7. One Battery Charging/Power Fail Relay, Transtronics BVUPS24PFA.
8. Six Slim Style SPDT Relays.
9. Two 12-volt DC Battery Backups, Powersonics PS-1270.
10. One NextGen Viper Radio.
11. One Bulkhead Lighting Arrestor.
12. One Coax Cable Jumper.
13. One lot of DIN-rail mount terminal blocks and Panduit.

2.03 EQUIPMENT ENCLOSURES

A. New enclosures shall be front access only, minimum No. 14 gauge steel, with continuously-hinged doors. Enclosures equal to or smaller than 24 inches wide by 24 inches high shall be equipped with at least two quarter turn latches. Enclosures larger than 24 inches in any dimension shall be equipped with 3-point latch with top and bottom bolts actuated by one rotating, lockable handle on each door. Provide a door stop kit for each door, and data pocket for wiring diagrams. Painting shall include phosphate treatment, zinc chromate iron oxide primer, baked rust-inhibiting enamel, and white interior. All doors and panels shall be gasketed. All louvers shall be filtered and forced-air cooling shall be provided as necessary for conditions where installed. Provide enclosure dimensions as specified

herein. Enclosures shall be as manufactured by Hoffman or Saginaw. MCC structures are not acceptable.

B. Each enclosure shall include, but not be limited to, the following equipment:
   1. PLC, I/O modules, and communication modules.
   2. Power supplies.
   3. Surge protective devices.
   4. DIN-rail mounted terminal blocks for field wiring terminations.
   5. Plastic wiring ducts.
   6. General purpose 15-amp, 120-volt AC duplex GFCI receptacle.
   7. 20-amp, 120-volt AC main circuit breaker and branch circuit breakers as required to feed the PLC and the I/O controlled field devices.
   8. Other accessories required to provide a complete and working PLC system.
   9. UPS backup.
   10. Network switch.
   11. Front panel-mounted programming port with RJ-45 jack and 120-volt receptacle.

C. The equipment mounted within the enclosures shall be mounted on the enclosure back panel, neatly organized, and shall be in accordance with the manufacturer's recommendations.

D. Refer to Section 26 05 53–Electrical Identification for the control panel and field wiring color code.

E. 24 VDC power supplies shall be provided in the enclosures to power all 24 VDC devices and loop-powered analog input signals, where required.

F. NEMA ratings of enclosures shall be as required for the area where installed, unless specified otherwise.

G. Manufacturer of Accessories:
   1. Plastic wiring duct shall be Panduit Panduct, or equal.
   2. Terminal blocks shall meet the requirements of Section 26 05 19–Wire.
   3. Wire markers shall meet the requirements of Section 26 05 53–Electrical Identification.
   4. Circuit breakers shall be Square D Type QO with mounting bases, or equal. Circuit breakers can be rail-mounted type, Square D, Class 9080, Type GCB-150, or equal.
   5. Signal conditioners shall be Action Instruments, DIN rail mount, or equal.
   6. Power supplies shall be Allen-Bradley Model 1606-XLS, or equal, and shall meet the following requirements:
      a. Sized for the connected load plus inrush with capacity for a 50% power boost for up to 5 seconds.
      b. Integral, dry-contact relay for monitoring "DC OK" status at the SCADA System.
      c. UL Listed.
      d. Conformal coated.
      e. Temperature Range: -25°C to 60°C.
      f. Protection Features:
         (1) Over-voltage protection.
         (2) Protection against no-load and short circuit conditions.
         (3) Over-temperature protection.
         (4) Internal input fuse.
         (5) MOV-type input transient protection.

H. All wiring within the enclosure shall be through plastic wiring troughs. Plastic wiring troughs shall have removable covers. Maximum fill for wiring troughs shall be 60%. All wiring in supervisory enclosures and control panels not in wiring troughs shall be bound with continuous-type spiral windings. Terminal strips located adjacent to wiring troughs shall have a minimum of 1 1/2 inches between terminal strip and wiring trough. All wiring labels shall be able to be read without removing wiring trough covers. Wiring troughs shall be provided for all field wiring.

I. Tubing and instruments containing water shall be in separate compartments located and constructed so that leakage or spray at 100 psi pressure cannot touch electrical conductors or devices. Leakage shall be conducted to the floor in duct or pipe.

J. All wiring for new panels shall be done in the factory, Class II, Type C with master terminal strips for exterior connections. Terminal strips shall be located either at the bottom or on the side of the enclosure, depending on where the I/O conduits penetrate the enclosure. Splices are not allowed within enclosures or wireways. All enclosures must pass through doors to point of installation, and if enclosures are shipped in sections, all wiring and connections between sections shall be done by CONTRACTOR. The field wiring terminals shall be clearly identified as to which I/O terminals they are wired. Jumpers between adjacent terminal blocks shall be copper jumper bars supplied by the terminal block manufacturer. All wiring shall be labeled at each end with corresponding numbers matching the associated terminal block. This numbering shall be shown on the shop and Record Drawings.

K. All door-mounted devices shall be furnished flush-mounted, and an exterior-engraved phenolic nameplate worded by OWNER (upon receipt of shop drawings) shall be provided for each component, device, and light. All components within the enclosures shall be identified with sticky-back adhesive, self-laminating, machine-printed marking labels with white background and black text; minimum size 12 font. Labels shall be installed on the enclosure back panel and not on the device or wireway. Devices shall be grouped for each device or unit being controlled.

L. All panels with DIN rail-mounted equipment shall include a minimum of 25% spare DIN rail space.

M. In addition to spare I/O specified herein, provide a minimum of 25% spare hot and neutral terminals wired to terminal strips. Spares shall be provided for all voltage sources within the panel (e.g., 120 V, 24 V).

N. Enclosures that include motor controllers shall have a main disconnect for the enclosure.

2.04 MICROLOGIX PROGRAMMABLE LOGIC CONTROLLERS

A. Construction:
   1. A single chassis shall house the Central Processing Unit (CPU), memory, embedded I/O circuitry, communications, power supply and display.
   2. The PLC shall be able to operate in an industrial environment with an ambient temperature of (-4°F to 140°F).
   3. The PLC shall be able to operate in a free airflow environment.
   4. The PLC shall be able to operate in high electrical noise environments.
   5. The PLC shall support up to 7 front-accessible expansion modules for a total of up to 256 discrete I/O: Each input and output point shall have a visual indicator to display ON/OFF status.
   6. The CPU shall be a self-contained unit, and shall be capable of:

a. Providing system timing and scheduling I/O updates.
b. Controlling all I/O scanning and communications service.
c. Performing internal diagnostic checks and providing visual indication by illuminating a “green” indicator when no fault is detected and a “red” indicator when a fault is detected.
d. The CPU shall have a real-time clock.

7. Non-volatile memory shall store the operating system, user program and all user data to protect against memory loss in the case of power loss or system shutdown. The PLC shall be capable of storing a minimum of 10 KB of data and 10 KB of program.
8. A minimum of four isolated discrete input groups, one isolated analog input group, six isolated discrete output groups and one isolated analog output group shall be located on the self-contained controller. At least four relays shall be individually isolated.
9. The manufacturer shall have available a variety of I/O modules including, but not limited to, AC or DC discrete input, AC or DC relay contact output:
   a. Inputs: 120 VAC, 24 VDC, DC sink, DC source, 4-20 mA analog, and RTD.
   b. Outputs: 120 VAC relay, 24 VDC relay, 4-20mA analog.
   c. Discrete I/O modules shall be 120 VAC, unless noted otherwise.
10. Programming Environment:
   a. The programming port shall be RS-232 or EtherNet/IP.
   b. The programming software shall run on the latest version of Windows and the programming methods shall be IEC-61131 compliant:
      (1) Ladder–Project Tree navigation and simultaneous multiple rung editing:
      (2) Online editing.
      (3) Data logging.
      (4) Diagnostics.
      (5) Reporting.
11. Communication:
   a. Two dedicated serial ports that support RS-232 and one serial port that supports RS-485; DF1, DH-485, Modbus RTU, DNP3, ASCII. These ports shall be capable of local and remote programming, troubleshooting, and data manipulation.
   b. One RJ-45 port that supports 10/100 Mbps Ethernet; EtherNet/IP, Modbus TCP, and DNP3 over IP. This port shall be capable of local and remote programming, troubleshooting, and data manipulation.
12. Power:
   a. The PLC shall operate on 120 VAC or 24 VDC.
   b. The onboard power supply shall be capable of supplying all necessary power to all subsystems (CPU, memory, local I/O, etc.) in addition to a minimum of seven expansion I/O modules, without external wiring.
   c. The power supply shall provide surge protection, isolation and power outage carryover of at least one cycle of the AC line.
13. The PLC shall have a simple embedded display with the ability to monitor/change user data, display messages and data to the user, receive numeric input, and provide access to two electronic trim pots which can each be adjusted between 0 and 250 for use in the controller’s program.

B. The PLC shall be as manufactured by Rockwell Automation MicroLogix 1400 Series, or equal.

C. System Supplier shall provide all the equipment necessary for data gathering, monitoring, and control as specified herein and shown on the Drawings. Each PLC system shall include, but not be limited to, CPUs with adequate memory and instructions, local power supplies, I/O modules, communications modules, and all other components required to make the PLC perform all required functions. Each PLC shall be mounted in new enclosures where

specified herein or shown on the Drawings. The PLC enclosures shall be completely assembled, prewired, and tested at the System Supplier's factory.

D. PLC Programming and PLC Software: System Supplier shall provide all PLC programming and software required to meet this specification. The software shall include, but not be limited to, the following:
   1. PLC logic programs to be written by System Supplier for the PLC systems to accomplish the monitoring and control functions as specified herein. The System Supplier shall document and annotate the programs, update them as required after startup, and then turn the programs over to OWNER on two USB flash drives.
   2. All I/O addressing that is to be viewed or manipulated by the HMI software shall be organized into contiguous blocks of integer tags for discrete bits and floating point tags for all other values to facilitate block data transfer between computers and PLCs.

2.05 UNINTERRUPTIBLE POWER SUPPLIES

A. Provide a UPS backup in each SCC that will provide continuous communication for at least 30 minutes following a power failure. UPS power shall be provided, at a minimum, to the following equipment:
   1. PLCs and I/O cards, controllers, and OIPs.
   2. Network switches, signal converters, and other communication devices.
   3. Power fail and communication indicating lights and alarm devices.
   4. Power supplies for loop-powered instruments.
   5. Automatic alarm dialers.
   6. Intrinsic safety barriers.
   7. Combustible/toxic gas detection, ventilation monitoring, and alarming instrumentation and notification devices.
   8. Intrusion detection system devices and video surveillance camera power supplies.

B. Interior control panels with PLCs shall be provided with a true online 120-volt AC UPS.
   1. Each UPS shall be provided with a dry contact output for remote indication of a common UPS alarm or if UPS batteries need replacement.
   2. UPS shall be APC with relay I/O module, Liebert GXT5 with relay card, or Eaton 9SX.

C. Exterior control panels with PLCs shall be provided with a 24 VDC battery controller for a UPS system.
   1. UPS shall have a rated current of 40 A, battery charging current of 2 A, and dry contacts rated for 30 VDC, 1 A for DC Bus OK, Battery Fail, and Battery Discharged.
   2. UPS shall be Delta Model DRU-24V40ABN, or equal, with external battery sizes and quantities needed to meet the runtime requirements specified herein.

2.06 RADIOS AND MISCELLANEOUS COMPONENTS

A. The system supplier shall furnish miscellaneous components for completion of a full and operating Telemetry system.

B. The system supplier shall provide eight CalAmp Viper Radios and radio cables configured to the existing frequency, eight antennas, new coax cable, and connectors at the existing booster station, tank, MTU and WTP RTU panels.

C. Additional items shall include but are not limited to:
   1. Antenna mounting hardware / masts. Antennas to be mounted on existing structures with new mounting hardware, or alternative masts in order to provide reliable communication per the required path studies.
   2. Interfacing relays required to provide the necessary dry contact closure in accordance with the I/O list.
   3. All mounting hardware for securing pressure sensing tubing within booster pump stations or tank buildings.

2.07 PRESSURE TRANSMITTERS

A. Pressure transmitters shall sense gauge or differential pressure and provide a 4-20 mAdc signal proportional to the sensed pressure. Pressure transmitters shall accept 24 VDC loop power. Increasing pressure shall result in increasing signal.

B. Transmitters shall be suitable for use in ambient conditions of 0° to 180°F and 0% to 100% relative humidity.

C. Accuracy (including linearity, hysteresis, and repeatability) shall be at least ±0.075% of span. Long-term drift shall be less than ±0.05% of the upper range limit over a 5-year period. The transmitter output signal shall not change more than 0.005% of span for a 1 V change in the loop voltage. Ambient temperature effect shall be less than ±0.6 psi for a 10 to 300 psi transmitter that experiences a 50°F change in ambient temperature within the normal operating range. Mounting position shall not affect transmitter performance. RFI effect shall be less than 0.1% of span for radio frequencies in the range of 27 to 1,000 MHz and field intensity of 30 V/m.

D. Process connection shall be 316L stainless steel fitting size and type as required by CONTRACTOR. Sensor material shall be 316L stainless steel, with silicone fill fluid. Sensor shall be suitable for use with process liquid/gas temperature from -50°F to 250°F.

E. Calibrated range shall be determined by CONTRACTOR based on process conditions. Calibrated range and process conditions used to determine range and span limits shall be included in submittal.

F. Pressure transmitter housing shall be NEMA 4X, epoxy-coated aluminum with a minimum of one 1/2-inch NPT conduit connection. Housing shall provide separation between electronics and field connections.

G. Digital indicator with transmitter configuration push buttons shall be provided in the transmitter housing. Transmitter configuration shall be performed using push buttons on the transmitter. A HART communicator or other electronic device shall not be required to configure the transmitter.

H. Transmitter shall be direct-connected to process unless specified otherwise on the Drawings. Provide stainless steel bracket and mounting bolts for surface mounting of transmitter if wall mounting is specified. Provide stainless steel two-valve manifold for pressure transmitters and stainless steel three-valve manifold with test ports for differential pressure transmitters.

I. Provide stainless steel information tag that indicates instrument number, service, and calibration range.

J. Pressure transmitters shall be Foxboro Model IGP10S, ABB, or equal.

2.08 SMOKE DETECTORS

A. The detectors shall be listed to UL 217 and shall be compatible with the control equipment to which they are connected. The detectors shall have the following functions:
   1. 85 dBA Solid-state, Nonlatching, Horn.
   2. Nominal 2.5% Sensitivity.
   3. Pulsing LED Sensing Chamber.
   4. Fully Insect Screened.
   5. Functional Test Switch.
   6. Horn Frequency 3100 Hz (Nominal).
   7. LED Condition Indicator.
   8. Mounting Hardware Adapts to Standard Junction Boxes.
   9. Dust Cover to Prevent Contamination During Installation.

B. The detectors shall have integral thermal heat sensing so that alarm activation shall occur because of smoke or heat detection. The integral thermal device shall be self-restoring and be rated for 135° at 50 feet. The detector shall have two Form A/C contacts rated for 0.3 amps at 120 volts.

C. The detectors shall operate at 120 VAC, 60 Hz. Device shall be rated for an operating temperature of 40°F to 100°F. The detectors shall be Gentex Model STRR, or equal.

2.09 OPERATOR INTERFACE PANEL

A. The operator interface shall meet the following general specifications:
   1. Voltage: 85 VAC to 264 VAC.
   2. Temperature: 0°C to 55°C.
   3. Humidity: 5% to 95% noncondensing.
   4. RFI: MIL-STD-461B.
   5. EMI: IEEE 472-1974.
   6. Communication Port: Ethernet.

B. The operator interface shall have the following minimum features:
   1. Type: Color Active Matrix Thin Film Transistor (TFT) touchscreen LCD.
   2. Display Size: 10.4-inch.
   3. Resolution: 800 by 600, 18-bit color graphics.
   4. Clock: Battery-backed real time.
   5. Application Memory: 512 MB.
   6. Enclosure: NEMA Type 12.

C. The operator interface panel shall be as manufactured by Allen-Bradley, Panelview Plus 7 Performance, or equal.

2.10 SURGE PROTECTIVE DEVICES FOR CONTROL PANELS, INSTRUMENTATION, AND NETWORK EQUIPMENT

A. The incoming power supply of each control panel shall be protected with a surge protective device (SPD). SPD unit shall be as manufactured by Citel, Model DS72US, or equal. Surge protection shall be provided for all phases and neutral.

B. Each analog signal entering or leaving a supervisory control panel and leaving a building shall be provided with a DIN-rail mounted surge protection device as manufactured by Citel, Model DLA-24D3, or equal. Each transmitter shall be provided with a surge protection device as manufactured by Citel, Model TSP15M, or equal, on the output and Citel, Model DS72US, or equal, on the power supply. Surge protection shall be provided for all phases and neutral.

C. Each Ethernet cable entering or leaving a supervisory control panel and leaving a building shall be provided with a DIN-rail-mounted surge protection device rated up to 10 Gbps as manufactured by Phoenix Contact, Model DT-LAN-CAT6+, or equal.

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

RTU I/O LIST

STRAND ASSOCIATES, INC®
SOUTH HOPKINS WATER DISTRICT
SOUTH HOPKINS HIGH SCHOOL TANK AND PUMP STATION
CONTRACT 1-2025
RTU I/O LISTING

RTU	EQUIPMENT NAME	NUMBER	DI	DO	AI	AO	WIRE	COMMENTS
	PUMP STATION							
	Power Fail		1	0	0	0	2~#14	From Pump Station Control Panel
	Pump 1 Running		1	0	0	0	2~#14	From Pump Station Control Panel
	Pump 1 in Auto Control Mode		1	0	0	0	2~#14	From Pump Station Control Panel
	Pump 1 Fault		1	0	0	0	2~#14	From Pump Station Control Panel
	Pump 2 Running		1	0	0	0	2~#14	From Pump Station Control Panel
	Pump 2 in Auto Control Mode		1	0	0	0	2~#14	From Pump Station Control Panel
	Pump 2 Fault		1	0	0	0	2~#14	From Pump Station Control Panel
	Pump Station Intrusion		1	0	0	0	2~#14	From Pump Station Control Panel
	Pump Station Water on Floor		1	0	0	0	2~#14	From Pump Station Control Panel
	Pump Station Low Temperature		1	0	0	0	2~#14	From Pump Station Control Panel
	Pump Station Smoke Detector		1	0	0	0	2~#14	From Pump Station Control Panel
	Pump Station Suction Pressure		0	0	1	0	#16 T/S Pair	From Pump Station Control Panel
	Pump Station Discharge Pressure		0	0	1	0	#16 T/S Pair	From Pump Station Control Panel
	Pump Station Flow		0	0	1	0	#16 T/S Pair	From Pump Station Control Panel
	Pump 1 Speed		0	0	1	0	#16 T/S Pair	From Pump Station Control Panel
	Pump 2 Speed		0	0	1	0	#16 T/S Pair	From Pump Station Control Panel
	Pump 1 Call to Run		0	1	0	0	2~#14	To Pump Station Control Panel
	Pump 2 Call to Run		0	1	0	0	2~#14	To Pump Station Control Panel
	Pump 1 Speed Control		0	0	0	1	#16 T/S Pair	From Pump Station Control Panel
	Pump 2 Speed Control		0	0	0	1	#16 T/S Pair	From Pump Station Control Panel
	TANK							
	Tank Level		0	0	1	0	#16 T/S Pair	From Tank Level Pressure Transducert
	Operator Interface Touch Screen							Ethernet IP Network
	Radio							Ethernet IP Network
	TOTALS		11	2	6	2		

SECTION 26 21 00

ELECTRICAL SERVICE SYSTEM

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
1. Utility Company.
2. Secondary Service Characteristics.
3. Definitions.
4. Overhead Electrical Service.

B. Allowances: CONTRACTOR shall include in the Bid the cost of the following items specified in this Section. Refer to the individual sections listed below for a complete description of the Work required. Electric Utility Service Entrance, Paragraph 1.05–Overhead Electrical Service.

C. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

D. See Division 01 for temporary service requirements. This section applies to permanent services only.

1.02 UTILITY COMPANY

A. The Utility Company is Kentucky Utilities Company.

1.03 SECONDARY SERVICE CHARACTERISTICS

A. The secondary service will be 120/240-volt, 4-wire, three-phase.

1.04 DEFINITIONS

A. Service: As defined in the NEC, Article 100.

B. Primary Voltage: Above 600 volts.

C. Secondary Voltage: 600 volts and below.

1.05 OVERHEAD ELECTRICAL SERVICE

A. Provide complete underground electrical service except for items provided by the Utility Company.

B. Provide electrical service system, except the Utility Company will provide: Service drop to weather head.

C. Coordinate the new electrical service with the Utility. All costs for the electrical service shall be included in the Lump Sum Bid.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 UTILITY COORDINATION

A. Division 26 Contractor shall obtain all required permits and licenses, pay all charges and fees, and give all notices necessary for utilities to perform the Work. Division 26 Contractor shall comply with all permit requirements whether the permit is issued to CONTRACTOR, the state, or the maintaining authority.

B. Division 26 Contractor shall complete all required electrical service applications and forms based on the Drawings and Division 26 Contractor's means and methods for the work required.

END OF SECTION

SECTION 26 32 13

STANDBY POWER SYSTEM–PORTABLE

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Steel base assembly, engine, generator, engine-generator set controls, environmental systems and trailer.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

B. Shop drawings shall include the following:
   1. Detailed descriptions of equipment to be furnished, including all deviations from these specifications.
   2. Detailed layouts of all equipment and ancillary items.
   3. The manufacturer shall furnish schematic and wiring diagrams for the generator and an interconnection wiring diagram for the entire standby system. Test reports certified by the manufacturer shall be provided to ENGINEER for the entire system.

1.03 QUALITY ASSURANCE

A. The generator shall be listed by Underwriters Laboratories, Inc., and be certified by the Canadian Standards Association.

1.04 OPERATING CONDITIONS

A. The generator set shall operate at 1800 rpm, 60 Hz and at a voltage of: 120/240 VAC, single-phase, 3-wire; 120/240 VAC, three phase; 120/208 VAC, three phase, 4-wire; and 277/480 VAC three phase, 4-wire. Unit shall be equipped with voltage selector switch and shall have a minimum capability of 250 kW, 313 kVA standby.

B. The generator set manufacturer shall verify the engine as capable of driving the generator with all accessories in place and operating, at the generator set kW rating after derating for the range of temperature expected in service and the altitude of the installation. Site conditions are 100°F maximum ambient and 900 feet altitude.

C. Voltage regulation shall be ±0.5% of rated voltage for any constant load between no load and rated load.

D. Frequency regulation shall be isochronous from steady state no load to steady state-rated load. Random frequency variation with any steady load from no load to full load shall not exceed ±0.5%.

E. Random Voltage Variation: The cyclic variations in RMS voltage shall not exceed ±0.5% of rated voltage for constant loads from no load to rated load, with constant ambient and operating temperature.

F. Total Harmonic Distortion: The sum of AC voltage wave-form harmonics from no load to full linear load shall not exceed 5% of rated voltage (L-N, L-L, L-L-L), and no single harmonic shall exceed 3% of rated voltage.

G. Telephone Influence Factor: TIF shall be less than 40 per NEMA MG1-22.43.

H. The engine generator set shall accept a single-step load of 100% nameplate kW and power factor, less applicable derating factors, with the engine generator set at operating temperature.

I. Motor starting capability shall be a minimum of 350 kVA. The generator set shall be capable of recovering to a minimum of 90% of rated no-load voltage following the application of the specified kVA load at near zero power factor applied to the generator set. Maximum voltage dip on application of this load, considering both alternator performance and engine speed changes, shall not exceed 25%.

1.05 WARRANTY

A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project.

PART 2–PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. The AC engine generator set shall be as manufactured by Cummins Power Generation, Kohler, or Caterpillar.

B. The Drawings and Specifications were prepared based on Cummins Power Generation. CONTRACTOR shall include in the Bid and shall be responsible for the cost of any changes to accommodate other equipment including, but not limited to, structural, mechanical, and electrical work. CONTRACTOR shall also pay additional costs necessary for revisions of Drawings and/or Specifications by ENGINEER.

2.02 TRAILER AND WEATHER-PROTECTIVE GENERATOR ENCLOSURE

A. Entire Standby Power System shall be mounted on manufacturer-provided, tandem-axle trailer, with the following minimum requirements:
   1. Weather-protective enclosure.
   2. 15-inch minimum wheels with radial construction trailer tires sized to exceed axle carrying capacity. Provide tongue-mounted spare tire.
   3. Weight-bearing fenders and running boards securely welded in place. Nonslip material shall be used on fenders and running boards required to access the generator set.

4. Tongue weight shall be 10% to 15% of total trailer weight, and is not to be considered when sizing tires and axles. A jack for hitch with wheel, and safety chains shall also be provided.
5. Electric braking system on both axles with battery backup breakaway system.
6. Clearance, parking and directional lights with reflectors, and lighted license plate holder and accessories. Plug for trailer lights shall match OWNER's existing receptacle.
7. Trailer shall include DEF and fuel tanks sized to operate genset for a minimum of 24 hours. The tanks shall be mounted to the trailer. Fuel tank shall include a fuel gauge, lockable fill cap, and shall include 110% secondary containment. The DEF tank shall include a DEF quality sensor. Trailer shall be DOT rated.
8. Electrical cable and plug holder.
9. Rear stabilizer jacks.

B. Where the top of the generator control panel is 6 feet or more aboveground, trailer shall include fold-up step(s) attached to the trailer.

C. Generator set weather-protective housing shall be provided factory-assembled to generator set base and radiator cowling. Housing shall provide ample airflow for generator set operation at rated load in the ambient conditions previously specified. All sheet metal shall be primed for corrosion protection and finish painted with the manufacturer's standard color using a two-step electrocoating paint process, or equal, meeting the performance requirements specified below. All surfaces of all metal parts shall be primed and painted. The painting process shall result in a coating which meets the following requirements:
1. Primer thickness 0.5 mils. Top coat thickness 0.8 mils to 1.2 mils.
2. Gloss per ASTM D523-89, 80% ±5%. Gloss retention after 1 year shall exceed 50%.
3. Crosshatch adhesion per ASTM D3359-93, 4B-5B.
4. Impact resistance per ASTM D2794-93, 120-inch pounds to 160-inch pounds.
5. Salt Spray per ASTM B117-90, 1000+ hours.
6. Humidity per ASTM D2247-92, 1000+ hours.
7. Water Soak per ASTM D2247-92, 1000+ hours.

D. Painting of hoses, clamps, wiring harnesses, and other nonmetallic service parts shall not be acceptable. Fasteners used shall be corrosion-resistant, and designed to minimize marring of the painted surface when removed for normal installation of service work.

E. The enclosure shall include hinged doors for access to both sides of the engine and alternator and the control equipment. Key-locking and padlockable door latches shall be provided for all doors. All hardware and door hinges shall be stainless steel. All doors shall be provided with door stops to hold them in the open position.

F. The enclosure shall include flexible coolant and lubricating oil drain lines that extend to the exterior of the enclosure, with internal drain valves and external radiator fill provision.

G. The enclosure shall be provided with an exhaust silencer which is mounted inside of the enclosure. Silencer exhaust shall include a rain cap and rain shield.

H. 125% environmental containment basin for oil and coolant.

2.03 ENGINE

A. The engine shall be stationary, liquid-cooled, diesel for use with No. 2 diesel fuel. The design shall be 4-cycle, 6-cylinder, minimum displacement of 506 cubic inches, turbocharged,

aftercooled as required by engine manufacturer. Engine shall be certified as capable of driving the generator of the rating indicated above on a continuous standby basis for the duration of normal source interruptions.

B. Engine accessories shall include the following:
   1. A 24-volt DC electric starter, as required by the engine manufacturer.
   2. Replaceable dry element air cleaner with restriction indicator.
   3. Positive displacement, mechanical, full-pressure lubrication oil pump, full-flow lubrication oil filters with replaceable elements, pressure relief valve, dipstick oil level indicator, and oil drain valve with hose extension. Provide all lubricants for proper operation of the unit.
   4. An electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed. The governing system shall include a programmable warm-up at idle, and cooldown at idle function. While operating in idle state, the control system shall disable the alternator excitation system.
   5. Engine protective devices to indicate alarm and engine shutdown for the following:
      a. Low coolant temperature alarm.
      b. Low coolant level alarm.
      c. Low lubrication oil pressure alarm and shutdown.
      d. High coolant temperature alarm and shutdown.
      e. Overspeed shutdown.
      f. Over-crank shutdown.
   6. Battery charging alternator 100 amp minimum, with solid-state voltage regulator.
   7. Engine shall be radiator-cooled by engine-mounted radiator system, including belt-driven pusher fan, coolant pump, and thermostat temperature control. Rotating parts shall be guarded against accidental contact. The cooling system shall be rated for full-rated load operation in a 104°F ambient condition. Provide radiator drain extension to the side of the generator. Extension shall include shutoff valve.
   8. The equipment supplier shall provide 50% ethylene glycol antifreeze solution to fill engine cooling system.
   9. Engine-mounted thermostatically controlled coolant heater to aid in quick starting. The coolant heater(s) shall be sized as recommended by the engine manufacturer to warm the engine to a minimum of 104°F in a 40°F ambient, in compliance with NFPA 110 requirements. Heater shall be rated single-phase, 120 volts, 1,000 watts and be disconnected whenever the engine starts. Heater shall be UL 499 listed and labeled. The coolant heater(s) shall include cord and plug with provisions to isolate the heater for replacement of the heater element without draining the coolant from the generator set.
   10. Vibration isolators, spring/pad type, quantity as recommended by the generator set manufacturer.
   11. An engine-driven, mechanical, positive displacement fuel pump and fuel filter with replaceable spin-on canister element.
   12. Flexible supply and return fuel lines.
   13. Fuel filter with replaceable element.
   14. The engine shall be provided with all fuel system piping required for automatic operation of the system. All piping shall be black iron and be sized to provide proper fuel flow for the engine. The unit shall be provided with all supply, return, vent, and fill lines as

required. Provide a check valve in the fuel supply line to prevent drain back of diesel fuel. Provide connections for connecting fuel system to the engine in compliance with applicable codes and regulations. All fuel piping shall be pressure tested for a minimum of 2 hours.

2.04 ENGINE EXHAUST SYSTEM

A. Exhaust muffler shall be provided for the engine of size as recommended by manufacturer. Muffler shall be of the critical-grade type. Muffler shall be side inlet.

B. Stainless steel flexible exhaust connections shall be provided as required for connection between engine exhaust manifold and exhaust line in compliance with applicable codes and regulations.

C. Provide an exhaust condensation trap with manual drain valve to trap and drain off exhaust condensation and to prevent condensation from entering the engine.

D. Provide a suitable rain cap at the stack outlet. Provide all necessary flanges and special fittings for proper installation.

E. Engine emissions shall meet current Environmental Protection Agency (EPA) NSPS gas engine emission regulations. Engines shall be EPA Tier 4 final nonroad certified and emission approval documentation shall be provided to OWNER prior to final completion. All costs associated with any on-site EPA required emissions testing shall be included in the Bid.

2.05 STARTING AND CONTROL BATTERIES

A. A UL-listed/CSA-certified 10-ampere voltage regulated battery charger shall be provided for the engine-generator set.

B. Charger shall be UL 1236-BBHH listed and CSA or CUL certified for use in emergency applications.

C. The charger shall be compliant with UL991 requirements for vibration resistance.

D. The DC output voltage regulation shall be within ±1%. The DC output ripple current shall not exceed 1 amp at rated output current level.

E. The charger shall include the following features:
   1. LED indicating lamps to indicate normal charging (green) and fault condition (red).
   2. AC input overcurrent, overvoltage, and undervoltage protection.
   3. DC output overcurrent protection.
   4. Corrosive-resistant aluminum enclosure.

F. A calcium/lead antimony storage battery set of the heavy-duty starting type shall be provided. Battery voltage shall be compatible with starting system. The battery set shall be size recommended by generator manufacturer and shall be capable of a minimum of three 15-second cranking cycles. A battery rack constructed in conformance with NEC requirements and necessary cables and clamps shall be provided.

2.06 GENERATOR

A. The generator shall be a single prelubricated bearing, self-aligning, 4-pole, two-thirds pitch, brushless, synchronous type, revolving field with amortisseur windings, and with direct-driven centrifugal blower fan for proper cooling and minimum noise. No brushes will be allowed. Generator shall be directly connected to engine flywheel housing, and driven through a flexible coupling to provide permanent alignment. Generator design shall prevent potentially damaging shaft currents.

B. Insulation shall meet NEMA standards for Class H and shall be UL 1446 listed. The maximum temperature rise shall not exceed 150°C at 40°C ambient.

C. The generator shall be three-phase, broad-range, reconnectable, and shall have a 3-position selector switch to select 120/240V single-phase, 120/208V three-phase or 277/480V three-phase output from the generator set. Unit shall be capable of providing full single-phase output from No Load to Full Load (i.e., extended stack).

D. The generator set shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5% above or below rated voltage.

E. A permanent magnet generator (PMG) shall be included to provide a reliable source of excitation power for optimum motor starting and short-circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single-phase or three-phase fault, at approximately 300% of rated current for not more than 10 seconds.

F. The subtransient reactance of the alternator shall not exceed 15%, based on the standby rating of the generator set.

G. Provide a 400-amp mainline circuit breaker with the engine generator set for 277/480-volt, three phase power. Provide a 400-amp mainline circuit breaker for 120/240-volt, single phase power. Provide a 400-amp mainline circuit breaker for 240-volt, three phase power. Provide a 400-amp mainline circuit breaker for 120/208-volt, three phase power.

2.07 ENGINE-GENERATOR SET CONTROL

A. The generator set shall be provided with a microprocessor-based control system that is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification.

B. The generator set mounted controls shall include the following features and functions. Control Switches:
   1. Mode Select Switch. The mode select switch shall initiate the following control modes. When in the RUN or MANUAL position, the generator set shall start and accelerate to rated speed and voltage. In the OFF position, the generator set shall immediately stop, bypassing all time delays. In the AUTO position, the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.
   2. EMERGENCY STOP switch. Switch shall be Red "mushroom-head," pushbutton. Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.
   3. RESET switch. The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.

4. PANEL LAMP switch. Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.

C. Generator Set AC Output Metering. The generator set shall be provided with a metering set, including the following features and functions: Digital metering set, 1% accuracy, to indicate generator RMS voltage and current (all three phases), frequency, output current, output kW, kW hours, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three-phase voltages (line-to-neutral or line-to-line), and total control on hours, as well as total values since reset.

D. Generator Set Alarm and Status Display:
   1. The generator set control shall include LED alarm and status indication lamps. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under outdoor conditions. Functions indicated by the lamps shall include:
      a. The control shall include green lamp to indicate that the generator set is running at rated frequency and voltage, and that a remote start signal has been received at the generator set. The running signal shall be based on actual sensed voltage and frequency on the output terminals of the generator set.
      b. The control shall include a flashing red lamp to indicate that the control is not in automatic state, and red common shutdown lamp.
      c. The control shall include an amber common warning indication lamp.
   2. The generator set control shall indicate the existence of the warning and shutdown conditions on the control panel. All conditions indicated below for warning shall be field-configurable for shutdown. Conditions required to be annunciated shall include:
      a. Low oil pressure (warning).
      b. Low oil pressure (shutdown).
      c. Oil pressure sensor failure (warning).
      d. Low coolant temperature (warning).
      e. High coolant temperature (warning).
      f. High coolant temperature (shutdown).
      g. High oil temperature (warning).
      h. Engine temperature sensor failure (warning).
      i. Low coolant level (warning).
      j. Fail to crank (shutdown).
      k. Fail to start/overcrank (shutdown).
      l. Overspeed (shutdown).
      m. Low DC voltage (warning).
      n. High DC voltage (warning).
      o. Weak battery (warning).
      p. High AC voltage (shutdown).
      q. Low AC voltage (shutdown).
      r. Under frequency (shutdown).
      s. Overcurrent (warning).
      t. Overcurrent (shutdown).
      u. Short-circuit (shutdown).
      v. Overload (warning).
      w. Emergency stop (shutdown).

E. Engine Status Monitoring:
   1. The following information shall be available from a digital status panel on the generator set control:

a. Engine oil pressure (psi or kPA).
b. Engine coolant temperature (degrees F or C).
c. Engine speed (rpm).
d. Number of hours of operation (hours).
e. Number of start attempts.
f. Battery voltage (DC volts).

2. The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set, as well as total time of operation at various loads, as a percent of the standby rating of the generator set.

F. Engine Control Functions:
1. The control system provided shall include a cycle-cranking system which allows for user-selected crank time, rest time, and number of cycles. Initial settings shall be for three cranking periods of 15 seconds each, with 15-second rest period between cranking periods.
2. The control system shall include an idle mode control which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled.
3. The control system shall include an engine governor control which functions to provide steady state frequency regulation, as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.
4. The control system shall include time-delay start (adjustable 0 seconds to 300 seconds) and time-delay stop (adjustable 0 seconds to 600 seconds) functions.
5. The control system shall include sensor failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sensor or wiring components, and an actual failure condition.

G. Alternator Control Functions:
1. The generator set shall include a full-wave rectified automatic digital voltage regulation system that is matched and prototype-tested by the engine manufacturer, with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion, and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase RMS sensing, and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque-matching characteristic shall be adjustable for roll-off frequency and rate, and be capable of being curve-matched to the engine torque curve with adjustments in the field. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alphanumeric LED readout to indicate setting level. Rotary potentiometers for system adjustments are not acceptable.
2. A microprocessor-based protection device shall be provided to individually monitor all phases of the output current of the generator set and initiate an alarm (overcurrent warning) when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The device shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (overcurrent shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.

3. A microprocessor-based protection device shall be provided to monitor all phases of the output current for short-circuit conditions. The control/protection system shall monitor the current level and voltage. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (short-circuit shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 Article 445.
4. A microprocessor-based AC over-under-voltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Undervoltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds. The system shall monitor individual phases and be connected line-to-neutral on three-phase, 4-wire generator sets, and for systems that are solidly-grounded.
5. The generator set control shall include a 120 VAC control heater. Heater shall include cord and plug.

H. A common fail contact for external connection to an audible alarm and remote alarm shall be provided. One auxiliary generator running contact shall also be provided for remote indication. All contacts shall be rated for 5 amps at 120 VAC.

2.08 MISCELLANEOUS EQUIPMENT

A. Provide duplex 120-volt and simplex 208-volt, single-phase, 20-amp receptacles for plugin of miscellaneous equipment.

B. Two shore power connection points with 120-volt grounded plugs for battery charger and block heater.

C. Provide a 50-foot, 4-wire, 500 MCM-type G/GGC cable assembly. On the load side of the 400-amp, 3-pole main line circuit breaker, provide a 50-foot, 3-wire, 500 MCM type G/GGC cable assembly.

D. Provide a 400-amp, 4-wire, 4-pole mating plug as manufactured by Crouse-Hinds. Plug shall be installed on the 400-amp, three-phase cable assembly. Provide a 400-amp, 3-wire, 4-pole mating plug as manufactured by Crouse-Hinds, Catalog No. APJ10487-S22. Plug shall be installed on the 400-amp cable assembly. Provide engraved nameplate indicating station served, and voltage for each circuit breaker and mating plug. Nameplate shall be stainless steel and permanently attached to generator at circuit breaker and at each mating plug.

E. Provide adequately-sized hangers or storage space on the generator set for storage of the two cable assemblies specified above, as well as a holder for each plug.

F. Provide reconnection board and selector switch to allow a switch from 480 volts to 240 volts by relocating the links on the connection board. Change of operating voltage on generator shall not require reprogramming at generator control panel. Switch shall have isolated outputs such that the selected voltage is the only source energized.

2.09 TOOLS AND SPARE PARTS

A. The required spare parts for the generator shall be those as recommended by the manufacturer and shall include the following items as a minimum:

1. All special tools required for normal operation and maintenance.
2. One air cleaner element.
3. One oil filter.
4. One set of fan belts.

B. All spare parts shall be packed in containers that are clearly identifiable with indelible markings on containers.

2.10 SCHEDULED OIL SAMPLING

A. In order to minimize engine downtime, the supplier of the standby generator must provide an oil-sampling analysis kit that operating personnel shall use for scheduled oil sampling.

B. Scheduled oil sampling shall be of the atomic absorption spectrophotometry method, and shall be accurate within a fraction of one part per million for the following elements: iron, chromium, copper, aluminum, silicon, and lead. In addition, the sample shall be tested for the presence of water, fuel dilution, and antifreeze.

C. All equipment needed to take oil samples shall be provided in a kit at the time of acceptance, and shall include the following:
1. Sample Extraction Gun: One.
2. Bottles: Ten.
3. Postage-Paid Mailers: Ten.
4. Written Instructions: One.

D. Immediate notification shall be provided to OWNER when analysis shows any critical reading. If readings are normal, a report showing that the equipment is operating within established parameters shall be provided.

E. The scheduled oil-sampling kit shall be made available at additional cost to OWNER beyond the mandatory starter kit specified previously and shall be optional for OWNER to continue this service after the starter kit has been depleted.

PART 3–EXECUTION

3.01 INSTALLATION

A. The standby power system shall be built in accordance with the manufacturer’s recommendations and all applicable codes.

B. Equipment shall be initially started and operated by representatives of the manufacturer.

C. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to initial operation and final testing of the system.

3.02 START-UP, TESTING, AND TRAINING

A. CONTRACTOR shall include 8 hours of start-up and testing by a certified, factory-trained engineer. Prior to making electrical connections, CONTRACTOR shall have a factory-trained

service technician meet at the jobsite to go over the installation, to preclude any installation and start-up problems. Start-up services shall include, but not be limited to, inspection of CONTRACTOR installation and functional testing of the standby power system. On-site time shall be over and above the cost of travel and travel time to the site.

B. CONTRACTOR shall provide a training session for up to three OWNER's representatives for one normal workday (not including start-up), at a jobsite location determined by OWNER. The training session shall be conducted by a manufacturer's qualified representative. The training program shall consist of instruction on operation and testing of the assembly, circuit breakers, and major components within the assembly.

3.03 TESTING

A. In addition to the standard factory tests, there shall be a 4-hour continuous load bank test at the jobsite before connection to load transfer switch, with loads from 10% to 100% of rated capacity to check voltage, frequency, fuel, air cooling and ventilating systems so that they can be determined adequate for the application. This test shall be accomplished with a portable three-phase resistive load bank. All emergency warning and detection equipment shall be demonstrated to be operable by simulating failures. A signed test report shall be submitted to OWNER and ENGINEER with deficiencies noted, if any. After this test, the electrical plant shall be connected to the plant, and the operation and maintenance of the unit comprehensively demonstrated to OWNER. Correct phasing between the engine generator and station shall be verified so that it will handle load. A minimum of two power failures shall be simulated.

B. In addition to the load bank test above, after the unit is connected to the system, three simulated outages and a 2-hour run period on the actual facility shall also be provided.

C. CONTRACTOR shall be responsible for all fuel costs for these tests.

END OF SECTION

SECTION 33 00 10

BURIED PIPING AND APPURTENANCES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. All underground piping, valves, and appurtenances of every description.
   2. Excavation, dewatering, and backfilling for all work under this section unless otherwise noted.
   3. Concrete foundations and anchor bolts for all equipment furnished under this section.
   4. Underground piping connections to all equipment, whether furnished under this section or not.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

C. Measurement and Payment: Payment for all work, including materials, equipment, and miscellaneous items necessary to complete the installation, will be made at the Unit Price Bid for buried piping and appurtenances.

1.02 SUBMITTALS

A. Shop Drawings: General arrangement drawings of 3 inches or larger exterior (belowground) ductile iron, stainless steel and welded steel piping shall be submitted to ENGINEER for approval. Drawings shall include proposed materials, length, location, and elevation of pipe, fittings, pipe restraint, valves, and appurtenances.

PART 2–PRODUCTS

2.01 MATERIALS OF CONSTRUCTION

A. All materials used in the manufacture, assembly, and painting of piping and valves in contact with water shall be compatible with potable water supplies and in contact with chemical feed systems shall be compatible with the chemicals being used. All glues, solvents, solders, etc., shall likewise be compatible. For instance, no lead-base solders shall be used. All materials in contact with water to be used for potable water supplies shall be National Sanitation Foundation (NSF)-approved.

B. Size and Type:
   1. All materials shall conform to the size and type shown on the Drawings or called for in the specifications.
   2. In joining two dissimilar types of pipe, standard fittings shall be used when available. In the event standard fittings are not available, the method of joining shall be standard selected by CONTRACTOR and submitted for review by ENGINEER.

C. Materials provided shall be suitable for the conditions in which they are being installed and used. CONTRACTOR shall review installation requirements of the Contract with material

suppliers and incorporate any additional installation requirements necessary to meet the required use within the price bid for the Work.

D. All pipe and materials used in performance of the Work shall be clearly marked as to strength, class, or grade. Pipe and materials not so marked shall be subject to rejection.

E. When requested by ENGINEER, material suppliers shall furnish certificates of compliance indicating that all tests required by various Standards have been conducted and that the test results comply with the Standards.

F. Piping appurtenances shall be made of the materials specified. All appurtenances not designated as to type shall be selected by CONTRACTOR and submitted for review by ENGINEER.

2.02 MANHOLES AND UNDERGROUND UTILITY STRUCTURES

A. Valve Boxes:
   1. A valve box shall be provided for fire hydrant auxiliary valves and for valves in the main. The valve box shall be centered and plumb over the wrench nut of the valve with the box cover flush with the finished ground elevation. Solid 4-inch concrete blocks shall be placed under the base of valve boxes so that the bottom of the base is about 2 inches away from contact with the valve bonnet. A Gate Valve Adaptor by Adaptor Inc., or equal, shall be provided. The valve box shall not transmit shock or stress to the valve.
   2. Valve boxes shall be made of cast iron conforming to ASTM A48. The castings shall be free from blowholes, porosity, hard spots, shrinkage defects or cracks, or other injurious defects and shall have a normal smooth casting finish. The castings shall be thoroughly coated with a 1 mil minimum thickness bituminous coating. Valve boxes shall be 5 1/4 inches in diameter. Valve boxes shall have a maximum length of 4 feet when extended without extension sections. Extensions shall be provided for deeper mains.
   3. Valve boxes shall consist of a base section, tubular mid and top sections, both with cast threads by which one can be telescoped on the other, extension sections if required, and a circular drop cover.
   4. Valve boxes shall be installed in accordance with Drawing 01-975-64A.
   5. Valve boxes shall be Tyler/Union 6850 Series, 4 inches through 12 inches, or equal. Extension heights shall be provided as required. Lids shall be marked for appropriate use. CONTRACTOR shall verify that all valve boxes are large enough to accommodate all operating nuts and wrenches.

2.03 BURIED PIPING

A. Ductile Iron Piping and Fittings:
   1. Unless otherwise shown or specified, all underground piping 3 inches in diameter or larger shall be ductile iron conforming to AWWA C151/A21.51 with mechanical joints or push-on joints. Unless otherwise shown or specified, all piping shall be minimum Special Thickness Class 52 with a water hammer allowance of 100 psi. Additional pipe wall thickness shall be furnished as required by AWWA C150 for buried piping with the depth of cover as shown on the Drawings when using laying condition 4 of AWWA C600 or the Class C Bedding Detail as shown on Drawing 01-975-43A.
   2. Except as otherwise specified, underground pipe shall have mechanical joints or push-on joints conforming to AWWA C110 and C111, as well as AWWA C153 (compact), with vulcanized styrene butadiene rubber gaskets conforming to AWWA C111. Gaskets that include metal locking segments vulcanized into the gasket to grip the pipe and provide joint restraint are not acceptable. Bolts on mechanical joints shall be

ASTM A242 high-strength low-alloy steel, conforming to AWWA C111 and ANSI A21.11. Certificate to that effect shall be provided.

3. For ductile iron pipe systems requiring pressure testing, restrained joints shall be provided in accordance with Part 3–Execution. Mechanical joints shall be restrained with MEGALUG® Series 1100 or 1100 SD, by EBAA Iron Sales, Inc., UNIFLANGE Series 1400 by Ford Meter Box Co., Inc., or equal, restraint. Push-on joints for ductile iron piping shall be restrained with MEGALUG® Series 1700 or 1100 HD, by EBAA Iron Sales, Inc., UNIFLANGE Series 1450 by Ford Meter Box Co., Inc., Flex-Ring or Lok-Ring by American Cast Iron Pipe Company, TR Flex by U.S. Pipe Company, or equal.
    a. Pipe restraint fittings shall be provided as follows:
        (1) For ductile iron pipe with ductile iron mechanical joints MEGALUG® Series 1100 or 1100SD by EBAA Iron Sales, Inc.; Series D SLDE or SSLD by Sigma; Series 3000 or 3000S by Star Pipe Products; or equal.
        (2) For ductile iron pipe with ductile iron push on joints MEGALUG® Series 1100HD or 1700 by EBAA Iron Sales, Inc; Series SLDEH or SSLDH by Sigma; Series 3100P or 3100S by Star Pipe Products; Flex Ring or Lok Ring by American Cast Iron Pipe Company; TR Flex by U.S. Pipe Company; or equal.
        (3) For PVC pipe with ductile iron mechanical joint fittings–MEGALUG® Series 2000 PV, 1100SV, or 2000SV by EBAA Iron Sales, Inc.; Series D SLCE or PVM by Sigma; Series 1000C or 4000 by Star Pipe Products; or equal.
        (4) For PVC pipe with PVC push on joints (not solvent welded)–MEGALUG® Series 1100HV, 1900, or 2800 by EBAA Iron Sales, Inc.; Series SLCEH, PWP (greater than 12-inch only), or D PWP (12 inches or less) by Sigma; Series 4100P by Star Pipe Products; or equal.
    b. Gland body, wedges, and wedge actuating components shall be ductile iron conforming to ASTM A536 Grade 65 45 12. Bolts and tie rods shall be high strength low alloy steel conforming to AWWA C111.
    c. Gaskets that include metal locking segments vulcanized into the gasket to grip the pipe to provide joint restraint are not acceptable.
4. Underground pipe shall have mechanical joint or push-on joint ductile iron fittings conforming to AWWA C110 and C111 or AWWA C153 compact fittings with a minimum rated working pressure of 150 psi. Gaskets for fittings shall be as specified for underground piping.
5. Ductile iron wall pipes shall be provided as shown on the Drawings. For piping over 24 inches that does not require restraints, wall pipes shall be provided with push-on joint connection at exterior end of wall pipe. For piping over 24 inches that requires restraint, wall pipes shall be provided with Flex Ring or Lok Ring by American Ductile Iron Pipe Company, TR Flex by U.S. Pipe Company, or equal, connection. For piping over 24 inches, wall pipes may also be provided with mechanical joint connection at exterior end of wall pipe. For piping that requires restraint, mechanical joint connections at exterior end of wall pipe shall be restrained as specified for mechanical joints.
6. For potable water systems, the outside pipe coating shall comply with AWWA C151. Lining and coatings shall be suitable with potable water systems. The asphaltic coating shall be applied over the cement lining on the inside of the pipe and directly on the outside of the pipe. The coatings shall be smooth and impervious to water without any tendency to scale off.
7. All buried ductile iron piping and appurtenances shall be polyethylene encased in accordance with AWWA C105. Polyethylene encasement shall be Class C (carbon black) and shall be minimum 8 mil thickness. Tape for securing the film shall be a thermoplastic material with a pressure sensitive adhesive face capable of bonding to

metal, asphaltic coating, and polyethylene. Tape shall have a minimum thickness of 8 mils and a minimum width of 1 inch. The polyethylene film envelope shall be as free as is commercially possible of gels, streaks, pinholes, particles of foreign matter, and undispersed raw materials. There shall be no other visible defect, such as holes, tears, blisters, or thinning out at folds.

B. PVC Pipe (AWWA) and PVC Pressure Pipe Fittings (4 Inches and Larger):
   1. PVC water main shall be AWWA PVC pressure-rated pipe and shall conform to the requirements of AWWA C900 for pipe from 4 inches to 60 inches. Pipe shall be furnished with integral elastomeric bell and spigot joints.
   2. PVC pipe diameter shall conform to ductile iron pipe sizes (DIPS). The type of PVC material, nominal pipe size, standard dimension ratio, and pressure class shall be not less than pressure class 235 and not greater than pipe dimension ratio 18.
   3. Markings on pipe shall include the following: Nominal pipe size, type of plastic pipe material, DR number, AWWA Designation with which the pipe complies, manufacturer's name, and the seal or mark of the laboratory making the evaluation of the suitability of the pipe for transport of potable water.
   4. All fittings for PVC pressure pipe shall be iron pipe fittings as specified herein.
   5. Provide tracer wire for underground PVC piping as specified herein, unless otherwise noted.

C. Tracer Wire:
   1. Provide minimum 10-gauge solid insulated copper tracer wire with buried thermoplastic pressurized pipe. Wire shall be continuous, terminate, and be accessible at valve boxes, manholes, fire hydrants, or at test stations as specified below. Tracer wire shall be located 12 inches above the top of the pipe. Any splices in copper wire shall be made with a 3M™ DBR/Y-6 splice kit, or equal.
   2. Tracer wire test stations shall be SnakePit magnetized tracer boxes by Copperhead Industries, or equal. Tracer box shall be corrosion-resistant brass wire lugs and wax pad to cover wire connection. Cover shall be color-coded according to APWA standards for fluid conveyed. Provide SnakePit Lite Duty Box in unpaved areas and Roadway Box in paved areas. Provide Rhino Triview Marker Posts, or equal, at all test stations. Provide custom decals to identify fluid in piping. The tracer wire shall be accessible at a minimum of every 500 feet along the pipeline and at horizontal bends in piping. The tracer wire shall run into and up the sides of all manholes and be secured near the casting. Test stations shall be placed as required between manholes to comply with the minimum 500-foot tracer wire accessibility requirement.
   3. CONTRACTOR shall perform continuity testing of all tracer wire in the presence of OWNER.

2.04 VALVES (VALVES FOR UNDERGROUND SERVICE ARE SPECIFIED IN DIVISIONS 23 AND 40)

A. Gate Valves: Shutoff valves in cast or ductile iron lines containing wastewater and shutoff valves in potable and non-potable water lines 4-inch diameter and larger shall be AWWA C515, ductile iron AWWA C509, cast iron, resilient seat, nonrising stem, OS&Y (rising stem) for wastewater applications, 150 psi working pressure with O-ring packing box, Kennedy, American, American AVK, or equal.

2.05 FIRE HYDRANTS

A. Fire hydrants provided under these Standard Specifications shall conform to AWWA C502 for Dry Barrel Fire Hydrants. Hydrants shall have the following features:

Bury Length	Approximately 3 1/2 feet to traffic flange.
Nozzle Size	One 4 1/2-inch- and two 2 1/2-inch-diameter openings.
Nozzle Threads	National standard fire hose coupling screw threads.
Drain Port	Drain port at base of hydrant barrel. Plug drain port when hydrant installed in area where groundwater level may rise above drain port.
Size of Main Valve Opening	5 1/4-inch-diameter minimum. The hydrant lead connection shall be minimum 6-inch-diameter mechanical joint.
Torque Requirements	Hydrant shall comply with AWWA C502 even if greater than 5-foot bury.
Lubrication	Nontoxic and providing proper lubrication for a temperature range of -30°F to +120°F.

B. Hydrants shall have permanent markings identifying the manufacturer by name, initials, insignia, or abbreviations in common usage, and designating the size of the main valve opening and the year of manufacture. Markings shall be so placed as to be readily discernible and legible after hydrants have been installed.

C. CONTRACTOR shall furnish certification to ENGINEER that the hydrant and all material used in its construction conform to the applicable requirements of AWWA C502 and the supplementary requirements thereto.

D. All joints on fire hydrant leads shall be made using pipe restraint specified herein. Approximately 1/2 cubic yard of bedding stone shall be placed from the bottom of the trench around the hydrant elbow and up the hydrant barrel. Bedding stone shall be wrapped completely in filter fabric to prevent the in migration of fine materials.

E. CONTRACTOR shall furnish all necessary fittings in the fire hydrant lead to install the fire hydrant in a plumb condition at locations shown on the Drawings and at the specified depth of bury. The pumper nozzle of all fire hydrants shall be installed with the nozzle pointing toward the street. ENGINEER reserves the right to alter the location of fire hydrants from that shown on the Drawings.

F. Hydrants shall be installed as shown on Drawing 01-975-65A.

PART 3–EXECUTION

3.01 INSTALLATION

A. Underground Piping:
   1. Utility lines shall be laid and installed to the lines and grades specified with valves, fittings, manholes, and other appurtenances at the specified locations; spigots centered in bells; and all manholes and riser pipes plumb. Water main and force main shall be installed at the depth indicated. Water main, force main, and other pressure mains shall be installed to within (plus or minus) 0.1 foot of designed grades. Staking shall be completed in conformance with Division 01.
   2. Deviations Occasioned by Underground Facilities: Wherever significant obstructions not shown on the Drawings are encountered during the progress of the Work, CONTRACTOR shall proceed in accordance with the General Conditions to notify owners and protect the facilities. Existing items unnecessarily damaged during the performance of the Work shall be repaired and replaced at the expense of CONTRACTOR.

3. Prior to commencing pipe laying, CONTRACTOR shall notify ENGINEER of the intended date for starting Work. ENGINEER may request at CONTRACTOR's expense the removal and relaying of pipe which was installed prior to notification of ENGINEER.
   a. Proper implements, tools, and facilities shall be provided and used by CONTRACTOR for the safe and convenient prosecution of the Work. All pipe, fittings, and appurtenances shall be carefully lowered into the trench piece by piece with a crane, rope, or other suitable tools or equipment, in such manner as to prevent damage to materials. Under no circumstance shall pipe be dropped or rolled into the trench.
   b. Materials shall be as shown on the Drawings or as specified herein.
4. Material Inspection: CONTRACTOR shall inspect the pipe, fittings, and appurtenances for defects when delivered to the jobsite and prior to lowering into the trench. Defective material shall be removed from the jobsite. All material shall be clean and free of deleterious substances prior to use in the Work.
5. Except where noted or specified, all ductile iron underground piping shall be laid in accordance with AWWA C605 with the conditions that (a) blocking shall not be used to support pipe and (b) all bends and fittings shall be restrained as specified below, and pipe joints shall be restrained in all directions from all bends and fittings to the length as specified below.
6. Pipe Length:
   a. All existing joints exposed during construction that are to remain in place shall be restrained.
   b. The minimum length of pipe to be restrained shall be as shown in the following table, regardless of bury depth.
   c. This table assumes fitting orientation as noted, 200 psi test pressure, a 1.5 factor of safety, Type CL native soil backfill, standard bedding, compaction of backfill at 80% standard proctor, AASHTO T-99 (Type 4 trench condition), and a 5-foot bury. Lengths shall be adjusted for other conditions and fittings. For other fittings and for more specific requirements, see the Drawings:

REQUIRED JOINT RESTRAINT DISTANCE FROM FITTINGS (FT)

Ductile Iron Pipe						
Bends, Valves, Dead Ends, and Hydrant Leads	4-IN	6-IN	8-IN	10-IN	12-IN	16-IN
Horizontal 90-Degree Bend (restrain both sides)	11	15	20	23	28	36
Horizontal 45-Degree Bend (restrain both sides)	10	10	10	10	12	15
Horizontal 22 1/2-Degree Bend (restrain both sides)	10	10	10	10	10	10
Horizontal 11 1/4-Degree Bend (restrain both sides)	5	5	5	5	5	5
*Vertical 45-Degree Bend (upper and lower bend distance)	10	14	19	23	27	35
*Vertical 22 1/2-Degree Bend (upper and lower bend distance)	5	7	9	11	13	17
*Vertical 11 1/4-Degree Bend (upper and lower bend distance)	5	5	5	6	7	9
Valve or Dead End	18	25	33	40	48	62
Fire Hydrant Leads	Restrain All Joints					

Tee Run Dimension						
Tees and Reducers	4-IN	6-IN	8-IN	10-IN	12-IN	16-IN
**Tee 6-Inch Branch (branch restrain length)		5	5	5	5	5
**Tee 8-Inch Branch (branch restrain length)			10	5	5	5
**Tee 10-Inch Branch (branch restrain length)				17	12	5
**Tee 12-Inch Branch (branch restrain length)					24	16
**Tee 16-Inch Branch (branch restrain length)						45
Reduce to 4 Inches (larger side restrain length)		13	24	33		
Reduce to 6 Inches (larger side restrain length)			14	25	35	
Reduce to 8 Inches (larger side restrain length)				14	26	46
Reduce to 10 Inches (larger side restrain length)					14	37
Reduce to 12 Inches (larger side restrain length)						27
*Restrain all fittings between the start and end of the offset and on the mainline as shown in the table. **Minimum 8-foot restrain run on each side of the tee.						

REQUIRED JOINT RESTRAINT DISTANCE FROM FITTINGS (FT)

Ductile Iron Pipe with Polyethylene Wrap						
Bends, Valves, Dead Ends, and Hydrant Leads	4-IN	6-IN	8-IN	10-IN	12-IN	16-IN
Horizontal 90-Degree Bend (restrain both sides)	14	19	25	30	36	46
Horizontal 45-Degree Bend (restrain both sides)	6	8	11	13	15	19
Horizontal 22 1/2-Degree Bend (restrain both sides)	5	5	5	6	8	10
Horizontal 11 1/4-Degree Bend (restrain both sides)	5	5	5	5	5	5
*Vertical 45-Degree Bend (upper and lower bend distance)	22	31	41	49	58	75
*Vertical 22 1/2-Degree Bend (upper and lower bend distance)	11	15	20	24	28	36
*Vertical 11 1/4-Degree Bend (upper and lower bend distance)	6	8	10	12	14	18
Valve or Dead End	53	74	97	117	139	179
Fire Hydrant Leads	Restrain All Joints					

Tee Run Dimension **OR** Larger End of Reducer Dimension						
Tees and Reducers	4-IN	6-IN	8-IN	10-IN	12-IN	16-IN
**Tee 6-Inch Branch (branch restrain length)		5	5	5	5	5
**Tee 8-Inch Branch (branch restrain length)			28	10	5	5

Tee Run Dimension **OR** Larger End of Reducer Dimension						
Tees and Reducers	4-IN	6-IN	8-IN	10-IN	12-IN	16-IN
**Tee 10-Inch Branch (branch restrain length)				47	34	5
**Tee 12-Inch Branch (branch restrain length)					69	45
**Tee 16-Inch Branch (branch restrain length)						109
Reduce to 4 Inches (larger side restrain length)		38	70	120		
Reduce to 6 Inches (larger side restrain length)			41	72	101	
Reduce to 8 Inches (larger side restrain length)				40	74	131
Reduce to 10 Inches (larger side restrain length)					41	106
Reduce to 12 Inches (larger side restrain length)						76
*Restrain all fittings between the start and end of the offset and on the mainline as shown in the table. **Minimum 8-foot restrain run on each side of the tee.						

REQUIRED JOINT RESTRAINT DISTANCE FROM FITTINGS (FT)

PVC C-900 Pipe						
Bends, Valves, Dead Ends, and Hydrant Leads	4-IN	6-IN	8-IN	10-IN	12-IN	16-IN
Horizontal 90-Degree Bend (restrain both sides)	14	19	25	30	36	46
Horizontal 45-Degree Bend (restrain both sides)	6	8	11	13	15	19
Horizontal 22 1/2-Degree Bend (restrain both sides)	5	5	5	6	8	10
Horizontal 11 1/4-Degree Bend (restrain both sides)	5	5	5	5	5	5
*Vertical 45-Degree Bend (upper and lower bend distance)	22	31	41	49	58	75
*Vertical 22 1/2-Degree Bend (upper and lower bend distance)	11	15	20	24	28	36
*Vertical 11 1/4-Degree Bend (upper and lower bend distance)	6	10	10	12	14	18
Valve or Dead End	53	74	97	117	139	179
Fire Hydrant Leads	Restrain All Joints					

Tee Run Dimension						
Tees and Reducers	4-IN	6-IN	8-IN	10-IN	12-IN	16-IN
**Tee 6-Inch Branch (branch restrain length)		5	5	5	5	5
**Tee 8-Inch Branch (branch restrain length)			28	10	5	5
**Tee 10-Inch Branch (branch restrain length)				47	34	5
**Tee 12-Inch Branch (branch restrain length)					69	45
**Tee 16-Inch Branch (branch restrain length)						109

Tee Run Dimension						
Tees and Reducers	4-IN	6-IN	8-IN	10-IN	12-IN	16-IN
Reduce to 4 Inches (larger side restrain length)		38	70	95		
Reduce to 6 Inches (larger side restrain length)			41	72	101	
Reduce to 8 Inches (larger side restrain length)				40	74	131
Reduce to 10 Inches (larger side restrain length)					41	106
Reduce to 12 Inches (larger side restrain length)						76
*Restrain all fittings between the start and end of the offset and on the mainline as shown in the table. **Minimum 8-foot restrain run on each side of the tee.						

6. For restrained pipe joints, all underground ductile iron pipe joints (except for the branch of tees and dead ends) shall be restrained to the length listed below in all directions from all bends and fittings. The branch of tees shall be restrained to three times the length listed below. Dead ends shall be restrained to 3.5 times the length listed below. All joints on yard and fire hydrant leads shall be restrained. Where wall penetrations occur at less than the length indicated below, the wall fittings shall also be restrained. Additional restraint shall be provided inside of structures as required.

MINIMUM LENGTH (IN FEET)
RESTRAINED PIPE FROM BENDS OR FROM BENDS OR FITTINGS
(POLYWRAPPED AND MINIMUM 3 FEET BURY DEPTH)

	Test Pressure, psi				
	10	25	50	100	150
Pipe Size, Inches					
3 to 12	5	18	18	36	36
14 to 18	5	18	18	36	54
20 to 24	5	18	36	54	72
30	10	18	36	72	90
36	10	18	36	72	
42	10	36	54	90	
48	10	36	54	90	

7. Force main and water main shall be installed in accordance with AWWA C600 for iron pipe, AWWA C605 for PVC pipe, and AWWA M55 for HDPE pipe. All plugs, caps, tees, hydrants, bends, and other fittings for water mains and force mains shall be provided with restrained joints.
8. Any pipe or fittings cracked in cutting or handling or otherwise not free from defects shall not be used. Pipe must be kept clean of mortar, cement, clay, sand, or other material. When PVC piping is installed during hot weather, it shall be laid in the trench with slack or permitted to cool to ground temperature before it is cut to length for making final connections. PVC expansion joints shall be provided where needed.
9. At times when pipe laying is not in progress, the open ends of pipe shall be closed with plugs to prevent the entry of foreign material. Acceptable plugs include Foreman Nite Caps by APS, mechanical joint cap or plug, bladder plug, or test plug. All foreign material shall be removed from the pipe prior to acceptance.
10. The locations and elevations of existing piping and manholes are approximate. Where necessary, existing piping shall be exposed by CONTRACTOR to confirm location and

elevation before installing new piping. Any changes in pipe location or elevation shall be approved by OWNER.

11. Valve Boxes: The valve box shall be centered and plumb over the wrench nut of the valve with the box cover flush with the finished ground elevation. Solid 4-inch concrete blocks shall be placed under the base of valve boxes so that the bottom of the base is about 2 inches away from contact with the valve bonnet. The valve box shall not transmit shock or stress to the valve.
12. Yard Hydrants: Yard hydrants shall be set on a slab of concrete at least 1 cubic foot in size and against a 3-cubic-foot minimum concrete brace laying against undisturbed earth. Backfill at base of hydrant shall be 1 cubic yard of coarse gravel. It shall be the responsibility of CONTRACTOR to set the hydrants at to the proper grade. Extensions or fittings shall be provided as required.

3.02 FIELD QUALITY CONTROL

A. CONTRACTOR shall include the cost of all televising, testing, cleaning, and disinfection in the price bid.

B. Work shall be tested as specified in this section. Unless indicated in writing before testing begins, tests shall be witnessed by ENGINEER and others as necessary. Test results shall be recorded, and reports or appropriate certificates shall be submitted to ENGINEER in triplicate.

C. New piping shall be tested. Prior to conducting the pressure and leakage test, CONTRACTOR shall backfill the trench for its full depth. All bends and special connections to the main shall be adequately blocked and tied prior to the test. Any damage caused to the main or its appurtenances during performance of these tests shall be corrected by CONTRACTOR at its expense. Should underground piping fail test, CONTRACTOR shall be responsible for removal and replacement of backfill, and relay new pipe if necessary, to repair the defective pipe. Under no circumstances shall defects be sealed from the interior of the pipe, and only where specifically allowed by ENGINEER, shall defects be sealed from the exterior of the pipe. Piping, interior or exposed, shall be subject to test before being covered with insulation or paint. Piping and appurtenances shall be watertight or airtight and free from visible leaks.

D. Piping shall be flushed or blown out after installation prior to testing. CONTRACTOR shall provide all necessary piping connections, water, air, test pumping equipment, water meter, bulkheads, valves, pressure gauge and other equipment, materials, and facilities necessary to complete the specified tests. CONTRACTOR shall provide all temporary sectionalizing devices and vents for testing.

E. Pressure Tests:
1. Pressure tests shall be performed as required by AWWA C600 and AWWA C605, unless otherwise noted herein.
2. When test medium for piping is water, all air shall be removed from piping by flushing, opening vents, loosening flanges, utilizing equipment vents and/or installation of corporations at high points in system. Test pumping equipment used shall be centrifugal pumps or other pumping equipment that will not place shock pressures on the main. Power plunger pumps will not be permitted for use on closed pipe systems. Pumps shall be disconnected during test periods. Presence or absence of air will be determined during pressurization of the piping system.
3. The test pressure in all lines shall be held for two hours, during which time the leakage allowance shall not exceed that specified. In case repairs are required, the pressure test

shall be repeated until the pipeline installation conforms to the specified requirements. Pumps, air compressors, instrumentation, and similar equipment shall not be subjected to the pressure tests.

4. During performance of the hydrostatic pressure test, water main shall be subjected to a minimum pressure of at least 50% above normal working pressure with a minimum pressure 125 psi. Force main shall be tested to 200% of normal operating pressure in the main, but to no more than the pressure rating of the pipe.
5. CONTRACTOR shall keep a record of all tests performed. These records shall show the individual lengths of main tested and test results.
6. Where connections are made to existing mains, it shall be the responsibility of CONTRACTOR to provide the necessary hydrostatic tests on all new mains installed. This may necessitate, but is not limited to, the installation of temporary valves and restraint to isolate the new system from the existing system. All materials, Work, and equipment necessary for this Work shall be furnished by CONTRACTOR at its expense.
7. All testing of pipelines shall proceed concurrently with installation. CONTRACTOR is encouraged to conduct daily preliminary testing of its Work.
8. Water from disinfection testing shall not be discharged to a stream, creek, river, storm sewer tributary thereto, or to a navigable water without first neutralizing the chlorine residual in the water and complying with local, state, and federal laws thereto.
9. Gauges used for testing shall have increments as follows:
    a. Tests requiring a pressure of 10 psi or less shall use a testing gauge having increments of 0.10 psi or less.
    b. Tests requiring a pressure of greater than 10 psi by less than or equal to 100 psi shall use a testing gauge having increments of 1 psi or less.
    c. Tests requiring a pressure of greater than 100 psi shall use a testing gauge having increments of 2 psi or less.

F. Prior to making final connection between new and existing piping, new piping shall be tested as specified above.

3.03 DISINFECTION

A. CONTRACTOR shall disinfect and flush the potable water system before it is put online. Water main shall be disinfected according to AWWA C651.

B. In accordance with the requirements of AWWA C651, at least one set of samples shall be collected from every 1,200 feet of new water main, plus one set from the end of the line and at least one set from each branch.

C. CONTRACTOR shall obtain water samples and arrange for analysis of water in potable systems for bacteria in accordance with Option A of Section 5.1 of AWWA C651. Copies of test results shall be submitted to OWNER and ENGINEER.

D. CONTRACTOR shall furnish all water and other materials, equipment, and labor necessary to disinfect all new water mains and all existing water mains disturbed by construction. CONTRACTOR shall notify OWNER to observe disinfection test and shall coordinate and bear cost for necessary laboratory testing and shall provide safe bacteriological sample results to OWNER prior to placing the water main in service. Sampling and testing shall be scheduled to complete the Work within the Contract Times. Items of material for testing shall be furnished in the size and quantity necessary to properly complete the test. Interruption or delay of CONTRACTOR’s Work progress caused by testing and sampling shall not be cause for extra payment under the Contract nor shall they be cause for extension of Contract Time.

3.04 CLEANING

A. All equipment and materials shall be clean before installation.

B. Upon completion of the work, all improvements disturbed by CONTRACTOR's operations shall be repaired or replaced. Broken concrete, rubble fill, and other excess material shall be removed from the site and wasted.

C. All waste disposal areas and all areas used for the storage of materials or the temporary deposit of excavated earth shall be leveled off, cleaned up, and returned to condition that existed prior to construction. All surplus material, tools, and equipment shall be removed, and the premises shall be left free of everything of the kind.

D. All pipes and manholes shall be flushed until clean, and all debris and mud shall be removed.

END OF SECTION

SECTION 33 12 33

ABOVE GROUND PACKAGED WATER BOOSTER PUMPING STATION–EASTERN BPS

PART 1–GENERAL

1.01 SUMMARY

A. The booster pumping station manufacturer shall design, construct, and deliver one above ground booster pumping station as shown on the Drawings and specified herein. The booster pumping station manufacturer shall manufacture the complete factory built above ground booster pumping station and deliver the completed booster pumping station to the site. The completed booster station shall be fully assembled, in one piece when delivered, including all necessary internal piping, valves, fittings, supports, control valves, pumps, motors, controls, non-automatic transfer switch, and other necessary appurtenances and after offloading and placement on the concrete foundation, require only pipeline connections, drain connections, power connections, telemetry interface, and termination onsite to complete the installation of the booster pumping station.

B. The station shall be complete when delivered and will not require internal CONTRACTOR construction, except to install the power service through the service conduit provided for that purpose and to connect the main water service to the required points, and other work as may be listed in the section for CONTRACTOR's installation requirements.

C. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 MANUFACTURER'S RESPONSIBILITIES

A. Design liability for the performance of the booster pumping station and controls as specified herein shall remain with the booster station manufacturer. It is the responsibility of the booster station manufacturer to fully understand the application as specified herein, and to design and build the booster pumping station to an acceptable quality standard, to perform as required by OWNER.

B. The booster pumping station manufacturer shall be responsible for visiting the site so as to be aware of, and plan for, any unusual conditions that could influence the design and construction of the station. Failure to understand conditions of the site limitations and site access will not alleviate the booster station manufacturer from the responsibility to design and deliver, as specified, the equipment as detailed herein.

1.03 COMPONENT SELECTION

A. Within these Specifications certain components are identified by manufacturer's name, or the product name and model number and not followed by "or equal." There will be no substitutions allowed for these named components. These are components of known quality level and serviceability and their use is to the benefit of OWNER.

1.04 PROVISIONS FOR ALTERNATE COMPONENT MANUFACTURERS

A. Where in these Specifications component manufacturers, software, or communication protocols are named, followed by “or equal,” those manufacturer’s materials, components, software, and communication protocols are readily available, non-proprietary in distribution, of known quality and performance, and establish the minimum acceptable level of quality for this project.

B. Provision is made herein for approval by OWNER of alternate manufacturers for the components, software, or communication protocols named herein which are followed by “or equal.” No alternate component manufacturer or software, proprietary in distribution, or communication protocol, of lower in quality will be considered.

1.05 SUBMITTALS

A. Submittals for motors associated with equipment specified in this section shall include data sheets from the motor manufacturer. Data sheets from the equipment manufacturer or supplier are not acceptable.

B. Equipment submittals shall be submitted electronically. The submittals shall contain a minimum of two full size drawings, size 34-inch by 22-inch, one each covering the booster pump station and the electrical control schematic. The booster pump station drawing shall be specific to this project, and in at least three different views, be to scale, and illustrate the National Electrical Code (NEC) clearances according to Section 110-26 of the NEC. The submittal shall be complete with data sheets covering all individual components that make up the booster pump station and the UL file number under which the manufacturer is listed, service department personnel statement as detailed in the Specifications, and be complete with the manufacturer’s formal warranty policy. The submittal shall be complete with a full-size photocopy of the manufacturer’s combination UL/manufacturer logo Packaged Pumping Systems label.

C. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

1.06 PROJECT COORDINATION

A. Coordination with OWNER: OWNER reserves the right to dictate the sequence and order of manufacture, delivery, and construction of the booster pumping station. Based on weather conditions and other factors that might legitimately affect the installing contractors scheduling, the manufacturer may be required to hold the station deliveries up to 90 days. In doing so, the equipment manufacturer may submit a pay request for the cost of the stored materials along with any insurance or other documentation required by the General Conditions.

B. Coordination with the Instrumentation Contractor/Supplier: Coordination with the Section 26 09 00–Controls and Instrumentation instrumentation integrator/supplier and design of the telemetry interface shall be an essential part of the requirement of the booster station manufacturer. One or several coordination meetings may be required to make sure the interface between the booster pumping station and the instrumentation is seamless. Failure to consider and account for this expected need for coordination and interfacing, as a cost factor, will not be accepted as a reason for a request for extra monies or failure to complete the project as required.

C. Coordination of Start-Up and Training Services:
   1. The coordination of equipment start-up, operator training, and follow-up operational check out site visits will be dictated by OWNER. Proper notice for the start-up and initiation activities shall be provided by OWNER so all parties have the proper personnel and equipment in place for a coordinated start-up of each piece of equipment.
   2. As is stated in the "Factory Start-Up" section of this Specification, start-up of the manufacturer's equipment shall be done only by factory personnel, who are direct employees of the manufacturer of record and who can demonstrate good and proper training and experience and who have been an employee of the manufacturer in a service capacity for at least two years. An affidavit to this effect is required; see Submittal with Bids section.
   3. Third party contractors or the personnel of a representative of the manufacturer will not be acceptable for doing the tasks involved in starting up and servicing the manufacturer's equipment. The failure of competent factory start-up and service personnel completing the required tasks on a timely basis gives rise to intolerable disputes and differences that are not in OWNER's best interest.

1.07 FACTORY INSPECTION

A. At the option of OWNER, its representative shall visit the station manufacturer's factory site to observe the finished booster station and controls for conformance to aspects of the Specification. The station manufacturer shall be required to assemble or disassemble certain portions of the finished station to reveal conformance. The station manufacturer shall notify OWNER a minimum of two weeks prior to factory completion of the station so the observation trip can be scheduled. Shipment of the station may not be allowed until the observation is completed and the equipment is acceptable for shipment. Review by OWNER or its representative does not relieve the booster station manufacturer of full responsibility for the design, manufacture, and construction of the booster pumping station as detailed herein.

1.08 SHIPMENT AND DELIVERY

A. The booster pumping station manufacturer shall be required to deliver the booster pumping station completed and undamaged by the manufacturer's carrier to the site fully assembled and ready for the power, telemetry, and electrical service connections, inlet, outlet, and drain piping connections.

1.09 QUALITY ASSURANCE

A. The equipment and materials covered by these Specifications are intended to be standard equipment of proven reliability and as manufactured by reputable manufacturers having experience in the production of such equipment. The equipment furnished shall be designed, manufactured, installed, and constructed in accordance with the best practices and methods and shall operate to OWNER's satisfaction.

B. The manufacturer of the specified equipment shall be a business regularly engaged in the manufacture, assembly, construction, start-up, and maintenance of water distribution equipment of the type required for this project. The manufacturer shall have at least 10 years of successful experience in providing stations, software, and controls of the type, design, function, and quality as required for this project to the municipal potable water market.

C. Welder's Certificates: Certify welders employed on the work, verifying AWS qualification within the previous 12 months.

D. Registered Professional Engineer Review: The base substructure, building and the bridge crane system and the means of attaching the building to the foundation shall be reviewed and stamped by a Registered Professional Engineer in the Commonwealth of Kentucky.

E. Pipe Welding:
   1. All pipe welds shall be performed by certified welders employed by the pump station manufacturer. As part of the equipment submittal, the pump station manufacturer shall provide copies of the welding certificates of the employees who are to perform the pipe welds.
   2. Shop welders shall be certified in accordance with ASME BPVC Section IX or AWS D1.1. Certification shall be done by an independent testing laboratory giving certification for the weld positions for which the tests were performed.

1.10 STATION CERTIFICATION AND COMPLIANCE

A. The station manufacturer shall be required to affix to the finished station an Underwriter's Laboratories (UL) label indicating compliance of the assembled equipment within the Packaged Pumping Systems to UL Listing Category QCZJ. This label shall be inclusive of the entire station with enclosure so as to demonstrate compliance with the National Electrical Code requirements for working clearances and wiring procedures. Equipment manufactured without this third party certification or equipment manufactured by an outside source of "brokered equipment" defined as systems not assembled on the premises of the named manufacture by that company's employees will not be allowed.

1.11 KENTUCKY BUILDING AUTHORITY APPROVAL

A. By Kentucky Commonwealth Law, all Modular Buildings Manufactured in or imported into the state must have Model Plan Approval by the Kentucky Office of Housing, Buildings & Construction (State Fire Marshal) as administered by the Kentucky Industrialized Building System (K.I.B.S.) Program. An authorized Manufacturer will have an assigned KIBS Factory Number, and each unit will bear a serialized label certifying it is "In Compliance with the Standards Adopted by the Authority of the 2002 Kentucky Residential Code or the 2018 Kentucky Building Code". The pump station Manufacturer will be required to provide the assigned KIBS Factory Number, and the Serial Number for each label which will be attached to the Modular Station. Stations lacking this serialized label at time of delivery will not be accepted.

1.12 WARRANTY

A. Extended Warranty: Manufacturer shall warrant equipment and appurtenances for a period identified in the following table from the earlier of either the date established for partial utilization in accordance with GC15.03 and 15.04, as modified in the Supplementary Conditions, or Substantial Completion of the project. Warranty shall be nonprorated, include all parts and labor, and be in written form. Warranty shall specifically exclude buyer's indemnification language. Warranty language shall not eliminate manufacturer's responsibility for sizing of the equipment. During warranty period, manufacturer shall be responsible for any travel expenses, outside contractor fees, and rental equipment fees associated with providing warranty service. Warranty shall not exclude normal wear items. Manufacturer shall pay expenses incurred for repairs and parts

replacement not made by manufacturer if manufacturer's response is not within 72 hours of notification by OWNER. Warranty language shall be provided with the shop drawings.

Item	Years
Building (2.05)	10
Vinyl Siding (2.12)	50
Station	2

PART 2–PRODUCTS

2.01 MANUFACTURERS

A. This listed equipment is part of the Base Bid as indicated on the Bid pages and will be considered as establishing the type, function, appearance, and quality required, as defined in the General Conditions.

B. The Drawings and Specifications were prepared based on EFI-Solutions, Inc. CONTRACTOR shall include in the Bid and shall be responsible for the cost of any changes, including engineering changes, to accommodate the other Base Bid equipment including but not limited to structural, mechanical, and electrical work.

2.02 BUILDING DESIGN CRITERIA

A. The station building enclosure shall be a factory assembled, modular structure of one compartment attached to the station base structure and requiring no additional assembly at the job site.

B. The building design criteria shall be:
1. To withstand snow load based on ASCE 7-05 Ground Snow Loads for the state and county of installation.
2. To withstand wind loads based on ASCE 7-10 for wind speeds.
3. Be designed for site specific seismic requirements based on local conditions as dictated by the Available Ground Motion Parameters according to ASCE 7 and IBC established by zip code and a live floor load of 125 PSF.

C. The modular building enclosing the station is shown at its minimum size so that National Standards mandated clearances are maintained above, below and around equipment for proper servicing, removal, and reinstallation of this equipment.

D. The building specified shall be of the size shown on the Drawings. Building sizes less than those shown will not be allowed.

2.03 BUILDING CONSTRUCTION

A. The materials specified are specifically chosen to be resistant to moisture degradation and infestation and to be maintainable.

B. Insulation values for the walls and roof structure shall be a minimum R-21 in the walls and the roof. Insulation within the roof and wall panels shall be foam-in-place polyurethane material applied between the interior and exterior sheathing forming a closed cell bounded by the steel framing. The insulation shall have a minimum density of 2.2 lbs/cu. ft. nominal

and shall be applied to the thickness required to provide a minimum R value of 21. The insulation shall have an ASTM E84 flame spread index of <10 and smoke developed of <195.

C. Building framing materials shall comply with the A.I.S.I. Specification for the Design of Cold-formed Steel Structural Members and to Standards ASTM C955, ASTM C1007, ASTM C645, ASTM C754 and ICBO 4782P. and 4784P. A framing design incorporating the members covered by the listed specifications and standards shall develop a structure meeting or exceeding the building design criteria listed previously.

D. Metal-clad, foam insulated panels or SIPS will not be allowed.

E. The building structure shall be fabricated using steel C-studs as wall framing members and C-joists for roof support. The size, placement and spacing of studs and joists shall be in accordance with the design criteria and material standards. The wall C-studs shall be a minimum 2-inch by 3 5/8-inch size of 16-gauge material minimum. The roof C-joists shall be a minimum 1 5/8-inch by 8-inch size of 16-gauge material minimum.

F. The exterior wall sheathing shall be 1" thick, 15 psi polystyrene foam board insulation with an R-5 insulative value.

G. The exterior roof sheathing shall be 5/8 inch thick, exterior, CDX grade plywood.

H. The interior wall and ceiling sheathing shall be 3/4 inch thick, exterior, CDX grade plywood.

I. All interior wall and ceiling surfaces shall be covered with .090 inch thick fiberglass reinforced plastic (FRP) sheeting of pebble grain, gloss, white finish. The individual wall faces shall be covered with one continuous sheet. The FRP sheets shall be glued to the gypsum sheathing requiring no fasteners. Corner moldings of like FRP material shall be installed and finished in a workmanlike manner.

J. Openings in the sidewalls and/or roof shall be as shown and be fully framed out and supported using single or multiple framing members to support and fasten those devices or equipment items requiring a framed opening, these being access hatches, HVAC equipment, pipe passages, conduit passages, door and window openings and other special purpose openings as might be shown and required. The attaching of devices or equipment to the building at a framed opening shall be done fully according to the device manufacturers mounting instructions.

2.04 HEAVY DUTY STEEL DOORS

A. Doors, single and double leaf and of the size shown, are manufactured of 18-gauge galvannealed steel. All doors shall be full flush construction and 1 3/4 inches thick. Doors shall be reinforced, stiffened, insulated, and sound deadened with a solid polystyrene foam board permanently bonded to the inside of each face skin. The lock and hinge edge of each door shall be welded with a center hairline seam the full height of the door. The lock edge shall be reinforced full height by a 14-gauge continuous one-piece channel extruded templating. The hinge edge shall be reinforced full height by a 14-gauge continuous one-piece channel, formed and tapped for hinges. Top and bottom of the door shall be closed with 16-gauge channels. Doors shall be thoroughly cleaned and receive an iron phosphate treatment prior to receiving one coat of prime paint. Door closures and rim panics are reinforced with 14-gauge channels.

B. Doors shall be fully mounted in frames produced for pre-hanging of commercial 1 3/4-inch doors. Frames are formed to 16-gauge commercial quality cold rolled steel conforming to ASTM A366 or A620 and A568. Frames are produced in two welded units, to be mechanically joined during installation. The base side is prepared for all required hardware. Both units, base and trim, are furnished with welded mitered faces. Frame anchoring includes compression anchors and stud screws. Door hinges shall be continuous gear hinges, fabricated of extruded 6063-T6 aluminum alloy/temper with pinless assembly. The doors shall have a lockset, exterior handle, and top mounted-door closer with hold-open device.

C. Doors and frames shall be finished with a two-component, aliphatic/acrylic polyurethane coating, white in color, with a high gloss finish. The coating shall be resistant to a wide range of solvents and chemicals under splash and spill conditions. The coating system is VOC compliant.

D. Door sizes and locations are as shown on the Drawings.

2.05 PASSAGE OF PIPES THROUGH INTERNAL WALLS

A. Where transmission pipes pass through walls, the passage shall be by having the pipe with a weld sleeve pass through and be welded to a steel plate.

B. The pipe passage plate shall extend down to the floor and be welded to the floor.

C. The pipe passage plate shall have welded to it, on the three sides, a channel iron frame that shall accept the building wall set into the channel flanges to lap over the building wall.

D. Where the flange overlaps the building wall, the edge of the channel flange shall be caulked to the wall on all three edges on both sides of the wall.

2.06 MOUNTING AND FASTENING

A. The building shall be fabricated up from and securely attached to a framework fabricated of 2-inch by 6-inch steel tubing welded at each corner to form a base frame serving as a stable base for handling and transporting the building prior to attaching the building to the station base skid. To hold the building framing to the 2-inch by 6-inch base frame, 5/8-inch anchor studs will be welded to the base frame. In assembling the building framing to the base frame a 3 1/4-inch by 4-inch by 1/4-inch thick anchor plate under a flat washer, lock washer and 5/8-inch nut shall be used to fasten the building framing to the framing base as shown. The base frame shall be grit blasted to a SSPC-SP 6 finish and coated with the specified coating material.

B. The building enclosure shall be firmly and securely attached to the steel base structure by lag bolting from inside the station, through evenly spaced 9/32-inch holes pre-drilled into a 2-inch by 1 1/2-inch by 1/8-inch thick angle piece that has been continuously welded to the steel floor. The lag bolts shall screw into the 2-inch by 6-inch tubular base frame upon which the building has been built.

C. The lag bolts shall be plated steel, size 5/16-inch diameter by 2-inch long. The number and location of the lag bolts shall be as determined by structural analysis so as to maintain the live load and wind load ratings as specified and to resist shearing and tearing in the process of transporting and placing the finished station.

2.07 EXTERIOR HOUSEWRAP

A. The station manufacturer shall apply a layer of housewrap to the exterior of the building. The housewrap shall reduce air infiltration and moisture penetration and damage.

B. The housewrap shall be stapled to the exterior sheathing.

C. Unless an additional exterior material is placed over the housewrap, nailer strips shall be nailed over the housewrap to keep the material from tearing away during shipment.

2.08 EXTERIOR FINISH–FAUX BRICK PANELS

A. The station manufacturer shall apply at the factory and prior to shipment fabricated veneer panels with an exterior face in a running bond pattern of kiln-fired clay brick finish applied with polymer epoxy resin on mineral fiber reinforced cement board.

B. Kiln-fired clay brick finish shall e manufactured with sanded epoxy giving deep rake joints between bricks. Epoxy color to be similar to face brick color unless otherwise specified. All material shall be obtained from one source to match in color as nearly as possible.

C. Epoxy resin finish shall conform to requirements of Mil Spec. Mil-R-9300b and Mil-R-21931A.

D. Mineral fiber reinforced cement board (M.F.B.) substrate shall meet the following minimum requirements:
   1. 7000 lb/in² Compressive Strength.
   2. 2000 lb/in² Flexural Strength.
   3. 0.15 Thermal “R” Value.
   4. 0/5 Flame/Smoke Burn Character.

E. Brick veneer shall be kiln-fired clay brick of severe weather exterior grade metting requirements of ASTM C-1088-94 and shall be modular sized (7 5/8-inch by 2 1/4-inch by 1/2-inch).

F. Panel substrate and brick finish shall withstand the following tests without noted change in appearance or material failure:
   1. 1,000 hours in Atlas Twinarc weatherometer.
   2. 14 cycles of salt, fog and thermal shock.
   3. 100 cycles at -50 to +150°F.

G. The panels shall be installed according to the manufacturers Installation Guide with the necessary accessories recommended by the manufacturer.

H. The manufacturer shall provide a five year warranty from date of purchase against defective materials or workmanship.

2.09 METAL ROOF SYSTEM

A. The roof sheathing shall be covered with a 26-gauge metal panel system to form a standing seam roof as shown. The panels shall have a Galvalume® substrate with a Kynar 500® finish. The panels shall meet UL Standard 2218, Class 4 impact resistant and

Class A fire resistant rating. The system shall be complete with fascia and soffit. The minimum roof slope shall be 3:12.

B. The ridgeline of the roof shall be covered end to end with a broken edge panel open along the sides to create a roof vent along both sides of the entire ridge line. The top of the broken edge panel along the ridge line shall cover over the top of the standing seams to provide a finished appearance.

2.10 FACTORY INSTALLED TRUSSED ROOF SYSTEM

A. The building manufacturer shall provide Wooden roof trusses, plywood sheathing, underlaying felt to be factory applied and be covered by the finished roof surface which shall be factory applied to the building to form a gabled roof system as shown. The roof pitch shall be 3:12.

B. When installed, the trusses shall be covered by 1/2-inch thick C-C Grade plywood. The selected roof material shall be called out in these Specifications.

C. When required, the roof structure shall include the roof hatches being built into the roof field by the station manufacturer using the same materials as specified above.

D. Metal facia and soffits shall be shipped loose with the station and be **installed on the building by the INSTALLING CONTRACTOR.** These materials for the facia and soffit shall be complimentary in color and texture and approved by ENGINEER. OWNER shall make color selections.

E. A ridge line, metal airvent system shall be installed as a part of the roof.

F. For review by the Engineer-of-Record, the roof system shall be designed and stamped by a Registered Professional Engineer in the State of Kentucky and provided with the equipment submittals.

2.10 BRIDGE CRANE SYSTEM SUPPORTS

A. The supports for the bridge crane running beams shall be attached into the building structure or shall be supported by structural steel, vertical columns placed along the sidewalls in sufficient numbers to fully support the bridge crane structure and any lifted load at any point within the building.

2.11 TRAVELING BRIDGE, CHAIN HOIST, AND TROLLEY

A. The hoist shall be rated for 2,000 pounds with 12-foot of lift. A Weston-type load brake shall be supplied that requires no lubrication. To minimize jamming and slipping, the hoist shall be supplied with hand wheel covers with guide slots. The chain will be hardened. The hook shall be forged steel, equipped with a safety latch and swivel.

B. The trolley shall be manufactured of high quality rolled steel. The wheels shall be double row, ball bearing design for greater wear capacity. The bearings shall be pre-packed with lifetime lubricant and protected with dust covers. The trolley shall quickly adapt to a wide range of beams with the “Dial-Fit” collar system. The trolley beam shall be a “W4x13” flange steel I-beam conforming to ASTM A36 standards.

2.12 DELIVERY–LIFTING DEVICE

A. An adjustable spreader type lifting device, built to lift the building structure without impinging the lifting chains/cables on the building sidewalls, shall be provided by the Installing Contractor for use by the installing contractor for the purpose of unloading station from trailer.

2.13 BUILDING SUBSTRUCTURE

A. The base/floor system substructure shall be made up of steel plate and standard structural steel shapes of the sizes and weights to bear the loading placed on the base by shipping and operation.

B. The substructure shall be designed to support the building live and dead loads plus the burden imposed by loading, transporting and unloading of this equipment.

C. All steel plates used in the substructure shall meet or exceed the requirements of ASTM A36. The structural shapes (channels and angles) shall be of the thickness/weight as shown on the Drawings for this item and shall meet or exceed the requirements for ASTM A36. The structural rectangular or square tubing shall be of the wall gauge as shown on the Drawings for this item and shall meet or exceed the requirements for ASTM A500 Grade B.

D. On the substructure on the floor plate, indented approximately 6-inch, there shall be welded a 1 1/2-inch by 2-inch by 1/8-inch steel angle iron with drilled holes. This angle steel piece shall be the bracket through which the building is attached to the base substructure.

2.14 FLOOR DRAINS

A. The station shall have floor drains as shown on the Drawings.

B. The floor drains shall be a 4-inch grated opening with 4-inch I.D. threaded hub for connection of a drain line up under the station floor.

2.15 PIPING FLOOR PENETRATIONS

A. Where suction and discharge piping, or any other pressure piping, passes through the station floor plate and base sub-structure, that area of the floor shall be provided with a grout sleeve made up of steel pipe of 9-inch height and of annular diameter to pass a full-size pipe flange for the pipe size shown.

B. The steel sleeve shall be welded into the floor plate with a 1-inch projection above the floor in the station. Following installation of the inlet and outlet pipes, the installing contractor shall be responsible for furnishing and installing grout to close the opening around the installed pipe.

2.16 SAFETY FLOOR MATTING

A. The walkway areas shall be covered with a rubber drainage runner. The runner shall be medium duty, 1/2-inch minimum thickness of open slot design allowing fluids to drain understanding or walking surfaces. The runner shall have a tread design to promote sure footing. The underside of the runner shall have a raise knob design to permit aeration and drainage, and to reduce runner fatigue. The runner shall not be glued to the floor.

2.17 PUMP OPERATING CONDITIONS

A. The pump station shall be capable of delivering the fluid medium at the following capacities and heads when operating at 0 feet minimum suction pressure.

B. Pumps No. 1 and No. 2:
   1. The pumps shall be close coupled end suction mounted, by Paco as Model 20501LC.
   2. Design Point: 175 GPM @ 70 feet TDH.
   3. Maximum Point: 260 GPM @ 46 feet TDH.
   4. NPSHr: 5 feet.
   5. Suction Pressure: 85 to 100 psi.
   6. Discharge Pressure: 115 psi.
   7. Pump Efficiency at Design Point: 74%.
   8. Pump Power: Non-overloading rated for 5 HP.
   9. Motor Speed: 3600 rpm nominal.
   10. Voltage: 240 V, 3 phase

2.18 PUMPS–CLOSE COUPLED HORIZONTAL END SUCTION, CENTRIFUGAL

A. The pumps employed within the pump station shall be of the close coupled, horizontal end suction, centrifugal configuration.

B. The pumps shall be of close grain cast iron construction complete with stainless steel impellers. The pumps shall conform to the detailed Specifications as set forth herein.

C. The pumps shall be Volute style with the pump casing bolted to adapter, with recessed lock fit. No stud or bolt holes are tapped through casing to liquid ways. Tapping openings provided for priming, venting, draining and suction and discharge gauge connections. Piping connection are to be as shown on the pump data sheets.

D. Impellers are to be single suction type, cast in one piece. All impellers are to be statically balanced to provide smooth operation, also hydraulically balanced except in some small sizes where end thrust is but a minor factor.

E. Wearing rings shall be renewable, be set on both the impeller and body and be set maintain proper running clearance with impeller hubs to minimize leakage between the suction and discharge.

F. Shaft sleeves shall be shouldered onto the shaft near impeller to cover the full length of shaft from impeller hub to motor end bracket by being in compression over the shaft protecting shaft from contact with liquid.

G. The stuffing box shall be cast integral with the pump casing. The stuffing box shall contain a single face type mechanical seal. The seal shall have a carbon rotating head against a Ni-Resist stationary face and be complete with a Buna-N boot with stainless steel spring and spring retainer.

H. The motor adaptor shall maintain a rigid, bolted, registered assembly between motor and the casing by a machined lock between adapter and motor end bracket keeping the adapter and casing in permanent alignment with motor and motor shaft.

I. Motor configuration shall be as a close-coupled assembled as an integral part of the complete units. The extended motor shaft carries the impeller and shaft sleeve. Motor bearings are ball bearing type, designed to carry all radial and thrust loads, and are installed in sealed housings which retain lubricant and exclude dirt and moisture.

2.19 PUMP/MOTOR VIBRATION ISOLATION PADS (FOR END SUCTION CLOSE COUPLED PUMPS)

A. The pump/motor assembly shall be mounted to a fabricated steel base built specifically for the pump/motor to be mounted. Each mounting or attachment point shall be complete with a vibration isolation pad. The pad will be in two parts, a 1/4-inch base layer followed by a 5/8-inch upper layer and be a nominal 2-inch by 2-inch square size for pump/motor combinations weighing up to 1,500 pounds.

2.20 PUMP SUPPORT STANDS

A. The pump support stands shall be structural steel C-channel, standard weight or steel plate bent to form a channel. The bent steel plate shall be of sufficient thickness to support the pump and motor. A plate or channel shall be welded between the pump supports to form an “H” configuration for rigidity. The base of the legs shall be continuously welded to the steel floor.

2.21 MOTORS

A. Motors shall conform to all applicable requirements of NEMA, ANSI, IEEE, and NEC standards and shall be UL listed for the service specified.

B. Motors provided for the equipment scheduled below shall meet the following requirements. Motors shall not be loaded beyond nominal rating, not including service factor, at any design condition.

C. These motors are for use with variable frequency drives.
1. Physical Construction:
   a. Copper leads and windings.. Motor leads shall have the same insulation class as the windings.
   b. Rotor bars shall be aluminum.
   c. Motors shall be equipped with grease fittings and automatic grease reliefs. Bearings shall be prelubricated and field-regreasable. Openings for addition of grease shall have grease fittings provided.
2. Mounting: As recommended by manufacturer.
3. Enclosure: ODP.
4. Efficiency: Premium efficient as noted in schedule below.
5. Service Factor: 1.15.
6. Power requirements: 60 Hz, three-phase, 240-volt, factory-wired for 240-volt connection, ±10% voltage variation.
7. Load type: Variable torque.
8. NEMA Design: B.
9. Insulation: Class F and rated for a Class B temperature rise.
10. Nominal operating speed: Single speed, 3600 rpm.
11. Nameplate: Stainless steel engraved attached to motor frame or enclosure with stainless steel rivets.

12. Conduit/Junction Box: Cast iron, diagonally split, fully rotatable, gasketed between cover and box, and between box and frame. Motor lead opening in the frame shall also be gasketed. A clamp-type terminal shall be provided inside each motor conduit box for grounding.
13. Accessories: Lifting eyes.
14. VFD requirements: Motor operating on VFDs shall be inverter-duty rated, meet the requirements of NEMA MG1, Part 31, and be capable of a minimum speed turndown of 4:1. Motors shall also include shaft grounding rings as manufactured by AEGIS, "SGR" by Electro Static Technology, or motor manufacturer selected equal.

D. Motor Schedule: If motor horsepower is increased to meet the requirements of this Specification, CONTRACTOR is responsible for increasing all wiring, starters, drives, and other electrical components as required by Code, at no additional cost to OWNER.

Pump	Horsepower	Nominal Speed	Efficiency	VFD
P-1	5	3600	91%	Yes
P-2	5	3600	91%	Yes

E. Pump motors powered with variable frequency drives shall be: Induction motors compliant with NEMA MG 1, Part 31; and be provided with a nameplate identification calling out that the motor meets NEMA MG 1 Part 31 requirements; and be provided with insulated bearings on both the drive end and the non-drive end on all motors rated at 100 hp or larger.

2.22 PIPING-TRANSMISSION

A. Piping shall be steel and conform to material specification ASTM A-53(CW) for nominal pipe size 4 inches and smaller and ASTM A53(ERW) Grade B for nominal pipe size 5 inches and larger. Steel butt-welding fittings shall conform to material specification ASTM A234 Grade WPB and to the dimensions and tolerances of ANSI Standards B16.9 and B16.28, respectively.

B. Forged steel flanges shall conform to material specification ASTM A105 Class 60 and/or ASTM A181 for carbon steel forgings and to the dimensions and tolerances of ANSI Standards B16.5 as amended in 1992 for Class 150 and Class 300 flanges.

C. The piping sizes shall be as shown on the Drawings.
1. Size 10-inch and below–Schedule 40.
2. Size 12-inch through 20-inch–Standard weight (0.375-inch wall).
3. Size 24-inch and above–Standard weight (0.500-inch wall).

D. The piping shall conform to AWWA Standard C-200.

2.23 PIPE SURFACE PREPARATION

A. All piping inside and outside surfaces shall be prepared by grit blasting, or other abrasive blasting, prior to any welds taking place to minimum SSPC-SP 6 finish.

2.24 PIPE CUTTING

A. Piping of 4-inch diameter and smaller may be cut by saw.

B. Piping of 6-inch diameter and larger shall be bevel cut, and Oxyfuel or Plasma-arc cutting techniques shall be used to facilitate bevel pipe cuts.

2.25 PIPE WELDING

A. All pipe welds shall be performed by certified welders employed by the pump station manufacturer. As part of the equipment submittal, the pump station manufacturer shall provide copies of the welding certificates of the employees who are to perform the pipe welds.

B. Shop welders shall be certified in accordance with ASME BPVC Section IX or AWS D1.1. Certification shall be done by an independent testing laboratory giving certification for the weld positions for which the tests were performed.

2.26 SADDLE CUTS AND WELDS

A. Saddle cuts in pipe made in preparation for a saddle weld of a pipe at an angle to a pipe shall be made with numerically controlled, plasma cutting machines. Similarly, saddle end cuts to pipes to make a saddle mating piece shall be done with the same numerically controlled plasma cutting equipment.

B. When the two saddle cut pieces are mated and welded with the MIG process, the internal finished weld shall be smooth and free of inclusions, crevices and other corrosion sites.

2.27 PIPE WELDING TECHNIQUES

A. Pipe welds shall be performed by metal added, inert gas shielded arc welding (MIG) techniques wherein the weld heat settings, the wire feed speed and the traverse speed of the work below the welding are numerically set to provide proper weld fusion and penetration and repeatable welds.

B. In all cases, short circuit transfer, spray transfer or pulse-arc transfer modes of the gas metal arc welding process shall be used.

C. When utilizing the short circuit mode, shielding gas consisting of 50 percent carbon dioxide and 50 percent argon gas shall be used. When utilizing the spray or pulse-arc transfer modes, a shielding gas consisting of 5 percent carbon dioxide and 95 percent argon shall be used.

D. In all cases, welding wire with a minimum tensile strength of 70,000 psi shall be employed.

E. All flange welds and butt welds of equal size pipe shall be a single continuous nonstop weld around the complete circumference of the pipe. Whenever possible, vertical up weld passes will be applied to all pipe welds. No vertical down weld passes will be allowed.

F. Completed pipe welded assemblies shall create no internal obstruction, restriction or create any unintended sources of water deflection.

G. Piping of 6-inch diameter and larger shall require a minimum of two weld passes to complete each weld. The first pass, or root pass, shall be applied at the bottom of the bevel cut using the short circuit transfer welding mode, and the second pass, or cap pass, shall be applied

over the root pass using the spray or pulse arc transfer welding modes so that at a minimum the total weld thickness shall be equal to thinnest of the two pieces being welded together.

H. The pipe shall be sand blasted, as specified elsewhere, before pipe weld and after pipe weld, before fusion bonded epoxy is applied.

2.28 WELD STANDOFFS

A. No welding shall be performed on fusion bonded coated piping after the coating process has been performed.

B. Where any piping is to be welded after the application of fusion bonded epoxy coating to the inside of the pipe, at the point of the weld, a weld standoff must be welded to the pipe prior to the coating. The weld shall be made to the standoff and not onto the pipe.

2.29 WALL PENETRATION COATING PROTECTION SLEEVE

A. Where a fusion bonded epoxy interior coated pipe passes through a steel wall section, prior to fusion bonded coating of that pipe, a pipe sleeve shall be welded over the pipe in the area where the pipe passes through the steel sheet.

B. The sleeve shall be 1/2 inch thickness and fit closely over the transmission pipe. The sleeve shall be seal welded to the transmission pipe at each end with a full and continuous fillet weld.

C. Following the welding of the sleeve to the transmission piping, the sleeve welds and the sleeve shall be grit blasted to an SSPC-SP 6 finish so the pipe is prepared for fusion bonded epoxy coating by the process specified elsewhere in these documents.

2.30 PIPE SUPPORTS

A. Pipe supports by minimum sizing for:
   1. 8-inch and smaller piping shall be 2-inch by 3-inch by 3/16-inch wall rectangular tubing.
   2. 10-inch and larger piping shall be 3-inch by 4-inch by 1/4-inch wall rectangular tubing.
   3. 6-inch and larger piping shall be provided with kick bracing projecting fully from the underside of the pipe to the floor at an angle of no less than 15 degrees from vertical out at a right angle to the run of the pipe being supported. These kick braces shall be in addition to the vertical pipe supports called out above.

B. Pipe supports are to be fully welded at both end points to the pipe and steel floor where required.

C. Where components are to be supported and may require disassembly at some time, the supports for these components shall be welded at the bottom and bolted at the top by use of a bolt yoke welded to the top of the support and bolted into the flange connection picking up at least three bolts.

2.31 RISER PIPE VERTICAL SUPPORTS

A. All of the inlet and outlet vertical riser pipes shall be provided each with, two structural steel, angle pipe support welded to the weldment plates on the vertical riser pipe to down to the

floor. These supports shall be opposed by at least 120 degrees around the pipe. The minimum member size for these supports shall be 3-inch by 4-inch by 1/4-inch tubular steel.

2.32 FUSION BONDED EPOXY INTERNAL PIPE COATING

A. The internal surfaces of piping to be fusion bonded coated shall be grit blasted to an SSPC-SP 10 finish with the finish profile required by the coating material manufacturer.

B. The internal, wetted surfaces of the steel transmission piping shall have applied to it a Fusion Bonded Epoxy Coating on the interior pipe surface. The coating shall be applied and meet the testing requirements of Table 1 and Table 2 with the exception of Table 2 section 7 per AWWA C213.

C. The powder coating product shall be National Sanitation Foundation (NSF) Standard 61 certified material.

D. The epoxy powder coating shall be Powdura NSF-61 ELS8-80003 from Sherwin Williams, or equal.

E. Prior to shipment of the station, the station manufacturer shall provide in writing to ENGINEER certification that the fusion bonded epoxy coating has been applied to all internal surfaces of the steel piping using the proper method. Said certification shall show under the station manufacturer's letterhead:
   1. Date of application.
   2. Material manufacturer and product designation including a product data sheet for the coating.
   3. Applier of the fusion bonded coating, name, address and phone number.
   4. Notarized signature of an officer of the station manufacturing company stating the fusion bonded epoxy coating was applied to AWWA Standard C213-91 or the latest revision.

2.33 COATINGS–CORROSION PROTECTION

A. All interior and exterior surfaces of the exposed steel structure, transmission piping, and fittings shall be grit blasted equal to commercial blast cleaning (SSPC-SP 6). Following fabrication all exposed surfaces of the station, interior and exterior, shall be coated according to the following requirements.
   1. Weldment Prime Coating: All weldments will be pretreated by hand to provide additional corrosion protection using the same product as the base coat. Following the pretreatment full coating application shall take place.
   2. Base Coating: The base coating shall take place immediately after surface preparation. The protective coating shall consist of a two-component, high solids, high build, fast drying epoxy system for protection and finishing of steel and having excellent corrosion resistant properties. The epoxy system shall be self-priming and require no intermediate coatings.
   3. Top Coating: Following the base coating application, a full finish coating application shall take place. The protective coating shall consist of a two-component, high solids, high build, fast drying epoxy system for protection and finishing of steel and having excellent corrosion resistant properties. The epoxy system shall be self-priming and require no intermediate coatings. The base and finish coats shall provide a total dry mil thickness of 8.0 mils.
   4. Post-Assembly Coating: Following assembly and just prior to shipping, there shall take place a thorough cleaning of the floor of the station followed by a rolled on coating of

the two part epoxy coating to cover over any scuffing or scaring that might have occurred during assembly.

2.34 FLOOR COATING AND CORROSION PROTECTION SYSTEM

A. The exposed surfaces of the structural steel base shall have a non-skid coating of a two-component, 100% high performance aromatic polyurea spray elastomer system with zero VOC (Volatile Organic Compounds), 100% solid. The coating shall offer outstanding performance and superior elastomeric protection for various substrates. The coating shall be designed as a user-friendly product for moisture insensitive applications because of its pure polyurea chemistry, and offer exceptional adhesion properties for properly prepared substrates. The high performance formulation shall produce an excellent skin formation for chemical resistance and moisture protection. The coating shall be dark gray in color.

B. Both the Iso "A" Side and Resin "B" Side shall be preconditioned between 70°F to 90°F before application. Iso "A" and Polyol "B" components must be pumped by low-pressure transfer pumps to a suitable high-pressure proportional pumping system.
   1. Temperature Settings:
      a. Iso "A" Block Heater: 140°F to 160°F.
      b. Resin "B" Block Heater: 140°F to 160°F.
      c. Hoses (Iso and Polyol): 140°F to 150°F.
   2. Equipment Hydraulic Pressure Setting: 2,000 psi to 2,500 psi.
   3. Chemical Technical Data:
      a. Mix Ratio by Volume: Gel Time: 1A: 1B 6 to 9 seconds.
      b. Tack Free Time: 9 to 12 seconds.
      c. Viscosity (cps) @ 77°F.
      d. "A" Iso Side: 1,000 ±100.
      e. "B" Resin Side: 370 ±50.
      f. Material Density (lbs/gal) @ 77°F "A" "A" Iso Side: 9.5 lbs/gal.
      g. "B" Resin Side: 8.4 lbs/gal.
   4. Basic Physical Properties:
      a. All tests are performed by OCM Test Laboratories.
         (1) ISO 17025 Certified.
         (2) American Association for Laboratory Accreditation (A2LA).

Test Name	Test Methods	Value
Hardness Shore D	ASTM D2240	60±1
Coefficient of Friction	ASTM D1894	
Static		0.305
Kinetic		0.127
Dielectric Const.	ASTM D150	3.6
Dissipation Factor	ASTM D150	0.031
Volume Resistance	ASTM D257	2.3x1014 ohm cm
Elongation	ASTM D412	162%
Flexural Strength	ASTM D790	2,630 psi
Flexural Modulus	ASTM D790	0.056 msi
Fungus Test	MIL-STD 810F	Pass
Pull-off Test–Adhesion	ASTM C297	
To Metal–No Primer		1,800 psi
To Metal–XPM Primer		1,910 psi
To Metal–LXSF515 Primer		1,870 psi

Test Name	Test Methods	Value
Taber Abrasion (gm Loss/1000 cycles)	ASTM D4060	0.06980
Tear Strength	ASTM D624	783 ppi
Tensile Strength	ASTM D412	3,432 psi
Water Vapor Trans.	ASTM E96	0.499 Grains/Hr Sq.Ft.

b. The chemical resistance testing for the coating shall be per ASTM D543 for immersion in fluids methods. Additional product certifications shall include USFDA Coatings for Incidental Food Contact Applications Certified by Keller and Heckman LLP and MIL-STD-810F.

2.35 SERVICE CONNECTIONS ON INTERNAL PIPING

A. All plumbed devices within the station eventually requiring service, such as meters, control valves, pumps and like equipment, shall be easily removed from the piping by the presence of appropriate placement and quantity of adaptors and couplings as shown on the Drawings; no less than the quantity of couplings and adaptors shown shall be allowed.

2.36 RESTRAINING POINTS

A. The main inlet and outlet piping to the station shall each be provided with two or four restraining points as welded on eyes or similar device welded to the underside of the base structure framing as shown to facilitate the attachment of joint restraint tie rods or other device to be used in retarding any pipe movement at the connections.

2.37 COMPRESSION COUPLINGS

A. The station piping shall include a variety of compression type, flexible coupling to prevent binding and facilitate removal of associated equipment. These couplings are to be where shown on the Drawings. In lieu of a compression coupling, a flanged coupling adapter (FCA) may be used.

B. Grooved fittings may not be used under any circumstance.

C. All compression couplings or FCAs, and flexible connectors/expansion joints shall include a minimum of two zinc coated steel threaded rods across the joint with appropriate bolted restraining points.

2.38 ELASTOMER PIPE CONNECTOR

A. The inlet side of each booster pump shall include an elastomer connector to help isolate vibration and noise in the piping system. The elastomer connector shall be of single sphere design, constructed of neoprene and nylon with bias-ply tire reinforcing cord to provide a 225 psi working pressure rating to a minimum of 120°F. The elastomer connector shall pass through the plate steel flanges designed to grip the connector so the connector seals without gaskets when the flange bolts are drawn up.

B. A control joint limiting pipe connector movement shall be supplied with each pipe connector.

2.39 LINE PRESSURE GAUGES

A. Combination pressure gauges shall have a built-in pressure snubber and have 4 1/2 inches minimum diameter faces and turret style case, black fiberglass-reinforced thermoplastic with a clear acrylic window with Buna-N gasket. The movement shall be rotary; the bourdon tube shall be copper alloy C-type. The gauge shall have a 1/4-inch MNPT lower mount process connection and contain a 0.6 mm copper alloy restrictor. Combination pressure gauge range and scale graduations shall be in psi and feet of water as follows:

B. Gauge ranges shall be established by ENGINEER for each of the suction and discharge gauges for each pump station.

C. All gauges will be panel mounted off the pipeline and be connected to their respective sensing point. The gauge trim tubing shall be complete with both isolating and vent valves and the tubing shall be so arranged as to easily vent air and facilitate gauge removal. Gauges mounted directly to the pipeline or at the sensing point will not be accepted.

D. Gauge ranges, markings and gauge location shall be identified in the submittal documents.

2.40 STATIC AND SENSING LINES

A. All gauge, switch and transmitter sensing lines shall be minimum 1/4-inch OD white polypropylene tubing run from the sensing point and a ball valve to the point of device mounting.

B. The pilot tubing shall be run in a workmanlike manner with elastomeric/stainless steel mounting straps to securely hold the tubing to be free of stress and vibration. The alignment and organization of the sensing lines shall be continuously rising.

2.41 SAMPLE TAP

A. A single, right angle outlet, smooth nose, brass sample tap shall be affixed to the manual vent ball valve for the low suction lockout and suction pressure gauge assembly.

2.42 HOSE BIBB WITH VACUUM BREAKER

A. There shall be provided a standard hose bibb with valve and vacuum breaker on the suction piping. The hose bibb connection shall be through a pressure regulator if the header pressure would exceed 60 psi.

2.43 BALL VALVES

A. The ball valves will be two-piece, full-port design with blow-out proof stem. The seats, packing and seal shall be PTFE. Ball valves shall be provided with an adjustable stem packing nut. The body and retainer shall be lead free brass (DZR). The ball shall be lead free brass (DZR), chrome plated for sizes 1/4-inch to 1-inch and 316SS for sizes 1 1/4-inch to 4-inch. The handle shall have a distinctive white lead free handle grip and blue lead free hanging tag. The valves will be NPTxNPT threaded pattern. Maximum working pressure shall be 600 psi up to 2-inch and 400 psi for sizes 2 1/2-inch to 4-inch.

2.44 BUTTERFLY VALVES

A. Valve body shall be one-piece wafer or lug design with extended neck to allow for 2 inch piping insulation. Flange locating holes shall be provided on wafer bodies to allow for quick and precise alignment during valve installation. Flange hole drilling per international flange standard as specified. A non-corrosive bushing and a self-adjusting stem seal shall be provided. No field adjustment shall be necessary to maintain optimum field performance.

B. The disc edge and hub on metal discs shall be spherically machined and hand polished for torque and maximum sealing capability. Disc shall be Nylon 11 coated ductile iron.

C. The stem shall be one-piece design. Disc to stem connection shall be and internal double "D" design with no possible leak paths in the disc-to-stem connection. External disc-to-stem connections such as disc screws or pins are not allowed. Stem shall be mechanically retained in the body neck and no part of the stem shall be exposed to the line media.

D. The seat shall be tongue-and-groove seat with a primary hub seal and a molded flange O-ring for weld-neck and slip-on flanges. The seat shall totally encapsulate the body isolating it from the line media and no flange gaskets shall be required.

E. The valve shall be rated for bubble-tight shut-off at pressures of 175 psi for 2-inch to 12-inch and 150 psi for 14-inch to 20-inch.

F. Valve manufacturer:
   1. Bray Series 30/31.
   2. Keystone.

2.45 MANUAL VALVE ACTUATORS

A. Manually operated butterfly valves size 6-inch and smaller shall be equipped with lever style operators capable of withstanding 450 ft. lbs. of input torque and mounted to the valve trunnion with four bolts.

B. Manually operated butterfly valves size 8-inch and larger shall be equipped with travelling nut style handwheel operators capable of withstanding 450 ft. lbs. of input torque and mounted to the valve trunnion with 4 bolts.

2.46 SILENT CHECK VALVES–WAFER STYLE

A. Silent check valves shall be wafer style, non-slam and made to set between ANSI Class 125 flanges.

B. Sizes shall be as shown.

C. The body of the check valve shall be cast iron. The plug and seat shall be bronze and conform to ASTM Designation B584. The seat shall contain a Buna-N seal to provide zero leakage. The seal design shall provide for both a metal to metal low and high pressure without over-loading or damaging the Buna-N seal. The guide bushings shall be bronze copper alloy and conform to ASTM Designation B584. The valve spring and seat retainers shall be stainless steel and conform to ASTM Designation A313. The valve plug shall be guided at both ends by a center shaft integral with the valve plug. Alignment of the center shaft shall be provided by guide bushings.

D. Silent Check Valve manufacturer:
   1. Val-Matic Model 1400.
   2. Or equal.

2.47 HYDRAULIC ACTUATED CONTROL VALVES–GENERAL

A. The valve configuration as shown shall be hydraulically operated, single diaphragm actuated. The valve shall consist of three major components: the body with seat installed, the cover with bearing installed, and the diaphragm assembly. The diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. Packing glands and/or stuffing boxes are not permitted and there shall be no pistons operating the main valve or pilot controls. Valve body and cover shall be epoxy coated. The stainless steel seat with integral bearing shall be of the solid, one piece design.

B. The diaphragm assembly shall contain a non-magnetic stainless steel stem of sufficient diameter to withstand high hydraulic pressures. The stem shall be fully guided through its complete stroke by a removable bearing in the valve cover and an integral bearing in the valve seat. No center guides shall be permitted. The stem shall be drilled and tapped in the cover end to receive and affix such accessories as may be deemed necessary.

C. The flexible, non-wicking, FDA approved diaphragm shall consist of nylon fabric bonded with synthetic rubber compatible with the operating fluid. The diaphragm shall be fully supported in the valve body and cover by machined surfaces which support no less than one-half of the total surface area of the diaphragm in either the fully open or fully closed position.

D. The pilot control system shall include CK2 isolation valves.

E. The pilot system shall include a closing speed control on all valves.

F. Pilot controlled sensing shall be upstream of the pilot system strainer so accurate control may be maintained if the strainer is partially blocked.

G. The pressure relief pilot shall be a direct-acting, adjustable, spring-loaded, diaphragm valve designed to permit flow when controlling pressure exceeds in the adjustable spring setting. The pilot control is normally held closed by the force of the compression on the spring above the diaphragm and it opens when the pressure acting on the underside of the diaphragm exceeds the spring setting. The pressure relief valve shall be supplied with the Dura-Kleen® stem (KD option).

H. The control valve shall be a Cla-Val Model 50A-01.

2.48 MAGNETIC FLOWMETER

A. Electromagnetic flow meters for permanent installations both above and below ground. The meters shall utilize bipolar pulse DC coil excitation to measure voltage induced by the flow of conductive liquid through a magnetic flux. The voltage shall be linearly proportional to flow velocity from 0.033 to 33 feet per second.

B. Sensor:
   1. The sensor shall consist of a stainless steel flow tube with ANSI Class150 B16.5 or AWWA C207 carbon steel or stainless steel flanges.

2. The sensor liner and electrode material shall be chosen to be compatible with the process fluid. All fluids require a minimum conductivity of 5µS/cm (20µS/cm for deionized water).
3. The sensor tube shall be lined with polyurethane, hard rubber, or PTFE based upon the size of the flow meter and the process media conditions. NSF-61 shall be available as option.
4. The sensor shall house two measuring electrodes, a grounding electrode, and one for physical empty pipe detection. The electrodes shall be bullet-nosed shaped and made of 316L SS or Alloy C22 (listed by the application and instrument schedule).
5. The sensor shall be rated for NEMA 4X service as standard; Optional NEMA6/IP67 for temporary immersion or NEMA6P/IP68 for permanent immersion.

C. Transmitter:
1. The transmitter shall be a three-stage microprocessor controller mounted integrally or remotely. The transmitter shall incorporate a universal 100-240 VAC/18-30 VDC power supply. The transmitter housing will carry a NEMA 4X rating and shall be constructed to prevent moisture ingress, promote corrosion resistance, and be impervious to saline environments.
2. The transmitter display shall indicate simultaneous flow rate and total flow with 3 totalizers (forward, reverse and net total) and user-selectable engineering units and readout of diagnostic error messages.
3. The Transmitter output shall be specified as either 4-20mA HART; 0-20mA, pulse/frequency/switch; Modbus RS-485, Profibus DP, or EtherNet/IP
4. The transmitter shall support commissioning options through a device driver-less operation via an internal web server accessible through a standard RJ-45 Ethernet port or a WLAN (Wireless Local Area Network) connection as specified.
5. The transmitter shall include an onboard method to verify flow meter performance to the original manufacturer specifications without the use of external handhelds, interfaces, or special tooling.

D. Installation:
1. The sensor shall house two measuring electrodes, a grounding electrode, and one for physical empty pipe detection. The electrodes shall be bullet-nosed shaped and made of 316L SS or Alloy C22. Straight run requirements are 5 diameters upstream and 2 diameters downstream to maintain laminar flow and full specified accuracy.
2. Sensor shall have optional unrestricted mounting magnetic flowmeter sensor for applications without the typical inlet/outlet straight pipe run requirements. The full bore magnetic flowmeter in sizes 1-inch to 12-inch shall maintain zero pressure loss while achieving 0.5% of rate accuracy.

E. The Inline Magnetic Flow Meter shall be an Endress+Hauser Promag W400.

2.49 METER TEST PORT

A. The meter installation shall be complete with a meter test port as shown on the plans for this item. The test port shall consist of a NPT coupling in the pipe downstream of the meter capable of accommodating a threaded by hose connection adapter. The connection shall be plugged.

2.50 PRESSURE TESTING

A. When the station plumbing is completed, the pressure piping within the station (including valves, pumps, control valves, and fittings), connections as make up the entire system shall be hydrostatically tested at a pressure of 150 psi or a pressure equal to the lowest test pressure rating of the equipment within the tested system, whichever is lesser pressure. The test pressure shall be applied for a minimum of 20 minutes, during which time all joints, connections and seams shall be checked for leaking. Any deficiencies found shall be repaired and the system shall be retested.

B. The results of this testing shall be transmitted in writing to ENGINEER prior to shipment of the station and shall note test pressure, time at full pressure and be signed by the Quality Control Manager or test technician.

2.49 ELECTRICAL DESIGN, ASSEMBLY, AND TEST

A. The electrical apparatus and control panel design, assembly, and installation, and the integration of component parts will be the responsibility of the manufacturer of record for this booster pumping equipment. That manufacturer shall maintain at their regular place of business a complete electrical design, assembly and test facility to provide continuity of electrical design with equipment application. Control panels designed, assembled or tested at other than the regular production facilities or by other than the regular production employees of the manufacturer of record for this booster pumping equipment will not be approved.

2.50 CONFORMANCE TO BASIC ELECTRICAL STANDARDS

A. The manufacturer of electrical control panels and their mounting and installation shall be done in strict accordance with the requirements of UL Standard 508A and the National Electrical Code (NEC), NFPA 70 latest revision so as to afford a measure of security as to the ability of the eventual owner to safely operate the equipment.

B. No exceptions to the requirements of these codes and standards will be allowed; failure to meet these requirements will be cause to remove the equipment and correct the violation.

2.51 UNDERWRITER'S LABORATORIES (UL) LISTING

A. All service entrance, power distribution, control and starting equipment panels shall be constructed and installed in strict accordance with UL Standards. The UL label shall also include an SE "Service Entrance" rating stating that the main distribution panel is suitable for use as service entrance equipment. The panels shall be shop inspected by UL, or constructed in a UL recognized facility. All panels shall bear a serialized UL label.

B. A photocopy of the UL labels for this specific project shall be transmitted to both the project ENGINEER and CONTRACTOR for installation within their permanent project files, prior to shipment of the equipment covered under these Specifications.

2.52 ETL LISTING

A. As an option to the UL Listing, all control panels shall be ETL Listed by Interek Testing Services (ITS) under the Industrial Control Panel (ICP) Category. Each completed control panel shall bear an ETL listing label stating that the panel conforms to UL STD 508A and is

certified to CAN/CSA STD C22.2 NO. 14. The listing label shall include the station manufacturer's name, address and telephone number. The station manufacturer shall have quarterly inspections performed by ETL at the manufacturer's facility so that the products being listed comply with the report and procedural guide for that product.

2.53 EQUIPMENT GROUNDING

A. Each electrical equipment item in the station shall be properly grounded per Section 250 of the National Electrical Code. Items to be grounded include, but are not limited to, pump motor frames, control panel, transformer, convenience receptacles, dedicated receptacle for heater, air conditioner, dehumidifier, lights, light switch, exhaust fans, pressure switches, etc.

B. All ground wires from installed equipment shall be in conduit and shall lead back to the panel to a copper ground bus specific for grounding purposes and so labeled. The ground bus shall be complete with a lug large enough to accept the installing electrician's bare copper earth ground wire. The bus shall serve as a bond between the earth ground and the equipment ground wires.

2.54 PANEL MOUNTING HARDWARE

A. Metal framing channel and hangers shall be used exclusively for mounting of electrical panels and electrical components except for those specifically designated otherwise.

B. When mounting panels in buildings with 3/4-inch plywood interior sheathing, certain panels and components may be mounted by screwing these devices to the wall. The maximum weight of a panel mounted with four lag screws cannot exceed 250 pounds. The lag screws must either be 5/16-inch or 3/8-inch diameter and be fully threaded.

2.55 ELECTRICAL SERVICE

A. The electrical service provided for this station will be 240-volt, 3 phase, 60 Hertz, 4-wire.

2.56 ELECTRICAL DISTRIBUTION PANEL

A. The distribution panel shall be a single section, bolt-on panelboard, top fed, surface mount, service entrance rated, NEMA 1 enclosure for the distribution voltage indicated above and with aluminum bus. Distribution panel shall have an interrupting rating of 35kAIC.

B. The main circuit breaker shall be rated for 200-amp service.

C. The distribution panel shall be complete with the following thermal-magnetic branch circuit breakers:
   1. One: 3-pole, 200 amp Main Breaker.
   2. Two: 3-pole, 30 amp Pump Motor Breakers.
   3. One: 3-pole, 30 amp Surge Protection Device Breaker.
   4. One: 3-pole, 15 amp Voltage Monitor Breaker.
   5. One: 2-pole, 40 amp Primary Transformer Breaker.
   6. One: 1-pole, 100 amp Lighting Panel Breaker.

D. Nameplates shall be provided for all circuit breakers and shall be etched phenolic.

2.57 MOTOR CONTROL PANEL

A. All PLC equipment, controls, and control relays shall be incorporated into one NEMA 1 control panel.

B. All motor control panels shall be factory-assembled, wired, and tested. All internal wiring shall be numbered, and each wire shall be terminated on terminal strips, including internal spares, field wiring, and spare field wires. Schematic and wiring layout drawings following JIC Standards that show all connections to external devices, a complete bill of materials, and a detailed description of operation, shall be submitted for each piece of equipment. Wiring diagrams for all control panels shall be completed using electronic CAD software and shall be in accordance with the requirements specified.

C. The control panel door shall be complete on the interior with a stick-on transparency containing an as-built reproduction of the electrical control panel schematic. The wiring diagram shall be a corrected as-built copy and contain individual wire numbers, circuit breaker numbers, switch designation, and control function explanations.

2.58 POWER CONVERSION WITH VARIABLE FREQUENCY DRIVES

A. The variable frequency drive (VFD) motor controllers shall be selected and sized to convert single phase, 240-volt power to three phase power sufficient to power the three-phase pump motors listed below. Variable frequency drives shall be capable of operating on single phase electrical service during normal operation and three phase electrical service when operating on generator power, without any manual intervention or programming of the drives:
Pump No. 1: 5 motor hp.
Pump No. 2: 5 motor hp.

2.59 VARIABLE FREQUENCY DRIVES (VFD)

A. This Specification is to cover a complete variable frequency motor drive (VFD) consisting of a pulse width modulated (PWM) inverter designed for use on a standard NEMA Design B induction motor.

B. The VFD package as specified herein shall be UL listed as a complete assembly and enclosed in an integrated UL type 1 enclosure, assembled and tested by the manufacturer in an ISO9001 facility. The VFD tolerated voltage window shall allow the VFD to operate from a line of +30 percent nominal, and -35 percent nominal voltage as a minimum.

C. All VFDs shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating. The keypad shall be removable, capable of remote mounting and allow for uploading and downloading of parameter settings as an aid for start-up of multiple VFDs.

D. The keypad shall include Hand-Off Auto selections and manual speed control. The drive shall incorporate bumpless transfer of speed reference when switching between Hand and Auto modes. There shall be fault reset and Help buttons on the keypad. The Help button shall include on-line assistance for programming and troubleshooting.

E. There shall be a built-in time clock in the VFD keypad. The clock shall have a battery backup with 10 years minimum life span. The clock shall be used to date and time stamp faults and record operating parameters at the time of fault. The clock shall also be programmable to

control start/stop functions, constant speeds, PID parameter sets and output relays. The VFD shall have a digital input that allows an override to the time clock (when in the off mode) for a programmable time frame. There shall be four separate, independent timer functions that have both weekday and weekend settings.

F. The VFDs shall utilize pre-programmed application macros specifically designed to facilitate start-up. The Application Macros shall provide on command to reprogram all parameters and customer interfaces for a particular application to reduce programming time. The VFD shall have two user macros to allow the end-user to create and save custom settings.

G. The VFD shall have cooling fans that are designed for easy replacement. Operating temperature will be monitored and used to cycle the fans on and off as required. The VFD shall be capable of starting into a coasting load (forward or reverse) up to full speed and accelerate of decelerate to setpoint without safety tripping or component damage (flying start).

H. The VFD shall have the ability to automatically restart after an over-current, over-voltage, under-voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between attempts shall be programmable.

I. The overloading rating of the drive shall be 110 percent of its normal duty current rating for one minute every ten minutes, 130 percent overload for two seconds. The minimum FLA rating shall meet or exceed the values in the NEC/UL table 430-150 for 4-pole motors.

J. The VFD shall have an integral 5 percent impedance line reactors to reduce the harmonics to the power line and to add protection from AC line transients. The 5 percent impedance may be from dual (positive and negative DC buss) reactors, or 5 percent AC line reactors. VFDs with only one DC reactor shall add AC line reactors.

K. The VFD shall include a coordinated AC transient protection system consisting of 4 to 120 joule rated MOVs (phase to phase and phase to ground), a capacitor clamp, and 5 percent impedance reactors

L. The VFD shall be capable of sensing a loss of load (broken belt/broken coupling) and signal the loss of load condition. Relay outputs shall include programmable time displays that will allow for drive acceleration from zero speed without signaling a false underload condition.

M. If the input reference (4-20 mA or 2-10V) is lost, the VFD shall give the user the option of either stopping and displaying a fault, running at a programmable preset speed, hold the VFD speed based on the last good reference received, or cause a warning to be issued, as selected by the user.

N. The VFD shall have programmable Sleep and Wake up functions to allow the drive to be started and stopped from the level of process feedback signal.

O. All VFD to have the following adjustments:
   1. Three programmable critical frequency lockout ranges to prevent the VFD from operating the load continuously at an unstable speed.
   2. Two PID Setpoint controllers shall be standard in the drive, allowing pressure or flow signals to be connected to the VFD, using the microprocessor in the VFD for the closed loop control.
   3. Two programmable analog inputs shall accept current or voltage signals.

4. Two programmable analog outputs (0-20 mA or 4-20 mA).
5. Six programmable digital inputs for maximum flexibility in interfacing with external devices.
6. Three programmable digital Form-C relay outputs.
7. Seven programmable preset speeds.
8. Two independently adjustable accel and decel ramps with 1 to 1,800 seconds adjustable time ramps.
9. The VFD shall include a motor flux optimization circuit that will automatically reduce applied motor voltage to the motor to optimize energy consumption and audible motor noise.
10. The VFD shall include a carrier frequency control circuit that reduces the carrier frequency based on actual VFD temperature that allows the highest carrier frequency without derating the VFD or operating at high carrier frequency only at low speeds.
11. The VFD shall include password protection against parameter changes.

P. The Keypad shall include a backlit LCD display. The display shall be in complete English words for programming and fault diagnostics (alpha-numeric codes are not acceptable). All applicable operating values shall be capable of being displayed in engineering (user) units. A minimum of three operating values shall be capable of being displayed at all times.

Q. The VFD shall have an RS-485 port as standard. The standard protocols shall be Modbus, Johnson Controls N2 bus, and Siemens Building Technologies FLN. Each individual drive shall have the protocol in the base VFD. All protocols shall be certified by the governing authority. Serial communications capabilities shall include, but not be limited to; run-stop control, speed set adjustments, current limit, accel/decel time adjustments, and lock and unlock the keypad. The drive shall have the capability of allowing the DDC to monitor feedback such as process variable feedback, output speed/frequency, current (in amps), percent torque, power (kW), kilowatt hours (resettable), operating hours (resettable), and drive temperature. The DDC shall also be capable of monitoring the VFD relay output status, digital input status, and all analog input and analog output valves. All diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote VFD fault reset shall be possible. The following additional status indicates and settings shall be transmitted over the serial communications buss–keypad Hand or Auto selected, bypass selected, the ability to change the PID setpoint. A minimum of 15 field parameters shall be capable of being monitored. The VFD shall allow the DDC to control the drive's digital and analog outputs via the serial interface. This control shall be independent of any VFD function.

R. All VFDs shall include EMI/RFI filters. The onboard filters shall allow the VFD assemble to be CE Marked and the VFD shall meet product standard EN 61800-3 for the First Environment restricted level.

S. All VFDs through 50 hp shall be protected from input and output power mis-wiring. The VFD shall sense this condition and display an alarm on the keypad.

T. The VFD units shall be ABB Model ACQ580, or equal.

2.60 DRIVE FUSE PROTECTION

A. There shall be provided fuse protection in accordance with the drive manufacturer's installation guidelines and as required in UL61800-5-1.

2.61 TELEMETRY JUNCTION BOX

A. It will be the responsibility of the station manufacturer to provide the following as an adjunct to the supplied telemetry equipment.
   1. NEMA 1, 20-inch by 16-inch junction box with hinged cover. Telemetry junction box shall contain terminal blocks for all signals.
   2. Telemetry control, status, and alarm circuits in conduit from main control panel to telemetry junction box as shown in Section 26 09 90–RTU I/O Listing.

B. Metal framing channel to mount telemetry equipment.

2.62 ALARMS CONDITIONS AND OUTPUTS

A. The following alarms/status signals shall be included within the booster pump station and wired to the telemetry junction box:
   1. Provide indication as to the position of the hand-off-automatic selector switches (In Auto) for the pumps.
   2. Entry Alarms on Hatches and Doors–The entry alarm shall be by door-mounted limit switches. The limit switch shall be the adjustable arm, roller contact type which makes an internal 120-volt AC SPST micro switch. The switch shall be mounted so as to active anytime the entrance door is opened.
   3. Pump Motor Starter Failure–There shall be logic provided for detection, indication and alarm of the failure of the motor starter/controller.
   4. High Discharge Pressure Alarm: The high discharge pressure alarm shall be provided by the analog signal from the discharge pressure transmitter rising above a setpoint.
   5. Low Suction Pressure Alarm: The low suction pressure alarm shall be provided by the suction pressure switch.
   6. Fire/Smoke Alarm: The fire/smoke alarm shall be provided by a 120-volt AC relay contact from a fire/smoke detector in the station.
   7. High Station Temperature Alarm: The station high temperature alarm shall be provided by a 120-volt AC contact from a thermostat in the station.
   8. Low Temperature Alarm: The station low temperature alarm shall be provided by a 120-volt AC contact from by a thermostat in the station.

2.63 ELAPSED TIME METER

A. The control panel shall contain one running time meter for each pump to show the cumulative number of hours of operation.

B. The meter shall be enclosed in a dust and moisture proof molded plastic case, suitable for flush mounting on the main control panel.

C. The meter dial shall register in hours and tenths of hours up to 99999.9 hours before repeating.

D. The meter shall be suitable for operation from a 115-volt, 60-cycle supply.

2.64 ELECTRICAL PHASE MONITOR (THREE-PHASE POWER)

A. A voltage monitor shall be supplied to protect equipment against single phasing, high and low voltage conditions.

B. When a fault is sensed, the monitor output relay shall open within two seconds or less to turn the equipment off and indicate an alarm at the telemetry panel. The monitor shall have an automatic reset and shall include adjustable voltage and time delay settings.

C. The monitor shall have an LED indicator (glows when all conditions are normal) and shall monitor phase sequence. The phase monitor shall be UL approved and CSA certified.

2.65 SURGE PROTECTION DEVICE (STANDARD)

A. The specified surge protective device shall provide effective energy surge diversion for the application in ANSI/IEEE C62.41-2002 location Category C3 (service entrance). Testing shall be per ANSI/IEEE C62.45-2002 using ANSI/IEEE C62.41 Category C3 waveforms and amplitudes.

B. The system individual units shall be UL listed under UL 1449, latest edition, Standard for Surge Protective Devices (SPD). Surge ratings shall be permanently affixed to the SPD.

C. SPD shall be suitable for use in Type 2 locations.

D. Unit shall provide maximum ANSI/UL 1449 VPRs for 240/120-volt, three-phase.
1. L-N = 800 V.
2. L-G = 900 V.
3. N-G = 700 V.
4. L-L = 1500 V.

E. The maximum surge current capacity of the specified system, based on the standard IEEE 8/20 microsecond waveform, shall be at least 160 kA per phase. The surge life (8/20) shall be at least 6 kA for 10,000 occurrences or 10 kA at 20 kV for 16,000 occurrences. The transient suppression capability shall be bidirectional and suppress both positive and negative impulses. SPD shall have a nominal discharge rating (In) of 10 kA.

F. The SPD shall have a minimum Short Circuit Rating (SCCR) of 100 KAIC. The interrupt capability must be confirmed and documented by a recognized independent testing laboratory.

G. The suppressor shall be designed so as to minimize the internal surge path impedance. Direct point-to-point internal wiring is inherently inductive and not acceptable. Connection to the power service shall be constructed as shown in the manufacturer’s installation notes for best performance.

H. Red and green solid-state LED indicators shall be provided on the hinged front cover to indicate protection status. An illuminated green LED shall indicate power is present at the protector on all phases, and an illuminated red LED shall indicate that one or more of the modules have reduced protection. Both front panel and internal LEDs are required to provide power and fault indications.

2.66 ELECTRICAL CONDUIT AND WIRING

A. The service entrance conduit(s) shall be installed from the main power distribution equipment or control panel through the capsule steel sidewall or the building floor and terminate exterior to the equipment enclosure as a thread hub. The service entrance exterior conduit connection points shall be capped or plugged for shipment.

B. All wiring outside of equipment and panel enclosures shall be run in conduit.

C. Devices and appliances where furnished by the original manufacturer with a UL approved cord and plug, may be plugged into a receptacle.

D. Equipment enclosure conduits shall be heavy wall rigid, Schedule 40 in minimum size 3/4-inch or larger, sized to handle the type, number and size of equipment conductors to be carried. UL listed for underground, encased, and above ground applications.

E. The conduit installations hall be in compliance with Article 352 of the National Electrical Code and be UL listed for underground, encased, and above ground applications.

F. Flexible conduit, not over 3 feet in length, may be used for final connections to equipment. The conduit used shall be liquid-tight, flexible, electrogalvanized, single-strip steel, U.L. listed conduit sized to handle the type, number and size of equipment conductors to be carried in compliance with Article 350 of the National Electrical Code. Conduit shall be Liquatite Type LA, or equal.

G. Motor circuit conductors shall be sized for the load. All branch circuit conductors supplying a single motor of one horsepower or more shall have an ampacity of not less than 125 percent of the motor full load current rating, dual rated type THHN/THWN, as set forth in Article 310 and 430 of the National Electrical Code, Schedule 310-16 for flame retardant, heat resistant thermoplastic, copper conductors in a nylon or equivalent outer covering.

H. Control and accessory wiring within control panels shall be sized for the load, type MTW/AWM (Machine tool wire/appliance wiring material) as set forth in Article 310 and 670 of the National Electrical Code, Schedule 310-16 and NFPA Standard 79 for flame retardant, moisture, heat and oil resistant thermoplastic, copper conductors in compliance with NTMA and as listed by Underwriters Laboratories (AWM), except where accessories are furnished with a manufacturer supplied UL approved rubber cord and plug.

I. Control wiring (e.g., thermal overloads, lockout stops, etc.) to motors utilizing VFDs shall be in a conduit separate from motor power wiring.

2.67 GAUGE PRESSURE TRANSMITTERS

A. Pressure transmitters shall be supplied to measure pump station suction and discharge pressure. The transmitters shall sense gauge pressure and transmit a 4-20 mA dc signal. The instruments shall measure pressure of a predetermined span. Range is to be fixed at 0 to 600 PSI. The accuracy shall be ≤±0.05% of span.

B. Each transmitter shall provide an analog output and include a standard LCD with touch control and bluetooth to provide Intelligent transmitter. The one-line digital indicator shall display the measurement in any selected units.

C. All process-wetted parts of each instrument shall be Type 316L stainless steel. The transmitter shall be protected by a gasketed, weatherproof IP66 and IP68 enclosure.

D. The transmitter shall have 1/4-inch NPT female threaded tapping port.

E. Gauge Pressure Transmitter Manufacturer: Endress & Hauser PMP71B or equal.

2.68 ELECTRICAL DEVICES

A. Multi-position switches including Hand-Off-Automatic switches shall be oil tight, three-position maintained and be located on the main control panel door.

B. Indicating lights shall be oil tight LED type.

C. Nameplates shall be furnished on all panel front mounted switches and lights.

D. Switches shall be Schneider Electric, Model ZB4BD, 22 mm, Die Cast Chrome plated devices, or equal. Pilot lights shall be LED type rated for 120 VAC operation as manufactured by Schneider Electric Model XB4BVG, or equal. Pushbuttons shall be non-illuminated, momentary contact as manufactured by Schneider Electric Model ZB4BL, or equal.

E. Relays shall include On-Off flag-type or LED indicator and shall be UL Listed.

F. Timing relays shall include On and timing out LEDs and shall be UL Listed.

G. Fuse holders shall be provided with integral LEDs to indicate when the fuse is blown.

H. Terminal blocks shall be rated to 600 volts AC/DC. Multi-level terminal blocks and stacked, single level terminal block installations are not acceptable.

I. Selector Switches:
   1. Pump No. 1, 3-position, Hand-Off-Auto.
   2. Pump No. 2, 3-position, Hand-Off-Auto.

J. Pilot Lights:
   1. Red–Low Suction Pressure.
   2. Green–Pump No. 1 Running.
   3. Green–Pump No. 2 Running.
   4. Red–Pump No. 1 Fail.
   5. Red–Pump No. 2 Fail.

2.69 CONTROL PHILOSOPHY

A. Low system side/suction side of the booster pumps shall be equipped with a pressure transmitter to sense a low suction pressure condition. The PLC will cease booster pump operation if a pressure below 5 psi is sensed (Auto mode only). Shutoff shall be delayed by a timer with an adjustable setting from 0 to 30 seconds that requires the pressure to be below the setpoint for the time setting on the timer before the pump is shut off. When the pump is shut off because of low pressure, manual reset shall be required and an alarm shall be sent to the supervisory control panel and to a “Red” low pressure push-to-test indicating light on the pump starter panel.

B. Booster Pumps: Provide a H-O-A switch on the starter panel for each pump that will perform the following functions:
   1. When the H-O-A switch is in the “Hand” position, the pump shall start and run at the speed set on the drive HIM bypassing all controls unless noted otherwise. Hand mode shall be hardwired to the VFD.
   2. When the H-O-A switch is in the “Off” position, the pump shall be inoperable.

3. When the H-O-A switch is in the “Auto” position, the pump shall be controlled by the start/stop outputs from the telemetry system.
4. Motor has internal thermal overloads that shall shut down the motor in the event of overtemperature (Hand and Auto modes). Manual reset shall be required to restart the motor. Internal thermal overloads shall be wired such that momentary power interruptions do not shut down the motor.

2.70 RECEPTACLES

A. Two duplex, ground fault circuit interrupter type receptacles shall be furnished about the periphery of the equipment enclosure, with one receptacle adjacent to the main control panel.

2.71 STATION EXTERIOR LIGHTING

A. An exterior light shall be provided as shown on the Drawings. The light shall be 20-watt LED, 4k color, and 5,000 lumens. Housing shall be one piece, injection molded, bronze, polycarbonate. A button type photo cell control shall be provided.

2.72 STATION INTERIOR LIGHTING

A. There shall be two or more 48-inch minimum length LED light fixtures installed within the equipment enclosure, as shown on the Drawings. The fixture shall be 120/277 VAC, 6,000 lumens minimum with a medium distribution lens, 4k color temp, and UL Listed for a wet environment. The light switch shall be of the night glow type and be located conveniently adjacent to the door.

B. Open fixtures will not be accepted.

2.73 HEATING/COOLING/EXHAUST UNIT

A. The unit shall be two-piece, wall-mounted, factory-assembled, pre-charged, prewired, tested and ready-to-operate mini split heat pump system. The unit shall have a limited warranty of 10-years on parts. One each exterior wall mounted compressor, hard-wired as shown:
1. One each interior wall mounted air handler. Hard wired as shown.
2. Remote adjustable thermostat.
3. Refrigerant: 410A (HFC).
4. Minimum EER Rating: 9.10.
5. 2 Ton capacity.

2.74 DEHUMIDIFIERS

A. Capacity 30 pints per 24 hours.

B. Compressor rated 115 volts, 60 Hz, 4.3 operating amps.

C. 106 CFM fan, two-speed fan.

D. Humidity range 35 to 80% RH, ambient temperature range of 41°F to 95°F, Type R410A refrigerant.

E. Washable filter.

F. Condensate piped direct to drain.

G. UL listed rubber cord.

2.75 MANUAL TRANSFER SWITCH

A. A manual transfer switch shall be provided to switch between normal utility electrical service and portable generator electrical power. The transfer switch shall be located inside the pump station structure.

B. The manual transfer switch shall be provided with a NEMA 1 enclosure 400 amp, double pole, double throw, heavy duty type with solid neutral for 240-volt, single-phase, three-wire electrical service.

C. The manual transfer switch shall be non-fusible, quick-make, quick-break with externally operable handle.

D. The manual transfer switch shall be Eaton, Square D, or equal.

2.76 EMERGENCY GENERATOR PLUG AND RECEPTACLE

A. An emergency generator plug with matching receptacle shall be provided for cable connection from the generator to the receptacle mounted on the pump station exterior. The plug shall be furnished to the generator manufacturer for installation on the generator cabling.

B. The receptacle and plug shall be Crouse Hinds Arktite series, or equal. Receptacle shall be rated for 200 A, 120/240 v, single-phase, three wire system. Receptacle shall be provided with back mounting box.

2.77 SPARE PARTS

A. CONTRACTOR shall provide, along with the shop drawings, a list of the manufacturer's recommended spare parts for the specified equipment. The list shall include a description of each spare part, current pricing, and expected delivery time for each part. No spare parts shall be provided by CONTRACTOR/manufacturer as part of this Contract.

2.78 ANCHOR BOLTS

A. Provide all anchor bolts required for equipment furnished. Anchor bolts shall be 316 stainless steel of ample strength for the intended service. Provide anchor bolts in accordance with Division 05.

PART 3–EXECUTION

3.01 GENERAL

A. Refer to requirements specified in Division 01 for equipment installation, quality control, testing, supervision, startup, and operator training. Comply with additional requirements as specified below.

B. A minimum of one trip and one day on site shall be provided for startup and training services.

3.02 FACTORY START UP SERVICE

A. Startup and warranty service shall be performed by the booster pumping system manufacturer. No representative, contract service organization or third party of any sort shall be directed to perform such services by the water booster system manufacturer.
   1. Start-up and warranty service technicians shall be regular factory direct employees of booster station manufacturer.
   2. As part of the submittal covering this equipment, list the factory service manager, their telephone number with extension, and their number of years with the company. List also each start-up technician, and years of service with the company.
   3. Verify that one or more of the service technicians listed above will perform the required start-up service and warranty on the equipment covered in the submittal.
   4. A total of one full day at job site for start-up and training will be required.
   5. Start-up service to include two bound O&M Manuals for the booster pumping station.
   6. Start-up service report attested to by start-up technician and representative of OWNER.
   7. Service report shall be distributed to:
      a. Manufacturer's file.
      b. ENGINEER's file.
      c. CONTRACTOR's file.
      d. OWNER's file.

3.03 FINAL WARRANTY REVIEW

A. Prior to the end of the warranty period, ENGINEER and OWNER shall review the booster pumping station with the manufacturer of the booster pumping station. A list of items to be completed shall be provided by ENGINEER and OWNER indicating any deficiencies which must be corrected prior to release of the warranty bond.

3.04 DEFINITION OF ACCEPTANCE

A. Pumping station acceptance shall be defined as that point in time when the following requirements have been fulfilled:
   1. All O&M documentation has been submitted and reviewed, by ENGINEER and OWNER.
   2. The startup of the pumping station, and controls and successfully completed all testing and operational requirements specified.
   3. All training as specified has been completed.
   4. All punch list items are completed.
   5. A full warranty statement as specified herein with the warranty commencement date (date of acceptance by OWNER) spelled out shall be presented to OWNER. The warranty statement shall clearly identify the booster station manufacturer as responsible for warranty service.

3.05 TRAINING, FOLLOW UP, AND SUPPORT SERVICES

A. The program for employee training shall educate all employees who will be required to operate and maintain the system. The objective of the training will be to provide a common working knowledge concerning all significant aspects of the system being supplied. The training program shall consist of one day working with the full set of employees and work

shifts. The training course outline shall be submitted to ENGINEER at least two weeks prior to the requested start of the training program.

B. The supplier shall provide all materials, equipment, and manuals to conduct the training program.

C. CONTRACTOR, through System Supplier, shall provide post-startup support services. Post startup support shall include follow up services during the one year period following final acceptance. Service shall include follow up recalibration and replacement of defective equipment, as well as additional training, software modifications, and control configurations as requested by OWNER. This shall include 24 hours for work on site other than warranty repair or replacement of defective equipment. This time shall be used for software enhancements and modifications to improve the operation of the system. In addition to the hours, include one trip to the site.

3.06 COORDINATION WITH INTEGRATOR

A. The manufacturer shall be responsible for all coordination with the Section 26 09 00–Controls and Instrumentation System Supplier so that all signals specified herein are provided and are compatible with the SCADA System. Refer to Section 26 09 90–RTU I/O Listing for the minimum required I/O between the station and telemetry panel.

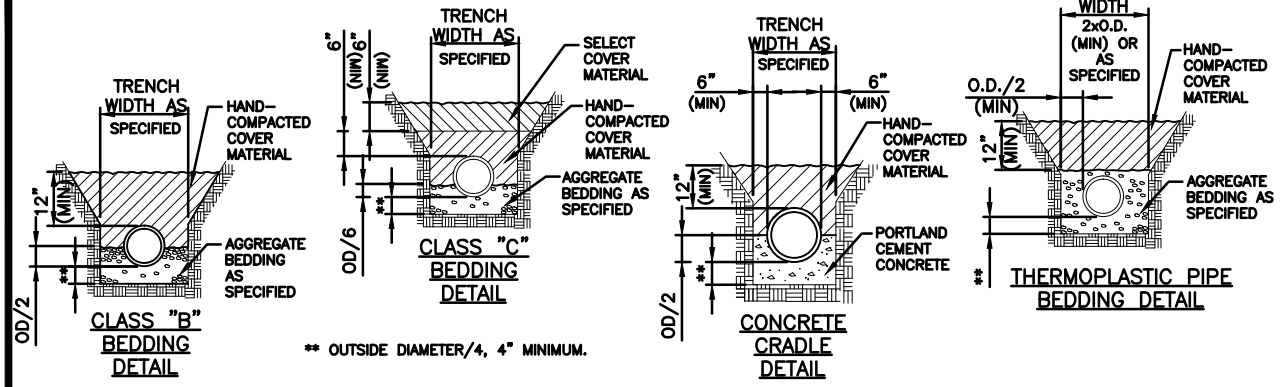
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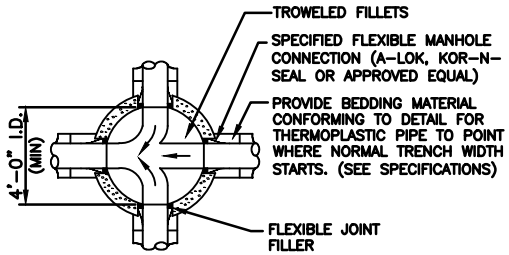
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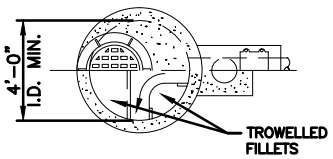
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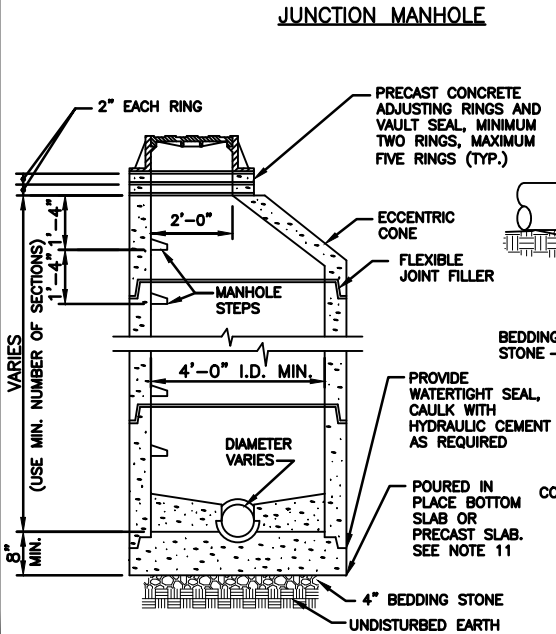
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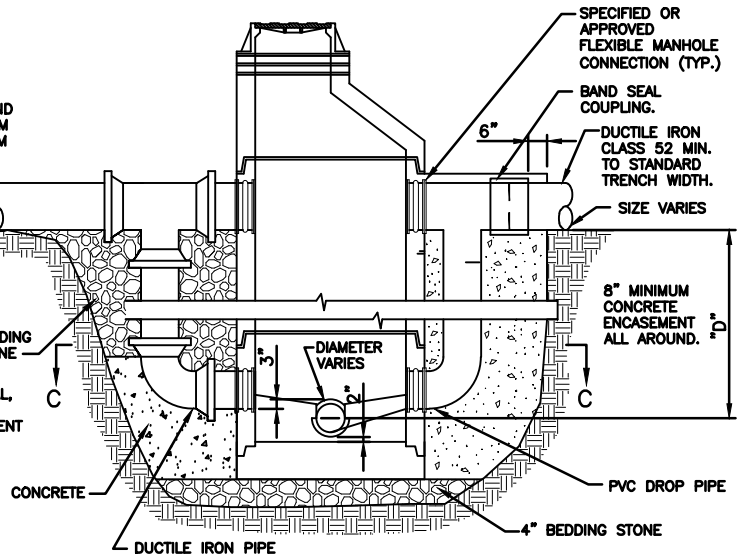
STANDARD DETAIL











NOTES

1. DETAILS RELATIVE TO ITEMS SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE SPECIFICATIONS AND THE APPLICABLE SPECIAL PROVISIONS.

2. VARIATIONS IN DIMENSIONS AND DESIGN MAY BE PERMISSIBLE, PROVIDING EQUIVALENT CAPACITY AND STRENGTH ARE ATTAINED.

3. ALL CONCRETE FILLETS SHALL BE HAND TROWELED WITH A 1/4"/FT. SLOPE.

4. INSIDE DIMENSIONS FOR MANHOLES: USE MINIMUM 4' DIAMETER FOR SEWER LESS THAN 18" IN DIAMETER; USE MINIMUM 5' DIAMETER FOR SEWER 18" THRU 24" IN DIAMETER; USE MINIMUM 6' DIAMETER OR MINIMUM 6' SQUARE FOR SEWER OVER 24" IN DIAMETER.

5. BEDDING CLASSES "B" AND "C" SHALL MEET OR EXCEED ASTM C12 REQUIREMENTS.

6. DROP TYPE ENTRANCE TO STANDARD MANHOLE WILL BE PAID FOR SEPARATELY IF SO LISTED IN THE BID.

7. SEE DRAWINGS FOR DROP TYPE ENTRANCES FOR SANITARY SEWERS LARGER THAN 15".

8. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF REGULATORY BODIES OF THE STATE AND APPLICABLE MUNICIPAL ORDINANCES.

9. ALL NEW CONSTRUCTION SHALL BE PLACED ON UNDISTURBED EARTH OR STONE BEDDING.

10. FLAT SLAB TOPS SHALL BE DESIGNED FOR H-20 TRUCK LOADING AND SHALL MEET REQUIREMENTS OF ASTM C-478.

11. BASE SLABS SHALL BE REINFORCED AS FOLLOWS: REINFORCING SHALL BE PLACED IN EACH DIRECTION AT 2" CLEAR FROM TOP SURFACE OF SLAB, REINFORCING SHALL BE GRADE 60. USE OF CAST-IN-PLACE SLAB SHALL NOT RELIEVE CONTRACTOR OF REQUIREMENTS TO PROVIDE WATERTIGHT JOINTS.

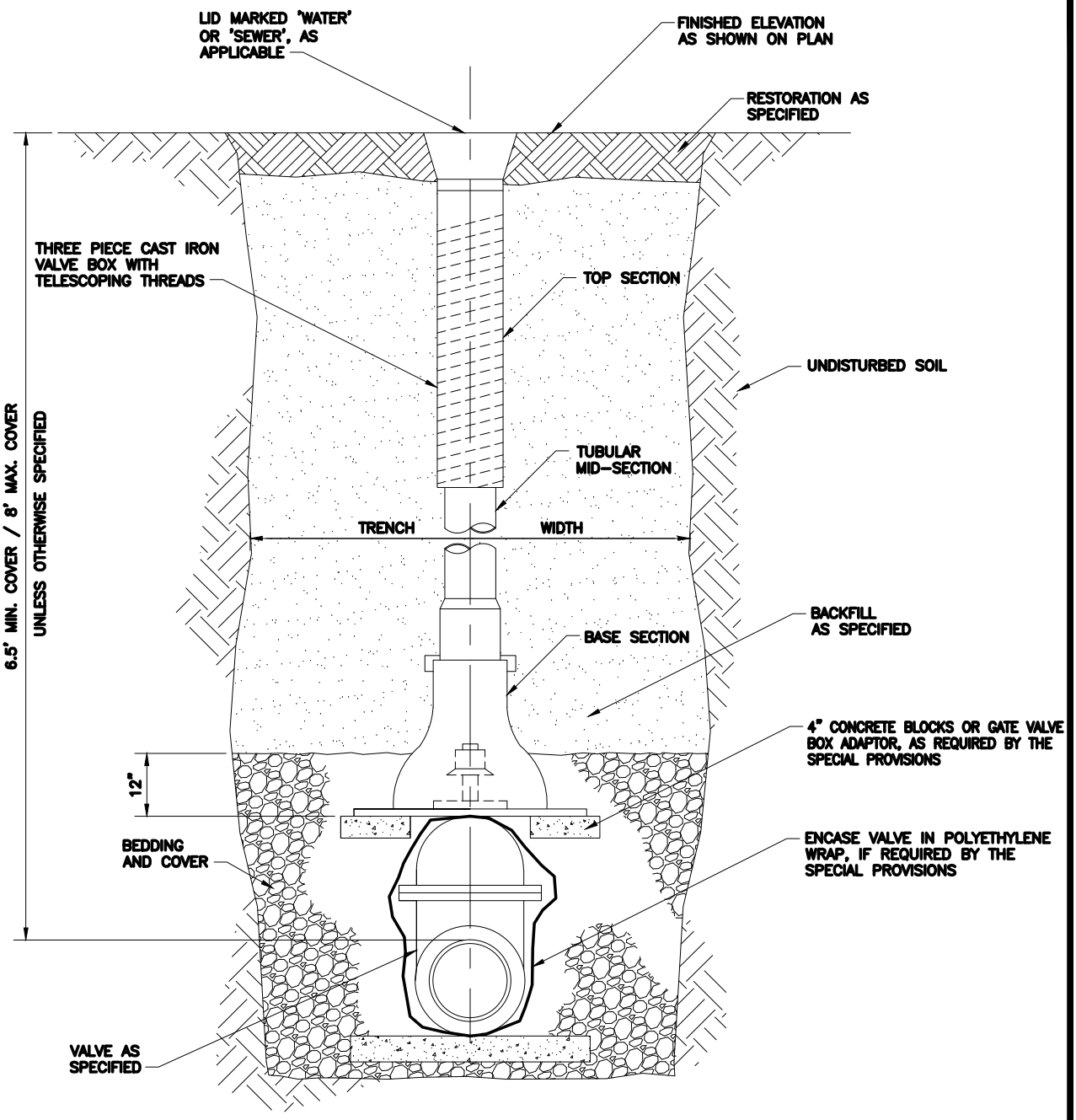
INSIDE DIA.	DEPTH	REINF.
4'	≦ 30'	#3@8"
5'	≦ 20'	#3@8"
5'	20'-30'	#4@10"
6'	≦ 20'	#4@10"
6'	20'-25'	#4@8"
6'	25'-30'	#4@6"

12. FLAT SLABS SHALL BE PROVIDED IN SHALLOW DEPTH SITUATIONS IN LIEU OF ECCENTRIC CONES.

STRAND ASSOCIATES®

01-975-43A

OCTOBER 2011



STANDARD BURIED GATE VALVE BOX SETTING

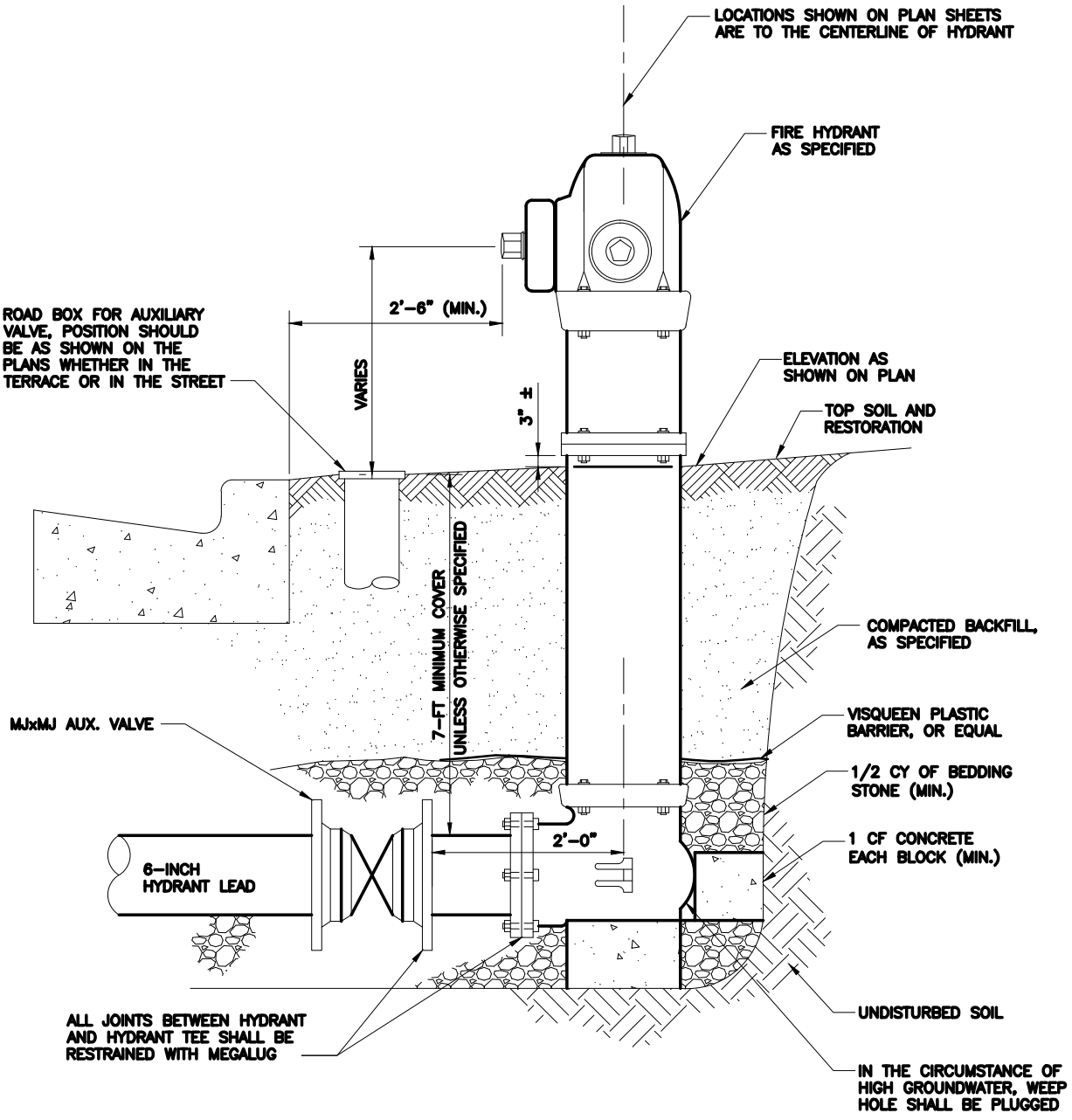
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OCTOBER 2011

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HYDRANT INSTALLATION

STANDARD DETAIL

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OCTOBER 2011

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GEOTECHNICAL REPORT

Report of Geotechnical Exploration
South Hopkins Water Tank & Pump Station
Madisonville, Hopkins County, Kentucky
S&ME Project No. 25360033

PREPARED FOR:

South Hopkins Water District
129 S. Main St.
Dawson Spring KY, 42408

PREPARED BY:

S&ME, Inc.
1913 Unruh Ct
New Albany, IN 47150

August 1, 2025

August 1, 2025

South Hopkins Water District
129 S Main St.
Dawson Springs, Kentucky 42408

Attention: Mr. Jon D. Blalock, Superintendent
E: jon1967@bellsouth.net

Reference: **Report of Geotechnical Exploration**
South Hopkins Water Tank & Pump Station
Madisonville, Hopkins County, Kentucky
S&ME Project No. 25360033

Dear Mr. Blalock:

S&ME, Inc. (S&ME) has completed our geotechnical exploration for the proposed new water tank and pump station located in Madisonville, Kentucky. This report describes our understanding of the project; the subsurface conditions encountered and presents our geotechnical recommendations for the planned construction. This work was performed in general accordance with S&ME Proposal No. 25360033 dated March 10, 2025, which was authorized by the South Hopkins Water District. on March 12, 2025.

Sincerely,

S&ME, Inc.

STATE OF KENTUCKY
ABIGAIL
CARR
39935
LICENSED
PROFESSIONAL ENGINEER

Abigail C. Carr, P.E.
Assistant Project Manager/Project Engineer

Deryk M. Kennedy, P.E.
Office Principal/Project Manager

Senior Review: Brad McLester, P.E. (NC) / Senior Engineer

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1.0 Introduction

S&ME, Inc. (S&ME) has completed our geotechnical exploration for the proposed new water tank and pump station located in Madisonville, Kentucky. This report describes our understanding of the project; the subsurface conditions encountered and presents our geotechnical recommendations for the planned construction. This work was performed in general accordance with S&ME Proposal No. 25360033 dated March 10, 2025, which was authorized by the South Hopkins Water District. on March 12, 2025.

The geotechnical exploration consisted of a total of six (6) soil borings (labeled B-01 through B-04, B-03A, and B-03B) advanced to depths ranging from 15 feet to 30 feet. Auger refusal was encountered in soil borings B-02, B-03, B-3A, and B-3B ranging in depths from 20.5 feet to 28.5 feet. Two additional rock soundings (labeled B-3R and B-05) were obtained to further evaluate the depth to bedrock along the perimeter of the proposed elevated tank footprint and obtain additional groundwater information.

The purpose of this exploration was to obtain subsurface data in order to evaluate the subsurface conditions and assess their characteristics relative to the support of the proposed elevated water tank and associated pump station.

A Site Location Map (Figure 1), Boring Location Plan (Figure 2), laboratory testing results, and typed boring logs are included in the Appendices of this report.

2.0 Project Information

Our understanding of the project is based on email correspondence between Mr. Mark Askin, P.E. of Strand Associates and Mr. Deryk Kennedy, P.E. of S&ME during the week of March 4, 2025. Appended to the email was a satellite picture of the proposed site location.

Based on our review of the relevant project information, we understand the proposed development calls for the construction of a new elevated multileg water tank and a premanufactured pump station adjacent to the existing Hopkins County Central High School. Specifically, the tank will be located at 37.25018 N, 87.47892 W. The water tank will have a 200,000-gallon capacity and the pump station will be able to accommodate 300 gallons per minute. The tank will have a diameter of 30 feet or less and will be supported by three or four legs. No below-grade structures are planned.

At the time of this proposal, tank diameter, number of legs and configuration, structural loads and settlement tolerances, and proposed site grading were under development and were not provided or available to be included in this report. Based on our review of site elevations, site grades around the proposed tank indicate about 5 feet of vertical relief across the site elevations of approximately 428 ft to 432 ft. Please refer to the Boring Location Plan (Figure 2) in Appendix I for site specific information.

3.0 Regional Geology

The project site is located within the Lisman or Sturgis Formation which is part of the Madisonville East Quadrangle. The surficial geology in the area is characterized by Holocene aged alluvium and alluvial fan deposits characterized as brown, grayish brown, and light brownish gray silt loam and silty clay loam which is underlain by reddish brown to dark reddish brown, crossed bedded and moderately sorted with medium to fine sand. Our review of the geologic mapping for the area (ngmdb.usgs.gov), indicates that bedrock at this project site is part of the Upper Pennsylvanian Group and reportedly consists of limestone, sandstone, claystone, shales, and coal. Bedrock is reported near El. 380, or at depths greater than 50 feet below the existing ground elevation at the site. Our borings extended to a maximum depth of about 30 feet or approximate El. 400 without encountering bedrock. The results of our exploration are generally consistent with the reported geologic mapping for the site.

4.0 Exploration Methods

The procedures used by S&ME for field and laboratory sampling and testing are in general accordance with ASTM procedures and established engineering practice. Appendices II and III contain brief descriptions of the procedures used in this exploration.

4.1 Field Exploration

A total of eight (8) soil test borings (labeled B-01 through B-05, B-03A, B-03B and B-03R) were performed for this geotechnical exploration and were extended to the depths shown in Table 4.1. The boring locations were staked in the field and cleared for utility conflicts by 811 prior to the field exploration by S&ME.

Boring B-04 was terminated at its target depth of 30 feet while the other borings terminated between 15.0-28.5 ft due to auger refusal. Boring B-01 was relocated to 50 feet to the west as requested by the client. B-05 and B-03R were completed as soundings to confirm rock depth and for groundwater information.

The borings were performed on two separate occasions using a truck-mounted CME-57 drill rig with 3¼-inch hollow stem augers and a track-mounted Diedrich D-50 with 4½-inch hollow stem augers. Soil samples were obtained using a split-barrel sampler driven by an automatic hammer system in general accordance with ASTM D1586. Select cohesive samples were obtained using thin-walled undisturbed samples (Shelby) tubes in general accordance with ASTM D1587. Split-barrel samples were examined immediately after recovery and representative portions of each sample were placed in air-tight containers and retained for subsequent laboratory testing. Shelby Tube samples were measured for recovery and sealed at both ends with wax and plastic end caps for transportation to the laboratory.

A general description of our field procedures, a soil log legend, and boring logs are provided in Appendix II of this report. The stratification lines shown on the boring logs represent the approximate boundaries between soil types. The actual transitions may be more gradual than shown.

Approximate boring coordinates and estimated elevations are summarized in Table 4.1. The approximate locations of the borings are shown on the Boring Location Plan (Figure 2) in Appendix I.

Table 4.1 – Boring Coordinates Summary

Boring No.	Longitude (degrees)	Latitude (degrees)	Approx. Surface Elevation (ft)	Approximate Location	Termination Depth (ft)
B-01	37.250322	87.478792	428	Pump building	15.0
B-02	37.250331	87.479408	431	Outside perimeter of tank	24.2
B-03	37.250217	87.479450	432	Outside perimeter of tank	20.5
B-04	37.250239	87.479311	432	Outside perimeter of tank	30.0
B-03A	37.250233	87.479467	431	Outside perimeter of tank	28.0
B-03B	37.250200	87.479439	432	Outside perimeter of tank	28.5
B-03R	37.250217	87.479450	432	Outside perimeter of tank	28.0
B-05	37.250315	-87.479329	432	Outside perimeter of tank	27.5

The groundwater levels in each boring were recorded during drilling and after the removal of augers, prior to backfilling with cuttings. The results of the groundwater level observations are presented on the appended boring logs and summarized in Section 5.3 of this report.

4.2 Laboratory Testing

The recovered soil samples were returned to our laboratory where applicable laboratory tests were performed. These tests are used to assess the engineering properties of the soil. The soil samples were visually classified by a geotechnical engineer in accordance with the Unified Classification System (ASTM D2487). The results of the soil classification and the field test results, are presented on the individual boring logs in Appendix II. Similar soils were grouped into strata on the logs and summarized in Section 5.1 below.

Selected split-barrel and undisturbed samples were subjected to the following laboratory tests:

- Natural Moisture Content (ASTM D2216)
- Atterberg Limit Tests (ASTM D4318)
- Grain Size Analyses (ASTM D422)
- Unconfined compressive strength tests (soil) (ASTM D2166)
- Unconfined compressive strength tests (rock) (ASTM D2938-95)

5.0 Subsurface Findings

The following is a brief and general description of the subsurface conditions encountered in the borings. More detailed descriptions are provided in the individual boring logs included in Appendix II.

5.1 Soil Stratification

5.1.1 Surface Material

The soil borings were advanced through topsoil (in borings B-01 through B-04, B-03A and B-03B) that cover the project site. The topsoil was generally described as dark to light brown, 1 to 4 inches in thickness, with variable amounts of root hairs and other organic materials.

5.1.2 Group A – Lean Clay (CL)

Lean Clay (CL) was the predominant soil type observed during the exploration and was encountered in each of the borings underlying the surface materials and extending to depths ranging from 0.1 feet below ground surface (bgs) to 20 feet bgs. This stratum was observed to generally vary in color from brown to gray, with varying amounts of weathered shale. Recorded SPT N-values ranged from 2 blows per foot (bpf) to greater than 50 bpf, indicating a very soft to hard consistency. Of note as the upper portions of this top stratum were lower consistency than the underlying material with shear strength generally increasing with depth. Laboratory testing performed on representative samples of this clay had liquid limits ranging from 38 percent to 44 percent, and plasticity index ranging from 21 percent to 26 percent indicating a low to moderate plasticity. Natural moisture contents ranged from 4.8 percent to 26.2 percent. These test data generally indicate over consolidated soils with gradually increasing strength with depth.

5.2 Laboratory Testing Results

A summary of the classification testing is presented in Table 5.1. Individual laboratory testing reports are included in Appendix III.

Table 5.1 – Classification and Atterberg Limit Testing Summary

Boring No.	Depth (ft)	USCS Classification	% Fines	Natural Moisture (%)	Liquid Limit	Plastic Limit (%)
B-01	3.0 to 5.0	CL	88	23.2	38	17
B-02	3.0 to 5.0	CL	96	22.0	41	20
B-03	3.0 to 5.0	CL	95	20.8	42	16
B-04	3.0 to 5.0	CL	94	21.5	44	17

5.3 Groundwater

Groundwater was not encountered in any of our soil test borings at the time of drilling or after the removal of augers. However, groundwater was encountered in the two rock soundings (B-05 and B-3R) at depths of 20 and 21 feet, respectively, and may represent the groundwater level in the general vicinity at the time the borings were drilled. Seasonal and periodic variations in precipitation can also affect the observed water level conditions. Long-term static groundwater readings can be obtained with the installation and periodic monitoring of piezometers, which was not performed at this site for this project.

6.0 Analyses and Recommendations

6.1 General Discussion

Our evaluation is based on the following criteria, assumed based on our experience with projects of this nature:

- The proposed tank, while not fully designed, is expected to perform successfully even if 3.0 inches of total settlement occurs, and if 1-inch of total settlement occurs for the shallow spread foundation supporting the pump building.
- A maximum tilt of 1/300 is assumed to be tolerable. This translates to a maximum allowable differential settlement of 3.0 inches between the center of the tank and the perimeter.

Structural loads for the 200,000-gallon tank are proposed to be supported on a ring foundation bearing approximately 10 feet below existing site grades. Soils encountered at this depth consisted of stiff to very stiff cohesive (CL) soils. These conditions are generally suitable to support the proposed foundation. However, some undercutting to remove soft and/or disturbed soil may be required in some locations. Shallow seasonal or perched groundwater may have an impact on construction activities and the structural capacity of the soil; hence, dewatering may be necessary. These items are described in the sections below.

Please note that details of the structural design were not available when this report was completed. Once final tank configuration, foundation loading, finished levels, etc. are known, we should be provided with this information to confirm that our conclusions herein are applicable. Some modifications to our recommendations may be needed. This review and related modifications can be provided under a separate scope of services.

The following recommendations are based upon the project information provided as summarized in the foregoing text. We identified the following key geotechnical issues that may impact the development of this site:

- Soft Cohesive Near Surface Soils
- Site Degradation During Construction
- Construction Monitoring
- Site Preparation

6.1.1 Soft Cohesive Near Surface Soils

Soft near surface cohesive soils were encountered during our exploration in each of our soil borings, with the exception of boring B-03. Additionally, clayey soils are prone to degradation during wet periods and are generally unstable under wheeled construction traffic. The contractor is advised to take precautions to minimize repetitive construction traffic over exposed soils.

Unstable soils may be present immediately below aggregate base course stone throughout the site. The contractor should expect selective undercutting throughout the site to address soft/unstable areas. It is our recommendation that soft soils be undercut to allow shallow foundations to bear on clay soils that are firm or better.

6.1.2 Site Degradation During Construction

As previously discussed, the site is overlain by clayey soils. If grading operations are performed during periods of wet weather, this zone will not perform satisfactorily with regard to site access and stability. Surface water and construction traffic should be directed away from construction activities.

6.1.3 Construction Monitoring

S&ME should be on-site during the construction activities performed at the project site to comply with the recommendations provided in this report and to provide remedial activities, where necessary.

6.1.4 Site Preparation

Prior to placing new fill or construction materials, all vegetation, topsoil, organic soils, abandoned utilities, or any unsuitable soils should be stripped from the proposed tank location. Following stripping and necessary undercutting, the entire exposed subgrade should proofrolled using a heavily loaded, tandem axle truck to locate any soft, wet, or weak zones. Any observed unsuitable materials, or subgrade soils which exhibit significant pumping and/or rutting during proofrolling should be stabilized using one of the following methods:

- Scarifying, aerating, and recompacting.
- Over-excavating and replacing with suitable fill.
- Using a geogrid on top of the subgrade in connection with granular base; or,
- Using chemical stabilization techniques.

The determination of which of the four methods is appropriate for remediation of weak portions of the subgrade could be best determined by an S&ME representative witnessing a proofroll. If below-grade excavations are not accessible to proofrolling, then the exposed soils at the bearing elevations should be observed, and if accessible, hand probed by a qualified geotechnical engineer or their representative to determine if weak or wet zones are present.

6.2 Fill Placement

In areas where new fill is anticipated for support of structures, including any trench backfill placed within the zone of influence, we recommend the fill material meets the following minimum requirements:

1. Fill should be free of deleterious materials and rock fragments greater than 4 in. in diameter.
2. Organic contents less than 4%
3. Uniformly spread in 6- to 8-in. thick loose lifts
4. Compacted at least 98 percent of the soil's maximum dry density, as determined by the laboratory Standard Proctor compaction test (ASTM D698)
5. The moisture content of any soil used as structural fill should be controlled at plus to minus 2 percent of the optimum moisture content during all compaction operations.

Based on the conditions of the soil encountered in the borings, portions of the existing soils can be reused as structural fill provided the soils are properly moisture conditioned. All topsoil, organic materials, debris, cobbles, and boulders should be separated from structural fill for possible future reuse. New fill should not be in a frozen

condition when placed and should not be placed on a frozen subgrade. The final determination of whether an on-site soil is suitable for structural fill should be made in the field by a qualified technician, under the direction of a licensed Professional Engineer.

6.3 Open Trench Excavation

Sloughing and caving of excavations should be anticipated in weaker cohesive soils, and in granular soils. Provisions should be made to brace the walls of all excavations or slope the excavation walls back at a safe angle in accordance with the most recent Occupational Safety and Health Administration (OSHA) excavation rules and regulations. The contractor is solely responsible for site safety. This information is provided only as a service and under no circumstances should S&ME be assumed to be responsible for construction site safety.

Based upon field SPT results and laboratory strength tests, soils will typically classify as OSHA Type B with maximum slopes of 1H:1V (horizontal to vertical) to the existing ground surface in accordance with OSHA guidelines. The proposed soil type can be used provided the soil is not subjected to vibration and remains dry (no seepage or presence of perched groundwater). Flatter slopes are allowed, but the excavated slopes should not be steeper than the OSHA guidelines. As excavations are made, the competent person in charge of operations should evaluate the soils to determine the appropriate benching or shoring methods required per OSHA guidelines. Granular soils (e.g., sand and gravel) should be excavated/shored according to the OSHA guidelines.

In general, any existing underground utilities, pavement, or structures within the influence zone of an open-cut trench may be susceptible to lateral movements if the excavations are not fully braced as the excavations are performed. The influence zone of the trench may be determined by extending an imaginary line from the base of the excavation to the ground surface using an inclination of approximately 45 degrees with the horizontal. Therefore, provided the lateral distance to and the depth of the existing utility or structure are known, a determination may be made as to whether the utility or structure is in the zone which may be affected by the proposed excavation. The risk of lateral movement within the influence zone increases with both the length of the excavation and the time the trench remains open. Thus, requiring the contractor to limit open trench excavation length to that which can be backfilled the same day as the excavation is performed would reduce the risk of lateral movement of the trench side walls.

If there is no tolerance for lateral movement of an existing underground utility or above ground structure located within the influence zone of an excavation, S&ME recommends that the trench excavations be directly braced at the time of the excavation. To be effective, the bracing must be designed to minimize deflection along the entire height and be constructed “tight” against the retained soil. If lateral movement cannot be tolerated, a bracing system must be installed before the excavation is made.

6.4 Shallow Foundations

Based on conditions encountered in the borings, we anticipate the tank foundation will bear in natural medium-stiff to stiff cohesive soils (CL, CL-ML). Based on experience with similar structures, we anticipate the tank will be supported on a reinforced concrete ringwall bearing approximately 10 feet below existing ground surface, and the pump building will be supported on conventional shallow (spread) foundation bearing approximately 3 feet below existing ground surface. If the final structural design will bear at a shallower depth, we should be informed as settlement and soil strength may differ in softer near surface soils.

6.4.1 Ringwall (Shallow Foundation)

- A net allowable bearing pressure of 2,500 pounds per square foot (psf) may be used for the design of the continuous spread perimeter foundation bearing roughly 10 feet below the existing ground surface in natural medium-stiff to stiff soils.
- If weak natural soils or existing uncontrolled fill are encountered at the plan foundation bearing elevation, the footing excavations should be extended through these zones to stronger, more suitable natural bearing soils. The footing over-excavations below the plan bearing elevation can be backfilled with low-strength concrete having a minimum 28-day compressive strength of 1,500 psi or with additional footing concrete. This low strength concrete should be placed at least 24 hours prior to the placement of footing concrete;
- Footings should be placed at least 36 inches below the lowest adjacent grade for frost protection or in accordance with local codes.
- Footings designed and constructed in accordance with the foregoing recommendations and procedures will have a factor of safety of at least 3 with respect to shearing strength.
- Considering a ring foundation bearing roughly 10 feet below grade, we have estimated that total settlement will be within tolerable ranges (i.e., less than 3 inches total and differential) for the tank.
- Considering groundwater levels observed in the borings, we anticipate that dewatering will likely not be required to construct the tank foundation.
- The foundation recommendations presented above are applicable to the tank floor system as well.

The foundation excavations should be free of debris, as well as free of water at the time of the concrete placement. Surface water infiltration can be minimized by grading the ground surface adjacent to the foundation excavations to prevent surface runoff from entering the foundation excavations.

All foundation excavations should be observed by the engineer of record or their representative to determine that suitable bearing soils are present and capable of supporting the loads as designed and to minimize the amount of undercut required during excavation if weak or unsuitable soil conditions or existing fill are encountered.

6.4.1.1 Uplift and Lateral Resistance

To resist potential uplift pressures created by groundwater, any below-grade structures, such as for the pump station, should be designed for uplift pressures resulting from the difference in elevation between the maximum anticipated hydrostatic head around the structures and the bottom of mat or floor of the structures. The structure dead weight and the frictional resistance developed between the backfill and structure walls must provide an adequate factor of safety against the anticipated hydrostatic uplift force. Uplift resistance may be increased by increasing the dead weight of the structure (mat and/or walls), cantilevering the mat foundation beyond the walls, or anchoring the mat/foundation to the underlying soil using piles or post-tensioned anchors. We assume the effort to install piles, or post-tensioned anchors would be greater than the effort of either increasing the structure dead weight or cantilevering the mat foundation beyond the walls. If recommendations for piles or anchors are desired, please contact us.

For uplift resistance calculations, the top 3-feet of soil shall be ignored due to frost depth, and due to the smooth nature of the proposed tank, a wall-soil interface friction coefficient is assumed to equal 0.5 * Effective Friction Angle (Φ) of the backfill material.

An additional option to reduce buoyancy forces would be to shift site grades up vertically, to decrease disturbance of the high groundwater table. If the tank bearing elevation is shifted without changing site grades, the structural engineer will need to confirm that the tank still meets sliding and overturning requirements.

6.4.2 Spread Footings

For the pump station building, a maximum allowable bearing pressure of 2,500 psf may be used such that the magnitude of post-construction settlement is less than 1-inch and the shallow foundations (column or wall) bear on at least 12 inches of compacted dense graded aggregate (DGA) such as INDOT #53 crushed limestone, above the stiff native cohesive (CL) soils as encountered in boring B-3A. The above bearing pressure considers that the column footings are 3 feet x 3 feet maximum dimension, and the wall footings are at least 24 inches wide, both bearing at least 3feet deep for protective embedment, and also on the premise that foundation subgrade is prepared as recommended in this report.

6.4.3 Tank Slab on Grade

It is our understanding that a non-structural slab will be constructed below the tank for maintenance access. Slabs will be supported by existing natural soils. We recommend at least the upper three feet of pad subgrades consist of low plasticity fill with a plasticity index (PI) of less than 30 percent. Most on-site lean clays (CL) do not meet this plasticity requirement. Soils beneath the tank foundations that are not within this range should be undercut and replaced, or chemically stabilized to prevent possible differential settlement due to expansion or contraction of the subgrade soils.

We suggest a layer of compacted dense-graded aggregate (DGA) or quarry screenings directly beneath the slab to enhance support and provide a working base for construction of the slab. The actual thickness should be based on the floor slab design, but our experience suggests a minimum depth of 4 inches. The DGA or quarry screenings should be moist, but not wet, as the concrete is placed to reduce curling of the slab as the concrete cures. The The upper 1-foot of subgrade below floor slab aggregate base course should be compacted to at least 100 percent of maximum dry density within 3 percent of the optimum moisture.

Floor slabs prepared in the manner described are expected to provide a modulus of subgrade reaction (k-value) of 50 pci.

6.5 Retaining Walls and Lateral Earth Pressure Recommendations

Below-grade portions of proposed structures, or walls acting as retaining walls, should be designed to withstand lateral earth pressures, as well as hydrostatic pressures, which may develop behind the walls. If it is anticipated that the walls of the proposed structures will be fixed at both the top and bottom preventing significant lateral deflections or rotations from occurring, then an "at-rest" earth pressure condition exists. If the walls can deflect a distance of at least 0.1 percent of their height, then an "active" earth pressure condition may be assumed for design purposes. The magnitude of lateral earth pressures varies based on soil type, permissible wall movement, and configuration of backfill.

Because cohesive soils and granular soils with significant clay content can cause high magnitudes of lateral loads due to creep and swelling pressures, these materials should not be used to backfill against below-grade walls. A free-draining granular material such as bank run sand and gravel containing a maximum of 20 percent passing the

No. 200 sieve, or a coarse angular gravel such as No. 57 limestone, should be used as backfill against below-grade walls. This granular zone should be drained to reduce hydrostatic pressures, but for the anticipated embedded foundation configuration, hydrostatic pressure will be unavoidable and should be considered in wall design. It is unknown at this time what material type will be used behind the below-grade walls. However, design parameters for the conditions encountered in the upper 15 feet in our borings at the site are presented in Table 6.1.

Table 6.1 – Lateral Earth Pressure Design Parameters

Backfill Parameters:	Existing Cohesive Soil	Coarse Angular Gravel (No. 57 limestone)
Equivalent Fluid Pressure		
Active Case	57 pcf	34 pcf
Passive Case	192 pcf	390 pcf
At-Rest Case	74 pcf	52 pcf
Earth Pressure Coefficient		
Active Case (K_a)	0.55	0.29
Passive Case (K_p)	1.83	3.39
At-Rest Case (K_0)	0.71	0.46
Unit Weight (pcf)		
Moist	105	115
Saturated	130	120
Buoyant	43	58
Effective Friction Angle (Φ)	17°	33°

The soil backfill placed behind below grade structures should be compacted to a similar requirement recommended in Section 6.3 of this report. We caution that operating compaction equipment directly behind the wall structures can create lateral earth pressures far in excess of those recommended for design. Therefore, bracing of the walls may be needed during backfilling.

6.6 Seismic Site Class and Design Spectral Accelerations

Based on the subsurface stratigraphy encountered within the borings, standard penetration resistance (blow counts), estimated shear strength values, and the estimated stratigraphy between the bottoms of the borings and 100 feet below existing grades, it is the opinion of S&ME that this site is best characterized by Seismic Site Class D in accordance with the 2018 Kentucky Building Code, which references the 2018 International Building Code and ASCE 7-10. The resulting design spectral accelerations are presented in Table 6.3.

Table 6.3 – Design Spectral Acceleration

Site Class	PGA	S_s	S_1	F_{PGA}	F_a	F_v	S_{DS}	S_{D1}	Seismic Design Category
D	0.182g	0.39g	0.114g	1.44	1.5	2.3	0.159g	0.114g	B (RC I-III)

6.7 Groundwater Considerations

Based on the water levels recorded during and after drilling and included in Section 5.3 of this report and the depths of excavation required it should be anticipated that groundwater will not be encountered during excavation for the tank foundations as water was 20 to 21 feet below grade at the time of drilling. If groundwater is encountered during construction due to seasonable fluctuations or perched water, and pumping from a system of sumps and pumps cannot sufficiently maintain the water level a minimum of 2 feet below the bottom of foundation subgrade or surface being compacted, then more extensive dewatering techniques, such as wells or a well-point system may be necessary for dewatering.

If perimeter drains are placed slightly below foundation bearing elevations surrounding the tank, slotted PVC pipe should be used wrapped in a geotextile to prevent fines migration. The pipe trench shall be backfilled with free-draining aggregate and either daylighted or pumped away from the tank foundations.

The presence of water in trenches, coupled with construction activity, will soften and weaken any cohesive soils present at the bottom of the excavations, and these affected materials may cause settlement beneath a pipe or structure following backfilling. Therefore, the bottom of all excavations should be kept free of standing water, and any softened, weakened, or disturbed materials should be removed and replaced with select granular backfill.

7.0 Limitations of Report

This geotechnical report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other representation or warranty either express or implied, is made.

We relied on project information given to us to develop our conclusions and recommendations. If the project information described in this report is not accurate, or if it changes during project development, we should be notified of the changes so that we can modify our recommendations based on this additional information if necessary.

Our conclusions and recommendations are based on limited data from a field exploration program. Subsurface conditions can vary widely between explored areas. Some variations may not become evident until construction. If conditions are encountered which appear different than those described in our report, we should be notified. This report should not be construed to represent subsurface conditions for the entire site.

Unless specifically noted otherwise, our field exploration program did not include an assessment of regulatory compliance, environmental conditions or pollutants or presence of any biological materials (mold, fungi, bacteria).

If there is a concern about these items, other studies should be performed. S&ME can provide a proposal and perform these services if requested.

Appendices

Important Information About Your
Geotechnical Engineering Report

Variations in subsurface conditions can be a principal cause of construction delays, cost overruns and claims. The following information is provided to assist you in understanding and managing the risk of these variations.

Geotechnical Findings Are Professional Opinions

Geotechnical engineers cannot specify material properties as other design engineers do. Geotechnical material properties have a far broader range on a given site than any manufactured construction material, and some geotechnical material properties may change over time because of exposure to air and water, or human activity.

Site exploration identifies subsurface conditions at the time of exploration and only at the points where subsurface tests are performed or samples obtained. Geotechnical engineers review field and laboratory data and then apply their judgment to render professional opinions about site subsurface conditions. Their recommendations rely upon these professional opinions. Variations in the vertical and lateral extent of subsurface materials may be encountered during construction that significantly impact construction schedules, methods and material volumes. While higher levels of subsurface exploration can mitigate the risk of encountering unanticipated subsurface conditions, no level of subsurface exploration can eliminate this risk.

Scope of Geotechnical Services

Professional geotechnical engineering judgment is required to develop a geotechnical exploration scope to obtain information necessary to support design and construction. A number of unique project factors are considered in developing the scope of geotechnical services, such as the exploration objective; the location, type, size and weight of the proposed structure; proposed site grades and improvements; the construction schedule and sequence; and the site geology.

Geotechnical engineers apply their experience with construction methods, subsurface conditions and exploration methods to develop the exploration scope. The scope of each exploration is unique based on available project and site information. Incomplete project information or constraints on the scope of exploration increases the risk of variations in subsurface conditions not being identified and addressed in the geotechnical report.

Services Are Performed for Specific Projects

Because the scope of each geotechnical exploration is unique, each geotechnical report is unique. Subsurface conditions are explored and recommendations are made for a specific project.

Subsurface information and recommendations may not be adequate for other uses. Changes in a proposed structure location, foundation loads, grades, schedule, etc. may require additional geotechnical exploration, analyses, and consultation. The geotechnical engineer should be consulted to determine if additional services are required in response to changes in proposed construction, location, loads, grades, schedule, etc.

Geo-Environmental Issues

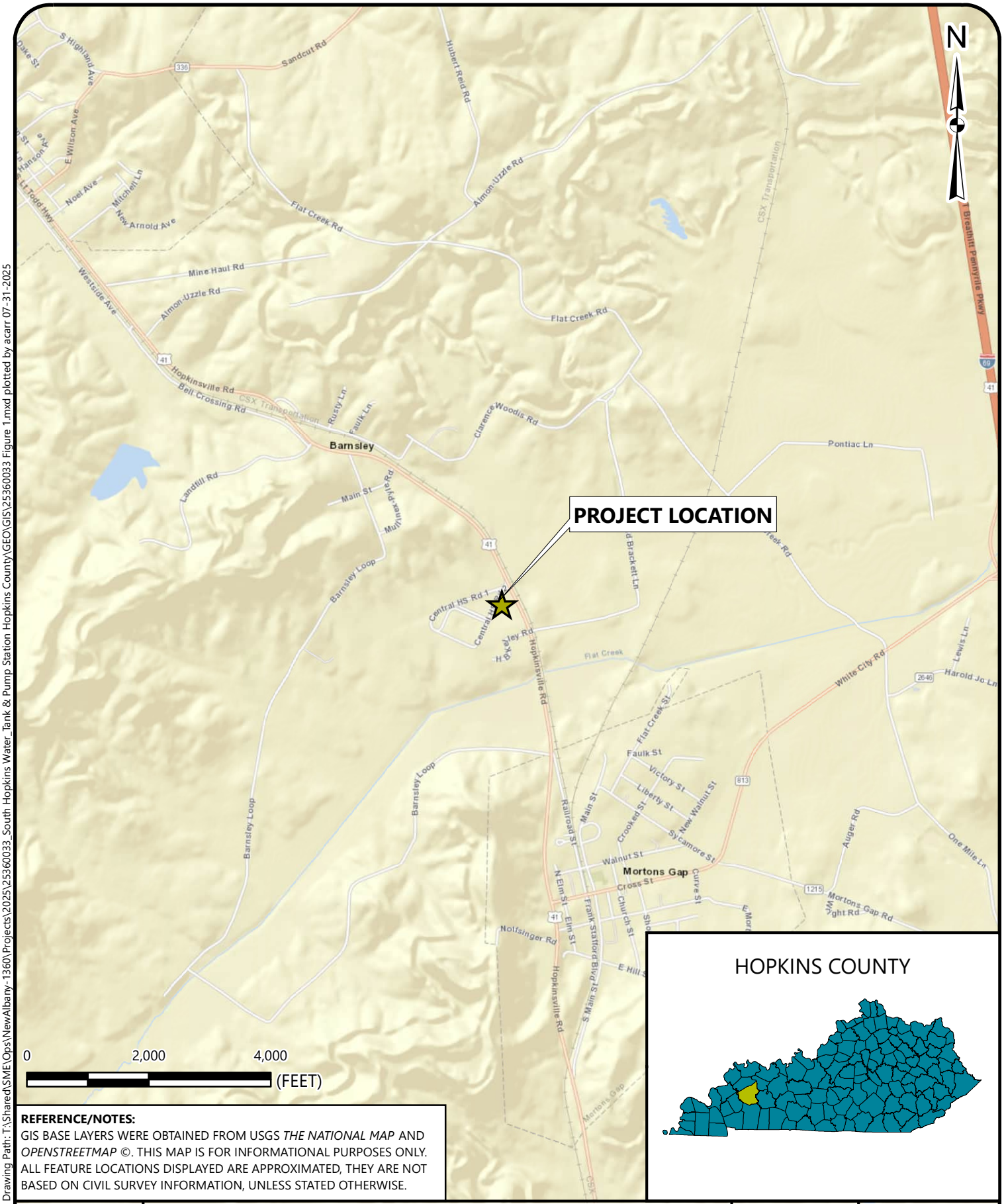
The equipment, techniques, and personnel used to perform a geo-environmental study differ significantly from those used for a geotechnical exploration. Indications of environmental contamination may be encountered incidental to performance of a geotechnical exploration but go unrecognized. Determination of the presence, type or extent of environmental contamination is beyond the scope of a geotechnical exploration.

Geotechnical Recommendations Are Not Final

Recommendations are developed based on the geotechnical engineer's understanding of the proposed construction and professional opinion of site subsurface conditions. Observations and tests must be performed during construction to confirm subsurface conditions exposed by construction excavations are consistent with those assumed in development of recommendations. It is advisable to retain the geotechnical engineer that performed the exploration and developed the geotechnical recommendations to conduct tests and observations during construction. This may reduce the risk that variations in subsurface conditions will not be addressed as recommended in the geotechnical report.

Portion obtained with permission from "Important Information About Your Geotechnical Engineering Report", ASFE, 2004
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Appendix I – Additional Figures



REFERENCE/NOTES:
GIS BASE LAYERS WERE OBTAINED FROM USGS *THE NATIONAL MAP* AND *OPENSTREETMAP* ©. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED, THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

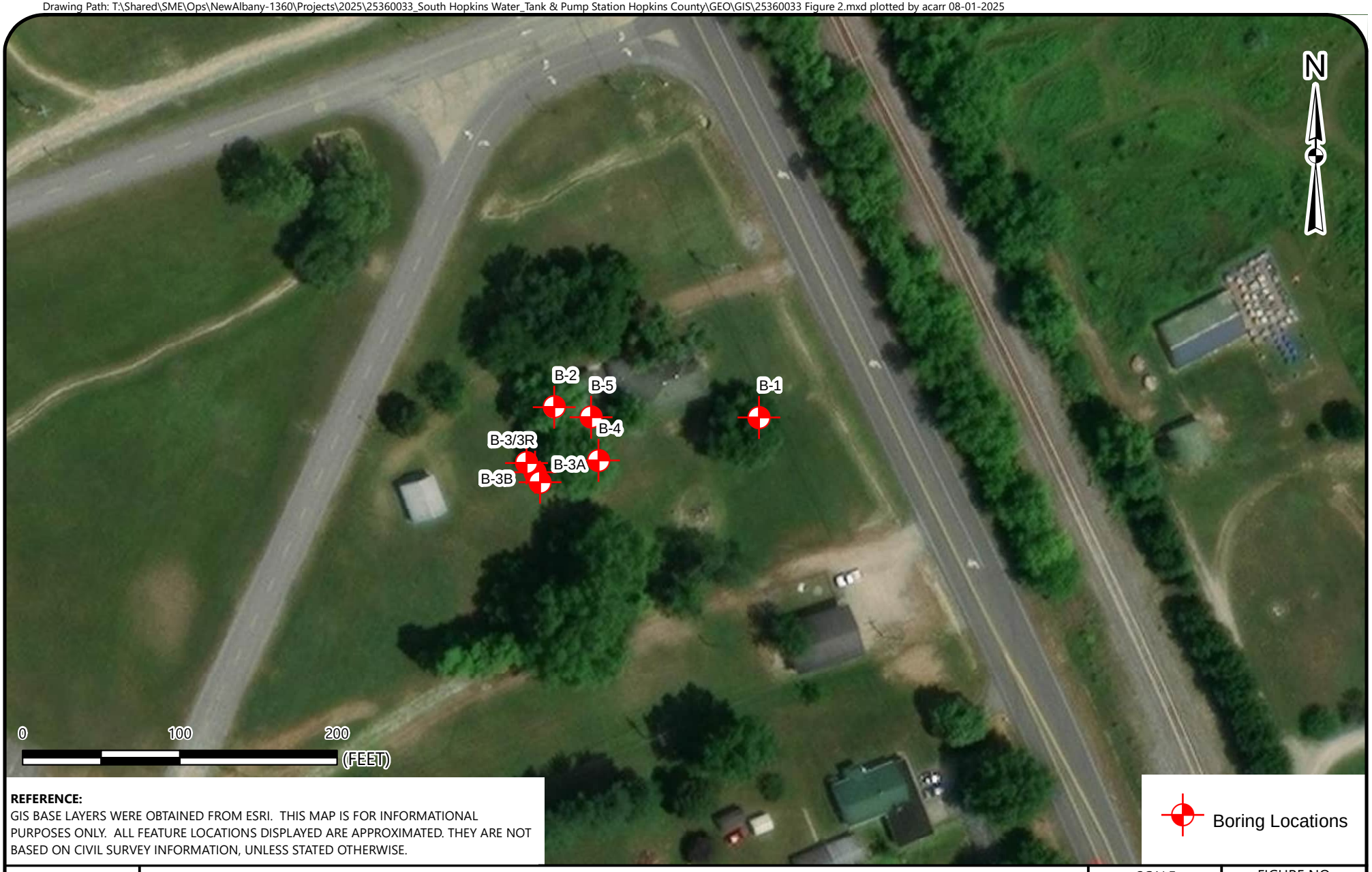
Drawing Path: T:\Shared\SME\Ops\NewAlbany-1360\Projects\2025\25360033_South Hopkins Water_Tank & Pump Station Hopkins County\GEO\GIS\25360033 Figure 1.mxd plotted by acarr 07-31-2025

VICINITY MAP

POTABLE ELEVATED WATER TANK AND PUMP STATION
MADISONVILLE, HOPKINS COUNTY, KENTUCKY

SCALE:	FIGURE No.
1:25,000	1
DATE: 7-31-25	
PROJECT NUMBER 25360033	

Drawing Path: T:\Shared\SME\Ops\NewAlbany-1360\Projects\2025\25360033_South Hopkins Water_Tank & Pump Station Hopkins County\GEO\GIS\25360033 Figure 2.mxd plotted by acarr 08-01-2025



REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM ESRI. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

BORING LOCATION PLAN

POTABLE ELEVATED WATER TANK AND PUMP STATION
MADISONVILLE, HOPKINS COUNTY, KENTUCKY

SCALE:	FIGURE NO.
1:1,000	2
DATE: 7-31-25	
PROJECT NUMBER 25360033	

Appendix II – Boring Logs

Summary of Field Procedures

Boring and Sampling

Soil Test Boring with Flight Auger

Soil sampling and penetration testing were performed in general accordance with ASTM D1586, *Standard Test Method for Penetration Test and Split Barrel Sampling of Soils*. Borings were made by mechanically twisting a continuous steel flight auger into the soil. At regular intervals, soil samples were obtained with a standard 1.4-inch I. D., 2-inch O. D., split barrel sampler. The sampler was first seated six inches to penetrate any loose cuttings, then driven an additional 12 inches with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler through the two final six inch increments was recorded as the penetration resistance (SPT N) value. The N-value, when properly interpreted by qualified professional staff, is an index of the soil strength and foundation support capability.

Soil Test Boring with Hollow-Stem Auger

Soil sampling and penetration testing were performed in general accordance with ASTM D1586, *Standard Test Method for Penetration Test and Split Barrel Sampling of Soils*. Borings were made by mechanically twisting a continuous steel hollow stem auger into the soil. At regular intervals, soil samples were obtained with a standard 1.4-inch I. D., 2-inch O. D., split barrel sampler. The sampler was first seated six inches to penetrate any loose cuttings, then driven an additional 12 inches with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler through the two final six inch increments was recorded as the penetration resistance (SPT N) value. The N-value, when properly interpreted by qualified professional staff, is an index of the soil strength and foundation support capability.

Auger Borings

Auger borings were advanced mechanically by a drill rig using a flight auger or hollow stem auger in general accordance with ASTM D1452, *Standard Practice for Soil Investigation and Sampling by Auger Borings*. The soils encountered were identified in the field by examining the cuttings brought to the surface. Soil consistency was qualitatively estimated by the relative difficulty of advancing the augers.

Undisturbed (UD) Sampling

Split spoon or split barrel sampling provide samples suitable for visual examination and classification tests but not sufficiently intact for quantitative laboratory testing. To provide samples for quantitative tests, relatively undisturbed samples were obtained by pushing sections of 3-inch O.D., 16-guage, steel tubing (Shelby tube) into the soil at the desired sampling intervals. The procedures used generally followed those described in ASTM D1587, *Standard Practice for Thin-Walled Tube Geotechnical Sampling of Soils*. Each tube, together with the encased soil, was carefully removed from the ground and the length of the recovered soil measured. Locations and depths of undisturbed samples were recorded on each field test boring record.

Refusal to Drilling

Refusal to the soil drilling methods used at this site may result from encountering hard cemented soil, soft weathered rock, coarse gravel, cobbles or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling would be required to determine the character and continuity of materials below refusal of the soil auger in natural soils. Where fills are present, refusal to drilling may also result from encountering buried debris, building materials, or objects. Backhoe test pits would be required to expose and identify buried materials below refusal levels in filled areas.

Borehole Closure

Following collection of relevant geotechnical data, boreholes were filled by slowly pouring auger cuttings into the open hole such that minimal "bridging" of the material occurred in the hole. Backfilling of the upper two feet of each hole was tamped as heavily as possible with a shovel handle or other hand held equipment, and the backfill crowned to direct rainfall away on the surface. Where boreholes exceeded five feet in depth, a plastic hole plug was firmly tamped into place within the backfill at a depth of about two feet.

Preservation and Transporting of Soil Samples with Control of Field Moisture

Procedures for preserving soil samples obtained in the field and transportation of samples to the laboratory generally followed those given in ASTM D4220, *Standard Practice for Preserving and Transporting Soil Samples* for Group B samples as defined in Section 4. Group B samples are those samples not suspected of being contaminated and for which only water content and classification, proctor, relative density, or profile logging will be performed. Group B samples also include bulk samples that are intended to be remolded in the laboratory for compaction, swell pressure, percent swell, consolidation, permeability, CBR, or shear testing. Representative samples of the cuttings or split spoon samples, or representative bulk samples, were placed in suitably identified, sealed glass jars or plastic containers and transported to the laboratory. Sample identification numbers on the containers corresponded to sample numbers recorded on field boring records or test pit records. Thin-walled tube samples were sealed at the ends with paraffin and capped with plastic end caps.

Preservation and Transporting of Intact Soil Samples

Procedures for preserving certain selected soil samples obtained in the field and transportation of those samples to the laboratory generally followed procedures given in ASTM D4220, *Standard Practice for Preserving and Transporting Soil Samples* for Group C samples as defined in Section 4. Group C samples are intact, naturally formed or field fabricated, samples for density determination, swell pressure, percent swell, permeability testing or shear testing with or without stress-strain plots or volume change measurement, including dynamic and cyclic testing. Representative thin walled tube samples were protected against vibration or shock, or extreme heat or cold, during transport to the laboratory. Sample identification numbers on the containers corresponded to sample numbers recorded on field boring records or test pit records. Thin-walled tube samples were sealed at the ends with paraffin and capped with plastic end caps. Samples were transported in the upright position in containers providing complete encasement in cushioning or insulation for individual samples.

Field Tests of Earth Materials

The subsurface conditions encountered during drilling were reported on a field test boring record by the chief driller. The record contains information about the drilling method, samples attempted and sample recovery, indications of materials in the borings such as coarse gravel, cobbles, etc., and indications of materials encountered between sample intervals. Representative soil samples were placed in glass jars and transported to the laboratory along with the field boring records. Recovered samples not expended in laboratory tests are commonly retained in our laboratory for 60 days following completion of drilling. Field boring records are retained at our office.

Measurement of Static Water Levels

Water level readings were made in the open boreholes immediately after completing drilling and withdrawal of the tools. Where feasible, measurements were repeated after an elapsed period of 24 hours to gauge the stabilized water level. Procedures for measurement of liquid levels in open boreholes are described in ASTM D4750, *Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)*. A weighted measuring tape was slowly lowered into each borehole until the liquid surface was penetrated by the weighted end. The reading on the tape was recorded at a reference point on the surface and compared to the reading at the demarcation of the wetted and unwetted portions of the tape. The difference between the two readings was recorded as the depth of the liquid surface below the reference point. Measurements made by this method were then repeated until approximately consistent values were obtained.

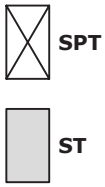
SOIL LOG LEGEND

SOIL PROPERTY SYMBOLS

N - Standard Penetration, bpf
LL - Liquid Limit, %
PPV - Pocket Penetrometer Value, tsf
NMC - Natural Moisture Content, %
PL - Plastic Limit, %
Qu - Unconfined Compressive Strength
F - Fines Content, %
PI - Plasticity Index, %
γd - Dry Unit Weight, pcf

The STANDARD PENETRATION TEST (SPT) as defined by ASTM D1586 (or AASHTO T206) is a method to obtain a disturbed soil sample for examination and testing and to obtain relative density and consistency information. A standard 1.4-inch I.D./2-inch O.D. split-barrel sampler is driven three 6-inch increments with a 140 lb. hammer freely falling 30 inches. The hammer can either be of a trip, free-fall design, or actuated by a rope and cathead. The SPT N Value is determined by adding the number of blows from the 2nd and 3rd 6-inch increments. A normalized blowcount (N_{60}) may be determined by the following equation: N_{60} = [Rig Energy Ratio (%) / 60] * N.

SHELBY TUBE (ST) samples are obtained by hydraulically pushing a thin-walled tube (typically 3-inches in diameter) to obtain a relatively undisturbed sample for testing of fine-grained soils to determine engineering properties such as strength, compressibility, permeability, and density. Shelby tubes are sampled in general accordance with ASTM D1587 (AASHTO T207).



Descriptive Order of Soil Strata: Geologic Disposition (i.e., Fill, Colluvium, Alluvium, etc.), ASTM Group Name (ASTM Group Symbol), quantified/qualified soil constituents, misc. constituents, consistency/density, color, organic description, moisture. ASTM group classifications is determined per ASTM D2487 where lab testing has been performed and ASTM D2488 where lab testing has not been performed.

ASTM GROUP NAME (SYMBOL) AND GRAPHIC

- WELL GRADED GRAVEL (GW)
- POORLY GRADED GRAVEL (GP)
- WELL GRADED GRAVEL WITH SILT (GW-GM)
- WELL GRADED GRAVEL WITH CLAY (GW-GC)
- POORLY GRADED GRAVEL WITH SILT (GP-GM)
- POORLY GRADED GRAVEL WITH CLAY (GP-GC)
- SILTY GRAVEL (GM)
- CLAYEY GRAVEL (GC)
- CLAYEY GRAVEL WITH SILT (GC-GM)
- WELL GRADED SAND (SW)
- POORLY GRADED SAND (SP)
- WELL GRADED SAND WITH SILT (SW-SM)
- WELL GRADED SAND WITH CLAY (SW-SC)
- POORLY GRADED SAND WITH SILT (SP-SM)
- POORLY GRADED SAND WITH CLAY (SP-SC)
- SILTY SAND (SM)
- CLAYEY SAND (SC)
- CLAYEY SAND WITH SILT (SC-SM)
- LEAN CLAY (CL)
- SILTY CLAY (CL-ML)
- SILT (ML)
- FAT CLAY (CH)
- ELASTIC SILT (MH)
- ORGANIC LOW PLASTICITY SILT OR CLAY (OL)
- ORGANIC HIGH PLASTICITY SILT OR CLAY (OH)
- PEAT (PT)
- TOPSOIL
- ASPHALT
- BASE - CEMENT MODIFIED
- BASE - CEMENT STABILIZED AGGREGATE
- BASE - GRAVEL
- CONCRETE
- VOID / NO RECOVERY
- IGM / PWR

FINE-GRAINED SOIL (Relative Consistency)

	N	PPV
Very Soft	< 2 bpf	< 0.25 tsf
Soft	2 - 4 bpf	> 0.25 - 0.5 tsf
Firm	5 - 8 bpf	> 0.5 - 1.0 tsf
Stiff	9 - 15 bpf	> 1.0 - 2.0 tsf
Very Stiff	16 - 30 bpf	> 2.0 - 4.0 tsf
Hard	> 30 bpf	> 4.0 tsf

COARSE-GRAINED SOIL (Relative Density)

	N
Very Loose	< 5 bpf
Loose	5 - 10 bpf
Medium Dense	11 - 30 bpf
Dense	31 - 50 bpf
Very Dense	> 50 bpf

MINOR CONSTITUENTS (% By Weight)

	Percentage
Trace	0% - 10%
Little	11% - 20%
Some	21% - 35%
"And"	≥ 36%

ORGANIC CONTENT OF SOIL (Determined by ASTM D2974 or AASHTO T267)

Classification	Percentage
With Organic Matter	4% - 15%
Organic Soil	16% - 30%
Peat	> 30%

MOISTURE CONDITION

Dry	Absense of moisture, dusty, dry to touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

At Time of Drilling (ATD) — Groundwater observation made anytime during the drilling process. Depending on time of reading and drilling methodologies, this value may be influenced by the drilling process.

End of Drilling — Groundwater measurement soon after the drilling processes are complete, and the borehole is at final depth. Drilling fluids, if introduced during drilling, may influence this measurement.

After Drilling — Groundwater measurements made in a borehole hours to days after drilling is complete. Depending on subsurface conditions, elapsed time, drilling process, etc. this observation may reflect a stabilized level.

REFERENCES:

FHWA NHI-16-072, Geotechnical Engineering Circular No. 5 "Geotechnical Site Characterization"
ASTM Specifications D2487 and D2488
DOT Specifications & Design Manuals from NC, SC, OH, MI, IN, PA, VA.

PROJECT: South Hopkins Water District Potable Elevated Water Tank and Pump Station
Adjacent to Hopkins County Central High School
S&ME Project No. 25360033

BORING LOG: B-01

Sheet 1 of 1

DATE DRILLED: 05/06/2025	**ELEVATION:** 428 ft	**NOTES:** Offset by client 50 feet west
DRILL RIG: Diedrich D-50	**DATUM:** NAVD88	
DRILLER: DSI	**BORING DEPTH:** 15.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cuttings	
DRILLING METHOD: 4-1/2" CFA	**LOGGED BY:** K. Roberts	**LATITUDE:** 37.250322 **LONGITUDE:** -87.478792
SAMPLING METHOD: UD, SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (● SPT, △ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
0								428
	0.3				TOPSOIL, (4 INCHES)			
	1.0			SS-1 (15 in)	LEAN CLAY (CL), soft, brown, slightly moist	2-1-2 N = 3	● ○	
	Qu=2,372 psf			ST-1 REC-100%	LEAN CLAY (CL), soft to stiff, light brown, slightly moist, With trace iron oxide nodules		⊢ ○	
5				ST-1				423
		Residuum		SS-2 (0 in)		5-5-8 N = 13	●	
	8.5							
				SS-3 (18 in)	LEAN CLAY (CL), hard, gray, slightly moist	5-15-34 N = 49	○ ●	
10								418
				SS-4 (3 in)		50/4" N = 50/4"	●	
15	15.0				Borehole terminated at 15.0 feet			413
20								408
25								403
30								398

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	05/06/2025		No groundwater encountered
END OF DRILLING	▼	05/06/2025		No groundwater encountered
AFTER DRILLING	▼			
AFTER DRILLING	▼			

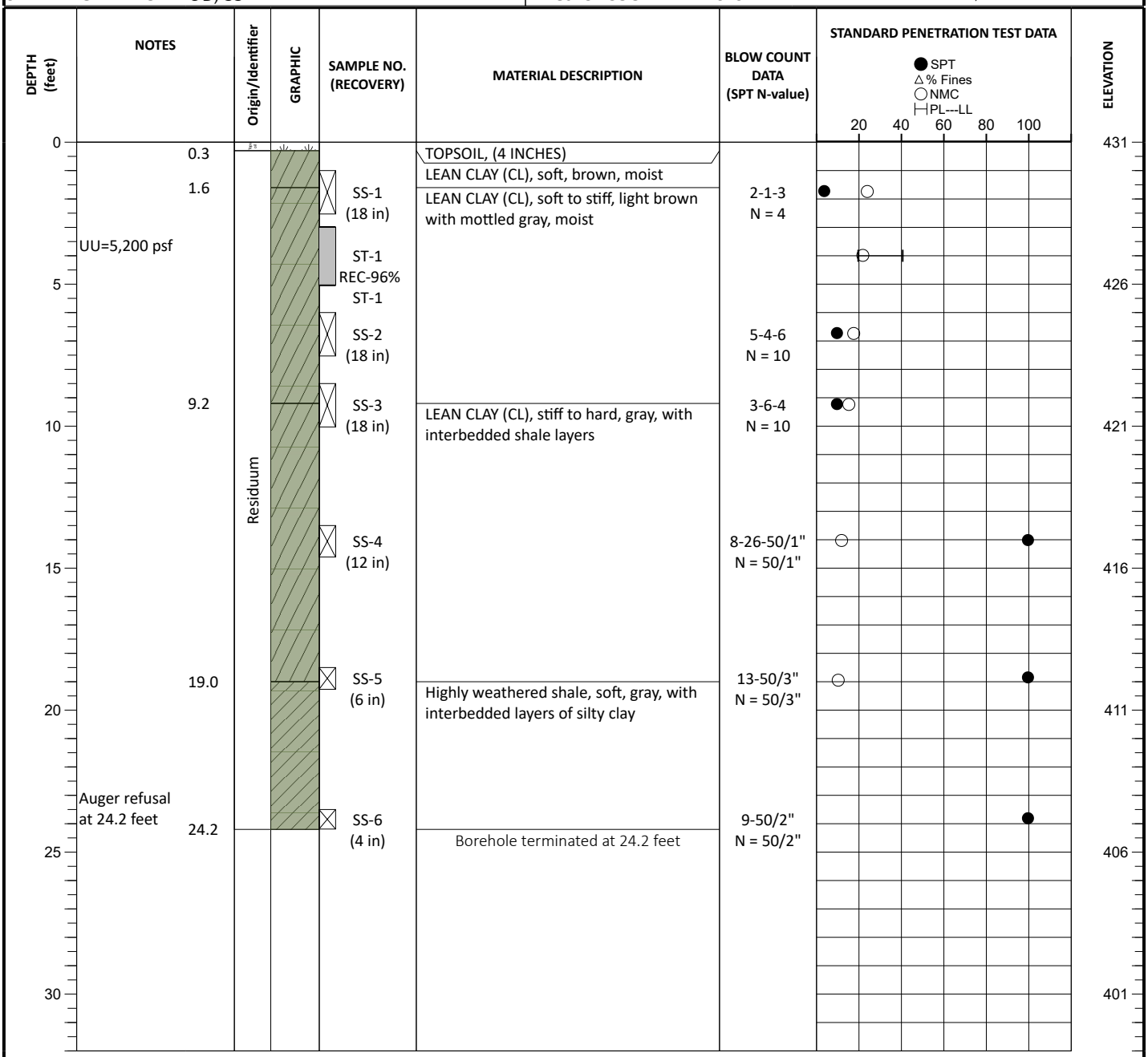
Elevation (Rounded to 1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT: South Hopkins Water District Potable Elevated Water Tank and Pump Station
Adjacent to Hopkins County Central High School
S&ME Project No. 25360033

BORING LOG: B-02
Sheet 1 of 1

DATE DRILLED: 05/06/2025	**ELEVATION:** 431 ft	**NOTES:**
DRILL RIG: Diedrich D-50	**DATUM:** NAVD88	
DRILLER: DSI	**BORING DEPTH:** 24.2 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cuttings	
DRILLING METHOD: 4-1/2" CFA	**LOGGED BY:** K. Roberts	**LATITUDE:** 37.250331 **LONGITUDE:** -87.479408
SAMPLING METHOD: UD, SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	



GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	05/06/2025		No groundwater encountered
END OF DRILLING	▼	05/06/2025		No groundwater encountered
AFTER DRILLING	▼			
AFTER DRILLING	▼			

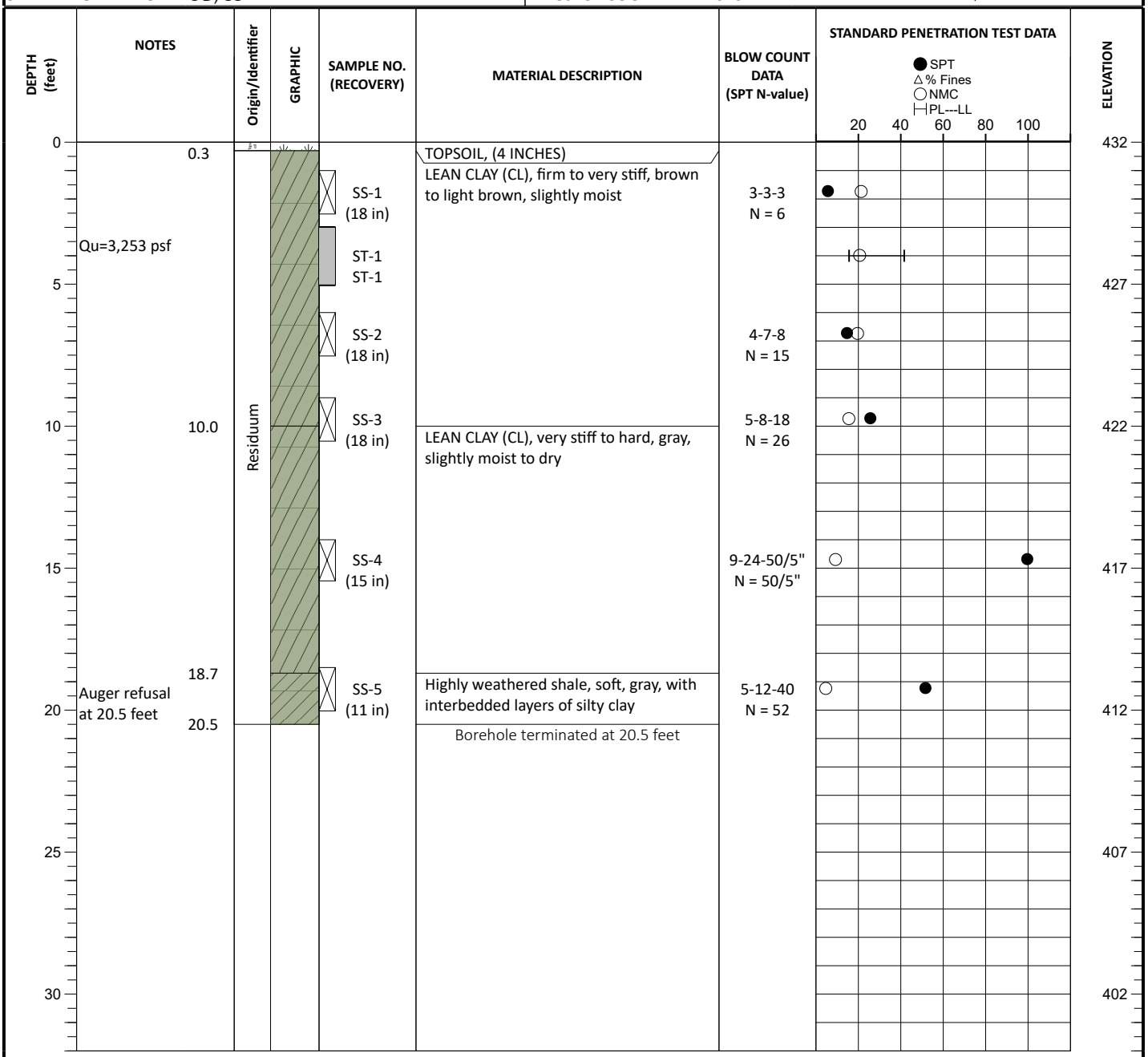
Elevation (Rounded to 1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT: South Hopkins Water District Potable Elevated Water Tank and Pump Station
Adjacent to Hopkins County Central High School
S&ME Project No. 25360033

BORING LOG: B-03
Sheet 1 of 1

DATE DRILLED: 05/06/2025	**ELEVATION:** 432 ft	**NOTES:**
DRILL RIG: Diedrich D-50	**DATUM:** NAVD88	
DRILLER: DSI	**BORING DEPTH:** 20.5 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cuttings	
DRILLING METHOD: 4-1/2" CFA	**LOGGED BY:** K. Roberts	**LATITUDE:** 37.250217 **LONGITUDE:** -87.479450
SAMPLING METHOD: UD, SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	



GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	05/06/2025		No groundwater encountered
END OF DRILLING	▼	05/06/2025		No groundwater encountered
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Elevation (Rounded to 1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	**South Hopkins Water District Potable Elevated Water Tank and Pump Station** **Adjacent to Hopkins County Central High School** **S&ME Project No. 25360033**	**BORING LOG: B-04** *Sheet 1 of 1*

DATE DRILLED: 05/06/2025	**ELEVATION:** 432 ft	**NOTES:**
DRILL RIG: Diedrich D-50	**DATUM:** NAVD88	
DRILLER: DSI	**BORING DEPTH:** 30.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cuttings	
DRILLING METHOD: 4-1/2" CFA	**LOGGED BY:** K. Roberts	**LATITUDE:** 37.250239 **LONGITUDE:** -87.479311
SAMPLING METHOD: UD, SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (● SPT, △ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
0	0.3				TOPSOIL, (4 INCHES)			432
	1.5			SS-1 (18 in)	LEAN CLAY (CL), soft, brown, moist, With trace iron oxide nodules	1-1-3 N = 4		
	UU=4,010 psf			st-1 REC-100% ST-1	LEAN CLAY (CL), soft to very stiff, light brown with mottled gray, moist, With trace iron oxide nodules			
5				SS-2 (18 in)		4-5-7 N = 12		427
	9.5			SS-3 (18 in)		4-6-12 N = 18		
10					LEAN CLAY (CL), very stiff to hard, gray, slightly moist			422
		Residuum		SS-4 (7 in)		33-50/1" N = 50/1"		
15								417
	18.7			SS-5 (5 in)		50/5" N = 50/5"		
20					Highly weathered shale, soft, gray			412
				SS-6 (1 in)		50/1" N = 50/1"		
25								407
				SS-7 (2 in)		50/2" N = 50/2"		
30	30.0				Borehole terminated at 30.0 feet			402

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	05/06/2025		No groundwater encountered
END OF DRILLING	▼	05/06/2025		No groundwater encountered
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Elevation (Rounded to 1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	South Hopkins Water District Potable Elevated Water Tank and Pump Station Adjacent to Hopkins County Central High School S&ME Project No. 25360033	BORING LOG: B-05 *Sheet 1 of 1*
DATE DRILLED: 06/27/2025	**ELEVATION:** 432 ft	**NOTES:**
DRILL RIG: CME-75	**DATUM:** NAVD88	
DRILLER: Flores and Mathis	**BORING DEPTH:** 27.5 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cuttings	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** E. Holland	**LATITUDE:** 37.250314 **LONGITUDE:** -87.479328
SAMPLING METHOD:	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA ● SPT △ % Fines ○ NMC ⊢ PL---LL 20 40 60 80 100	ELEVATION
0					Rock sounding - no samples obtained.			432
5						PPV= 2.5		427
10								422
15								417
20	▽							412
25	Hole caved at 25.1 feet Auger refusal at 27.5 feet				Borehole terminated at 27.5 feet			407
30	27.5							402

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	06/27/2025	20.0	
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Elevation (Rounded to 1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	South Hopkins Water District Potable Elevated Water Tank and Pump Station Adjacent to Hopkins County Central High School S&ME Project No. 25360033	BORING LOG: B-3A *Sheet 1 of 1*

DATE DRILLED: 06/27/2025	**ELEVATION:** 431 ft	**NOTES:**
DRILL RIG: CME-75	**DATUM:** NAVD88	
DRILLER: Flores and Mathis	**BORING DEPTH:** 28.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cuttings	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** E. Holland	**LATITUDE:** 37.250233 **LONGITUDE:** -87.479467
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (● SPT, △ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
0								431
	0.1			SS-1 (16 in)	TOPSOIL, dry, (1 INCH) LEAN CLAY (CL), soft, brown, dry	1-1-1 N = 2 PPV= 1.8	●	
	2.5			SS-2 (18 in)	LEAN CLAY (CL), stiff to very stiff, brown and mottled gray, With trace organics	2-5-4 N = 9 PPV= 3.8	●	
5				SS-3 (18 in)		3-5-7 N = 12	●	426
				SS-4 (17 in)		2-4-6 N = 10 PPV= 3.2	●	
10				SS-5 (18 in)		2-6-11 N = 17 PPV= 4.5	●	421
		Residuum						
15	15.0			SS-6 (18 in)	LEAN CLAY (CL), hard, gray, dry	20-38-40 N = 78 PPV= 2.5	●	416
	20.0			SS-7 (2 in)	Highly weathered shale, soft, gray, with mica flakes	50/2" N = 50/2"	●	411
20	Hole caved at 23.3 feet							
25				SS-8 (5 in)		50/5" N = 50/5"	●	406
	Auger refusal at 28.0 feet							
	28.0				Borehole terminated at 28.0 feet			
30								401

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	06/27/2025		No groundwater encountered
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Elevation (Rounded to 1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	South Hopkins Water District Potable Elevated Water Tank and Pump Station Adjacent to Hopkins County Central High School **S&ME Project No. 25360033**	**BORING LOG: B-3B** *Sheet 1 of 1*

DATE DRILLED: 06/27/2025	**ELEVATION:** 432 ft	**NOTES:**
DRILL RIG: CME-75	**DATUM:** NAVD88	
DRILLER: Flores and Mathis	**BORING DEPTH:** 28.5 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cuttings	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** E. Holland	**LATITUDE:** 37.250200 **LONGITUDE:** -87.479439
SAMPLING METHOD: SS	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA (● SPT, △ % Fines, ○ NMC, ⊢ PL---LL; 20 40 60 80 100)	ELEVATION
0								432
	0.1			SS-1 (10 in)	TOPSOIL, (1 INCH)			
	0.9				LEAN CLAY (CL), soft, brown, dry	1-1-2 N = 3 PPV= 1.5	●	
				SS-2 (18 in)	LEAN CLAY (CL), soft to stiff, brown with mottled gray, dry, With trace organics	2-5-4 N = 9	●	
5				SS-3 (12 in)		3-5-5 N = 10 PPV= 4.0	●	427
	6.8			SS-4 (18 in)	LEAN CLAY (CL), stiff, brown and gray, dry	PPV= 4.2 6-5-8 N = 13	●	
10	10.1			SS-5 (13 in)	LEAN CLAY (CL), hard, gray, dry to wet, With mica flakes	11-20-22 N = 42 PPV= 4.5	●	422
		Residuum						
15	15.0			SS-6 (18 in)	Highly weathered shale, soft, gray	12-32-44 N = 76 PPV= 3.2	●	417
	Hole caved at 20.7 feet							
20	20.1			SS-7 (2 in)	Highly weathered shale, soft, gray	50/2" N = 50/2"	●	412
25				SS-8 (8 in)		37-50/2" N = 50/2"	●	407
	Auger refusal at 28.5 feet							
	28.5				Borehole terminated at 28.5 feet			
30								402

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	06/27/2025		No groundwater encountered
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Elevation (Rounded to 1 ft)

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

PROJECT:	South Hopkins Water District Potable Elevated Water Tank and Pump Station Adjacent to Hopkins County Central High School S&ME Project No. 25360033	BORING LOG: B-3R *Sheet 1 of 1*

DATE DRILLED: 06/27/2025	**ELEVATION:** 432 ft	**NOTES:**
DRILL RIG: CME-75	**DATUM:** NAVD88	
DRILLER: Flores and Mathis	**BORING DEPTH:** 28.0 ft	
HAMMER TYPE: Auto Hammer (140 lb)	**CLOSURE:** Cuttings	
DRILLING METHOD: 3-1/4" HSA	**LOGGED BY:** E. Holland	**LATITUDE:** 37.250217 **LONGITUDE:** -87.479450
SAMPLING METHOD:	**PROJECT COORDINATE SYSTEM -** NAD 1983 StatePlane Kentucky South FIPS 1602 Feet	

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA ● SPT △ % Fines ○ NMC ⊢ PL---LL 20 40 60 80 100	ELEVATION
0					Rock sounding - no samples obtained.			432
5								427
10								422
15								417
20								412
25	Hole caved at 26.0 feet Auger refusal at 28.0 feet							407
28.0					Borehole terminated at 28.0 feet			
30								402

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	▽	06/27/2025	21.0	
END OF DRILLING	▼			
AFTER DRILLING	▼			
AFTER DRILLING	▼			

Elevation (Rounded to 1 ft)

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LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf), AR = Auger Refusal, IGM = Intermediate Geomaterial

Appendix III – Laboratory Testing Results

Summary of Laboratory Procedures

Recovered disturbed and undisturbed samples and the drillers' field logs were transported to the laboratory where they were examined by the geotechnical engineer. Selected samples representative of certain groups of soils were subjected to simple classification tests by hand or other simple means.

Recovered disturbed and undisturbed samples and the drillers' field logs were transported to the laboratory where they were examined by the geotechnical engineer. Selected samples representative of certain groups of soils were subjected to simple classification tests by hand or other simple means. Other samples were tested in the laboratory to determine their strength or consolidation properties.

Laboratory Tests of Soil

Examination of Split Spoon Soil Samples

Soil and rock samples and field boring records were reviewed in the laboratory by the geotechnical engineer. Soils were classified in general accordance with the visual-manual method described in ASTM D 2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Method)*. The geotechnical engineer also prepared the final boring records enclosed with this report.

Extrusion and Examination of Group C Undisturbed Samples

Undisturbed samples were stored in the vertical position in the laboratory. Samples were extruded from the thin-walled sampler, using a specially constructed extruder, in the same direction of travel as the sample entered the tube during sampling. In certain cases it was necessary to cut the tube into short sections to facilitate removal of the soil without compressing or disturbing the sample. Specimens were trimmed using a wire saw or steel straightedge. Where removal of pebbles or crumbling resulting from trimming caused voids on the surface of the specimens selected for quantitative laboratory testing, they were filled with remolded soil obtained from the trimmed portion of the sample.

Moisture Content Testing of Soil Samples by Oven Drying

Moisture content was determined in general conformance with the methods outlined in ASTM D2216, "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil or Rock by Mass." This method is limited in scope to Group B, C, or D samples of earth materials which do not contain appreciable amounts of organic material, soluble solids such as salt or reactive solids such as cement. This method is also limited to samples which do not contain contamination.

A representative portion of the soil was divided from the sample using one of the methods described in Section 9 of ASTM D2216. The split portion was then placed in a drying oven and heated to approximately 110 degrees C overnight or until a constant mass was achieved after repetitive weighing. The moisture content of the soil was then computed as the mass of water removed from the sample by drying, divided by the mass of the sample dry, times 100 percent. No attempt was made to exclude any particular particle size from the portion split from the sample.

Liquid and Plastic Limits Testing

Atterberg limits of the soils was determined generally following the methods described by ASTM D4318, *Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils*. Albert Atterberg originally defined "limits of consistency" of fine grained soils in terms of their relative ease of deformation at various moisture contents. In current engineering usage, the liquid limit of a soil is defined as the moisture content, in percent, marking the upper limit of viscous flow and the boundary with a semi-liquid state. The plastic limit defines the lower limit of plastic behavior, above which a soil behaves plastically below which it retains its shape upon drying. The plasticity index (PI) is the range of water content over which a soil behaves plastically. Numerically, the PI is the difference between liquid limit and plastic limit values.

Representative portions of fine grained Group A, B, C, or D samples were prepared using the wet method described in Section 10.1 of ASTM D4318. The liquid limit of each sample was determined using the multipoint method (Method A) described in Section 11. The liquid limit is by definition the moisture content where 25 drops of a hand operated liquid limit device are required to close a standard width groove cut in a soil sample placed in the device. After each test, the moisture content of the sample was adjusted and the sample replaced in the device. The test was repeated to provide a minimum of three widely spaced combinations of N versus moisture content. When plotted on semilog paper, the liquid limit moisture content was determined by straight line interpolation between the data points at N equals 25 blows.

The plastic limit was determined using the procedure described in Section 17 of ASTM D4318. A selected portion of the soil used in the liquid limit test was kneaded and rolled by hand until it could no longer be rolled to a 3.2 mm thread on a glass plate. This procedure was repeated until at least 6 grams of material was accumulated, at which point the moisture content was determined using the methods described in ASTM D2216.

Grain Size Analysis of Samples

The distribution of particle sizes greater than 75 µm was determined in general accordance with the procedures described by ASTM D421, *Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants*, and D422, *Standard Test Method for Particle Size Analysis of Soils*. During preparation samples were divided into two portions. The material coarser than the No. 30 U.S. sieve size fraction was dry sieved through a nest of standard sieves as described in Article 6. Material passing the No. 30 sieve was independently passed through a nest of sieves down to the No. 200 size.

Grain Size Analysis of Samples with Hydrometer

The distribution of particle sizes was determined in general accordance with the procedures described by ASTM D421, *Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants*, and D422, *Standard Test Method for Particle Size Analysis of Soils*. During preparation samples were divided into two portions. The material coarser than the No. 10 U.S. sieve size fraction was dry sieved through a nest of standard sieves as described in Article 6. Material passing the No. 10 sieve was soaked in demineralized water and a dispersing agent, then the soil-water slurry placed in a glass sedimentation chamber and the specific gravity of the slurry recorded at various time intervals. The grain size distribution was calculated from the time rate of sedimentation of the various size particles. After the final hydrometer reading was obtained, the suspension was washed through the No. 200 sieve. The remaining material retained on the No. 200 sieve was oven dried, and then passed through a standard nest of sieves.

Percent Fines Determination of Samples

A selected specimen of soils was washed over a No. 200 sieve after being thoroughly mixed and dried. This test was conducted in general accordance with ASTM D1140, *Standard Test Method for Amount of Material Finer Than the No. 200 Sieve*. Method A, using water to wash the sample through the sieve without soaking the sample for a prescribed period of time, was used and the percentage by weight of material washing through the sieve was deemed the "percent fines" or percent clay and silt fraction.

UU or "Q" Triaxial Shear Tests of Undisturbed Samples

Shear tests were performed using the UU or "Q" test method described by ASTM D2850, *Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils*. This test is typically limited to fine-grained soils having a permeability slower than 10^{-3} cm/sec, which are preserved as Group C samples as defined in ASTM D4220. The UU test employs rapid application of both confining and axial stresses without permitting drainage of pore water. This condition simulates rapid loading of the soil during construction before sufficient time is allowed for the soil to consolidate. UU tests were performed on samples at their "as-received" moisture content, so that results may be applied to "construction conditions" in embankment stability analyses. The extruded sample was encased in a rubber membrane and sealed to the specimen base and cap with rubber O-rings to prevent drainage of the specimen. For this test UD samples were tested without trimming except for cutting the end surfaces plane and perpendicular to the longitudinal axis of the specimen.

The UU test is performed with the drain valve of the triaxial cell closed during all phases of the test and before the sample has a chance to consolidate (S<100 percent). The chamber was pressurized to the desired confining pressure and the sample allowed to stabilize at least 10 minutes before application of axial load. The sample was loaded axially by compressing the top platen into the sample at a constant rate of approximately one percent strain per minute. Deformation of the sample and the applied stress was recorded electronically using LVDT strain gauges. Failure of the specimens during the tests was defined as the maximum principal stress difference (deviator stress) attained at any point during the test, or as the deviator stress at 15 percent strain, whichever occurred first. Test output is attached in the Appendix and includes a plot of deviator stress vs. applied strain for various load increments, and Mohr Circle plots at various increments of confining stress.

Unconfined Compressive Strength Tests of Compacted Cohesive Samples

The unconfined compressive strength of compacted cohesive soils was determined generally following the procedures described by ASTM D2166, *Standard Test Method for Unconfined Compressive Strength of Cohesive Soil*. Specimens were prepared in a standard mold by compacting them at predetermined moisture contents to the dry density values prescribed by the geotechnical engineer. Compacted samples were then removed from the mold and specimens prepared using the procedures described in Section 6.4 of ASTM D2166. The ends of each specimen were carved by hand and trimmed as necessary to provide a surface perpendicular to the specimen's long axis, but the ends were not capped.

The prepared sample was placed in a compressive testing machine and the specimen compressed in the platen at a rate of 1 to 2 percent strain per minute. Deformation and loading of the sample were recorded at regular intervals until the load values began to decrease with increasing axial strain, or a total strain of 15 percent of the original sample length was attained. Sample stress was corrected at each load increment for

the change in cross sectional area produced by deformation of the sample using the formulae in sections 8.2 and 8.3 of ASTM D2166.

Form Number: QA-LEXASSIGN
Form Version: 5.2
Form Date: 05/07/25

Lab Summary

S&ME, Inc. - New Albany: 400 Industrial Blvd, New Albany, IN 47150

Project Number:	25360033	Report Date:	07/22/25
Project Name:	South Hopkins Water Tank and Pump House		
Client Name:	South Hopkins Water District		
Client Address:	129 S. Main St, Dawson Springs, KY 42408		

Techncial Responsibility: *Jacob Folsom* *Position:* *Laboratory Services Manager* *Signature:* Jacob Folsom *Date:* *07/22/25*

Notes: 1. No recovery

SAMPLE IDENTIFICATION	SAMPLE TYPE	USCS	AASHTO CLASS.	NATURAL MOISTURE CONTENT,%	ATT. LIMITS LL	PL	PI	USCS PARTICLE SIZE GRAVEL (PLUS #4)	SAND	FINES (Pass #200)	MAX DRY DENSITY, PCF @ OPT MC %, STANDARD	SOIL UNCOFINED COMPRESSIVE STRENGTH, PSF	UU PEAK DEVIATOR SRESS, PSF	SDI	pH	DRY UNIT WEIGHT, PCF	NOTES
B-01, 1.0 - 2.5 ft, SS-1	SS			26.2%													
B-01, 3.0 - 5.0 ft, UD-1	UD	CL		23.2%	38	17	21	0%	12%	88%		2,372				100.1	
B-01, 6.0 - 7.5 ft, SS-2	SS																1
B-01, 8.5 - 10.0 ft, SS-3	SS			10.9%													
B-02, 1.0 - 2.5 ft, SS-1	SS			24.1%													
B-02, 3.0 - 5.0 ft, UD-1	UD	CL		22.0%	41	20	21	0%	4%	96%			5,200			105.3	
B-02, 6.0 - 7.5 ft, SS-2	SS			17.7%													
B-02, 8.5 - 10.0 ft, SS-3	SS			15.4%													
B-02, 13.5 - 14.6 ft, SS-4	SS			12.0%													
B-02, 18.5 - 19.4 ft, SS-5	SS			10.4%													
B-03, 1.0 - 2.5 ft, SS-1	SS			21.5%													
B-03, 3.0 - 5.0 ft, UD-1	UD	CL		20.8%	42	16	26	0%	5%	95%		3,253				104.8	
B-03, 6.0 - 7.5 ft, SS-2	SS			19.8%													
B-03, 9.0 - 10.5 ft, SS-3	SS			15.7%													

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Form Number: QA-LEXASSIGN
Form Version: 5.2
Form Date: 05/07/25

Lab Summary

S&ME, Inc. - New Albany: 400 Industrial Blvd, New Albany, IN 47150

Project Number:	25360033	Report Date:	07/22/25
Project Name:	South Hopkins Water Tank and Pump House		
Client Name:	South Hopkins Water District		
Client Address:	129 S. Main St, Dawson Springs, KY 42408		

Techncial Responsibility: *Jacob Folsom* *Position:* *Laboratory Services Manager* *Signature:* *Date:* *07/22/25*

Notes: 1. No recovery

SAMPLE IDENTIFICATION	SAMPLE TYPE	USCS	AASHTO CLASS.	NATURAL MOISTURE CONTENT,%	ATT. LIMITS LL	PL	PI	USCS PARTICLE SIZE GRAVEL (PLUS #4)	SAND	FINES (Pass #200)	MAX DRY DENSITY, PCF @ OPT MC %, STANDARD	SOIL UNCOFINED COMPRESSIVE STRENGTH, PSF	UU PEAK DEVIATOR SRESS, PSF	SDI	pH	DRY UNIT WEIGHT, PCF	NOTES
B-03, 14.0 - 15.4 ft, SS-4	SS			9.4%													
B-03, 18.5 - 20.0 ft, SS-5	SS			4.8%													
B-04, 1.0 - 2.5 ft, SS-1	SS			24.9%													
B-04, 3.0 - 5.0 ft, UD-1	UD	CL		21.5%	44	17	27	0%	6%	94%			4,010			103.1	
B-04, 6.0 - 7.5 ft, SS-2	SS			20.5%													
B-04, 8.5 - 10.0 ft, SS-3	SS			12.5%													

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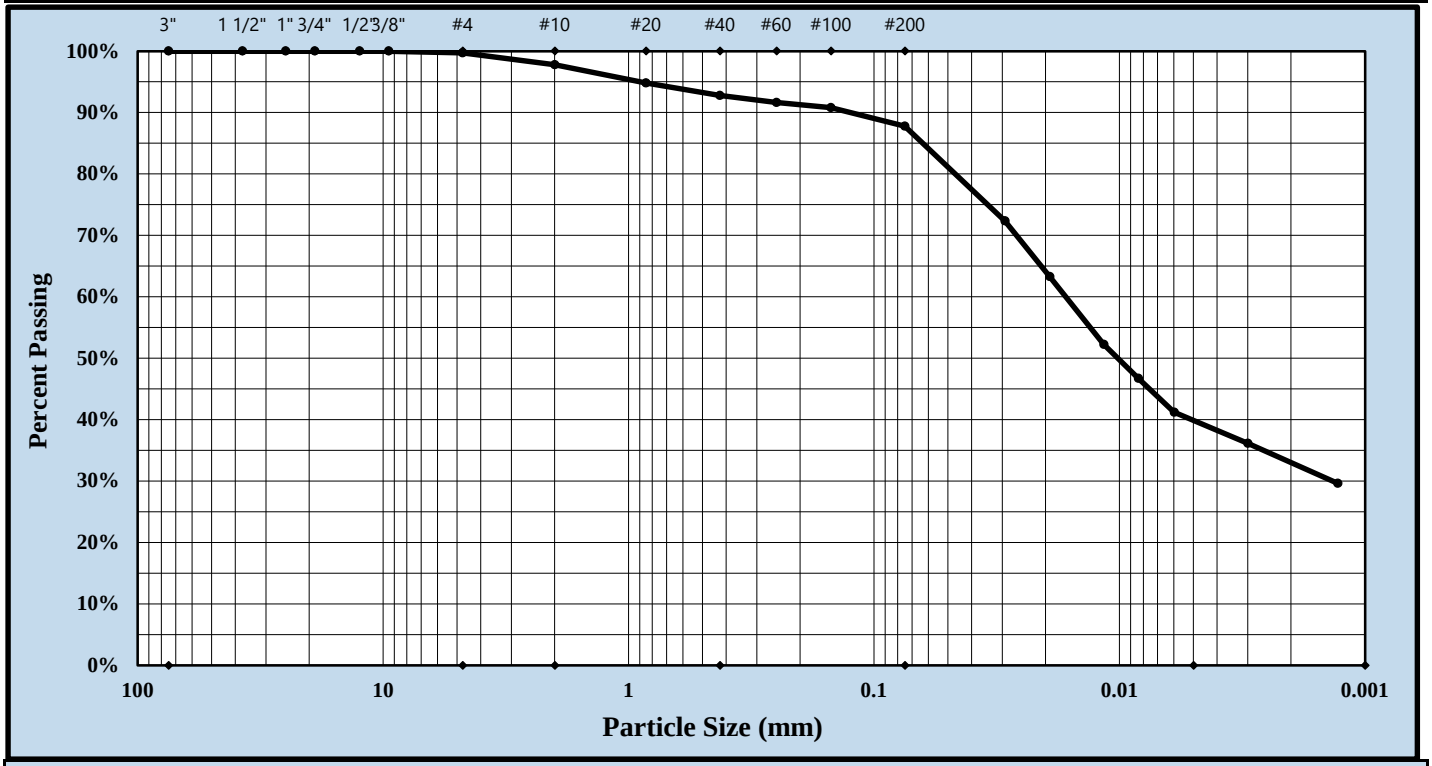
Form No. TR-D422-3
Revision No. 2LEXi
Revision Date:12/11/24

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D422

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	25360033	Report Date:	07/10/25
Project Name:	South Hopkins Water Tank and Pump House	Test Date(s):	07/01/25
Client Name:	South Hopkins Water District		
Client Address:	123 S Main St Dawson KY 42408		
		Sample Date:	06/05/25
Location:	B-1	Depth (ft.):	3.0 - 5.0
Sample Description:	LEAN CLAY (CL)		



Particle Size Definitions: ASTM D2487 (USCS) and D653			
Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt Size	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay Size	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Nom. Maximum Particle Size:	#4	Gravel:	0.3%	Silt Size:	47.9%
Silt & Clay (% Passing #200):	87.8%	Total Sand:	11.9%	Clay Size:	39.9%
Assumed Relative Density:	2.650	Moisture Content:	23.2%		
Liquid Limit:	38	Plastic Limit:	17	Plastic Index:	21
Coarse Sand:	1.9%	Medium Sand:	5.0%	Fine Sand:	5.0%

Description of Sand and Gravel — Rounded ☒ Angular ☐ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus A — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations:

Jacob Folsom	Jacob Folsom	Lab Services Manager	7/22/2025
Technical Responsibility	*Signature*	*Position*	*Date*

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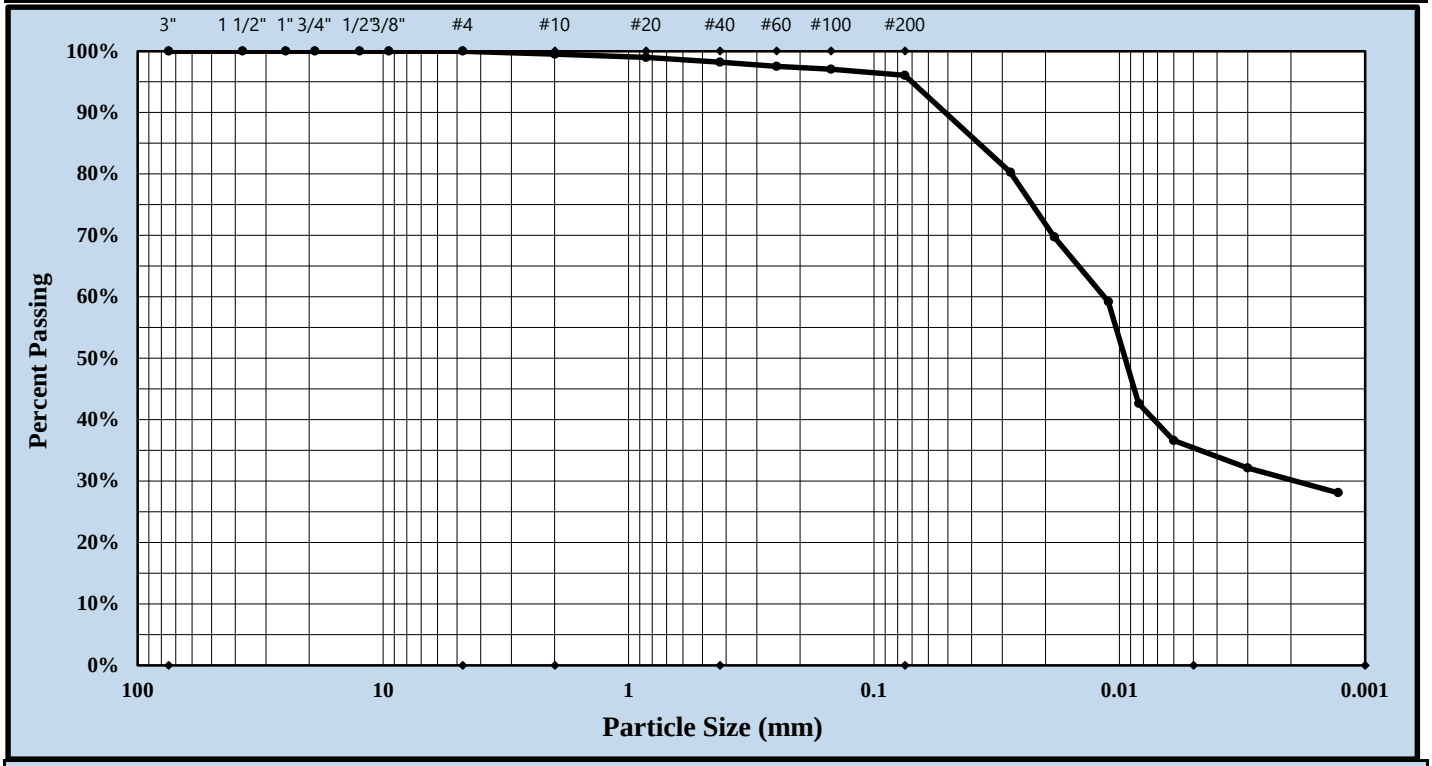
Form No. TR-D422-3
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Revision Date:12/11/24

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D422

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	25360033	Report Date:	07/10/25
Project Name:	South Hopkins Water Tank and Pump House	Test Date(s):	07/01/25
Client Name:	South Hopkins Water District		
Client Address:	129 S. Main St., Dawson Springs, KY 42408		
		Sample Date:	06/05/25
Location:	B-2	Depth (ft.):	3.0 - 5.0
Sample Description:	LEAN CLAY (CL)		



Particle Size Definitions: ASTM D2487 (USCS) and D653			
Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt Size	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay Size	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Nom. Maximum Particle Size:	#10	Gravel:	0.0%	Silt Size:	60.6%
Silt & Clay (% Passing #200):	96.0%	Total Sand:	4.0%	Clay Size:	35.4%
Assumed Relative Density:	2.680	Moisture Content:	22.0%		
Liquid Limit:	41	Plastic Limit:	20	Plastic Index:	21
Coarse Sand:	0.5%	Medium Sand:	1.3%	Fine Sand:	2.1%

Description of Sand and Gravel — Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus A — Dispersion Period: 1 min. — Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations:

Jacob Folsom	Jacob Folsom	Lab Services Manager	7/23/2025
Technical Responsibility	*Signature*	*Position*	*Date*

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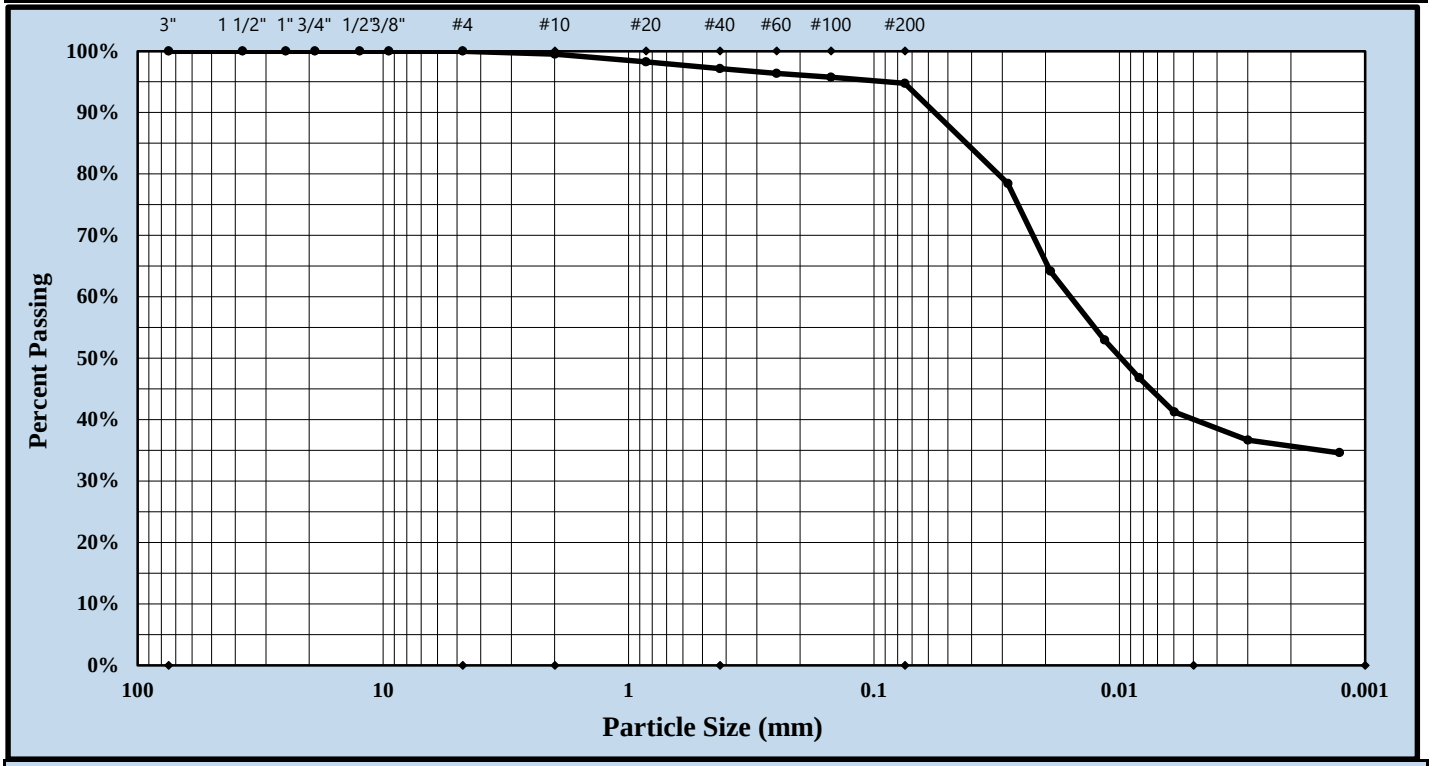
Form No. TR-D422-3
Revision No. 2LEXi
Revision Date:12/11/24

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D422

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	25360033	Report Date:	07/10/25
Project Name:	South Hopkins Water Tank and Pump House	Test Date(s):	07/01/25
Client Name:	South Hopkins Water District		
Client Address:	123 S Main St Dawson Springs, Ky 42408		
		Sample Date:	06/05/25
Location:	B-3	Depth (ft.):	3.0 - 5.0
Sample Description:	LEAN CLAY (CL)		



Particle Size Definitions: ASTM D2487 (USCS) and D653			
Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt Size	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay Size	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Nom. Maximum Particle Size:	#10	Gravel:	0.0%	Silt Size:	54.7%
Silt & Clay (% Passing #200):	94.7%	Total Sand:	5.3%	Clay Size:	40.0%
Assumed Relative Density:	2.650	Moisture Content:	20.8%		
Liquid Limit:	42	Plastic Limit:	16	Plastic Index:	26
Coarse Sand:	0.5%	Medium Sand:	2.4%	Fine Sand:	2.4%

Description of Sand and Gravel — Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus A — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations:

Jacob Folsom		Lab Services Manager	7/22/2025
Technical Responsibility	*Signature*	*Position*	*Date*

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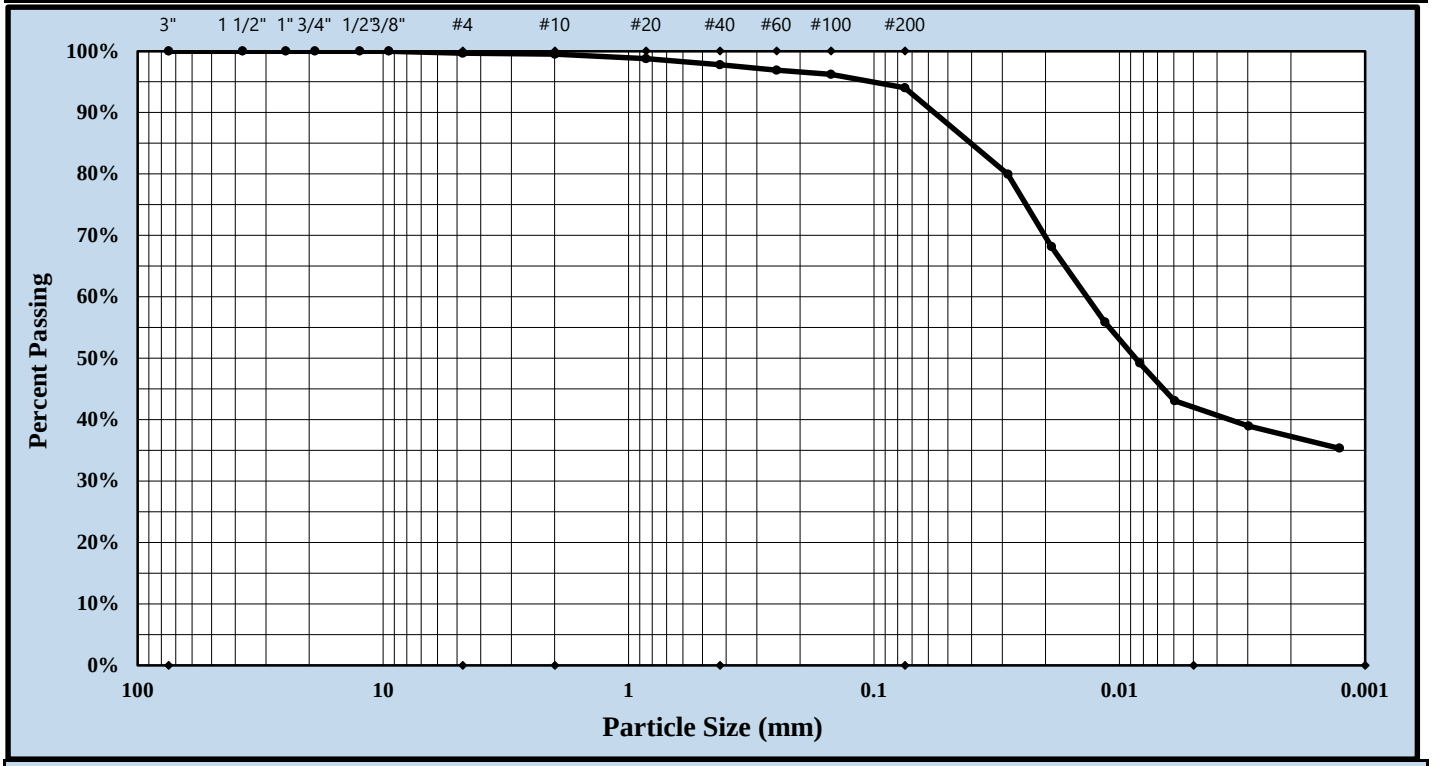
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Revision Date:12/11/24

PARTICLE SIZE ANALYSIS OF SOIL

ASTM D422

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	25360033	Report Date:	07/10/25
Project Name:	South Hopkins Water Tank and Pump House	Test Date(s):	07/01/25
Client Name:	South Hopkins Water District		
Client Address:	Dawson Springs, Ky 42408		
		Sample Date:	06/05/25
Location:	B-4	Depth (ft.):	3.0 - 5.0
Sample Description:	LEAN CLAY (CL)		



Particle Size Definitions: ASTM D2487 (USCS) and D653			
Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt Size	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay Size	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Nom. Maximum Particle Size:	#10	Gravel:	0.3%	Silt Size:	52.0%
Silt & Clay (% Passing #200):	94.0%	Total Sand:	5.7%	Clay Size:	42.0%
Assumed Relative Density:	2.650	Moisture Content:	21.5%		
Liquid Limit:	44	Plastic Limit:	17	Plastic Index:	27
Coarse Sand:	0.2%	Medium Sand:	1.7%	Fine Sand:	3.8%

Description of Sand and Gravel — Rounded ☐ Angular ☒ Hard & Durable ☒ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus A — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations:

Jacob Folsom	Jacob Folsom	Lab Services Manager	7/22/2025
Technical Responsibility	*Signature*	*Position*	*Date*

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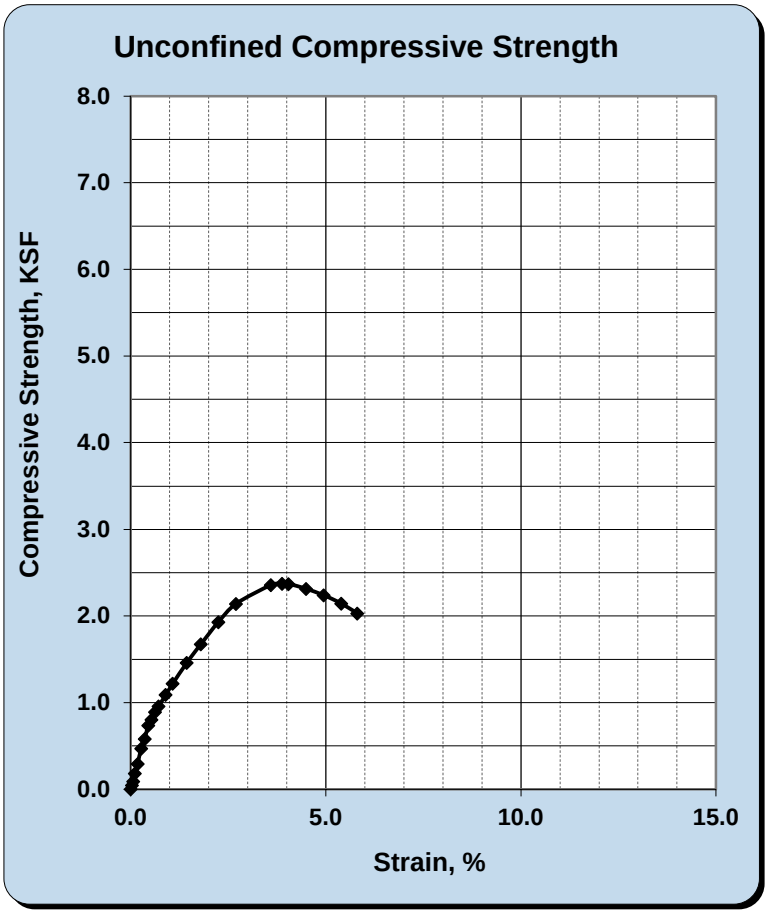
Form No. TR-D2166-01-C
Revision No. : 1LEXd
Revision Date: 07/09/24

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS

ASTM D2166

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	25360033	Report Date:	7/10/2025
Project Name:	South Hopkins Water Tank and Pump House	Test Date(s):	6/27/2025
Client Name:	South Hopkins Water District		
Client Address:	123 S Main St Dawson Springs, KY 42408		
Type:	Intact	Sample Date:	6/5/2025
Location:	B-1	Depth (ft.):	3.1 - 3.6
Sample Description:	LEAN CLAY (CL)		



Failed Specimen



Type of Sample: Intact
Source of Moisture Sample: Entire

Liquid Limit: 38
Plasticity Index: 21
Height to Diameter Ratio: 1.9
Rate of Strain (%/min.): 1
Strain at Failure: 3.9%

Initial Dry Unit Weight: 100.1 pcf
Initial Water Content: 23.2%
Unconfined Compressive Strength, q_u: **2372** PSF
Undrained Shear Strength, s_u: **1186** PSF

References / Comments / Deviations:

Jacob Folsom	Jacob Folsom	Lab Services Manager	7/22/2025
Technical Responsibility	*Signature*	*Position*	*Date*

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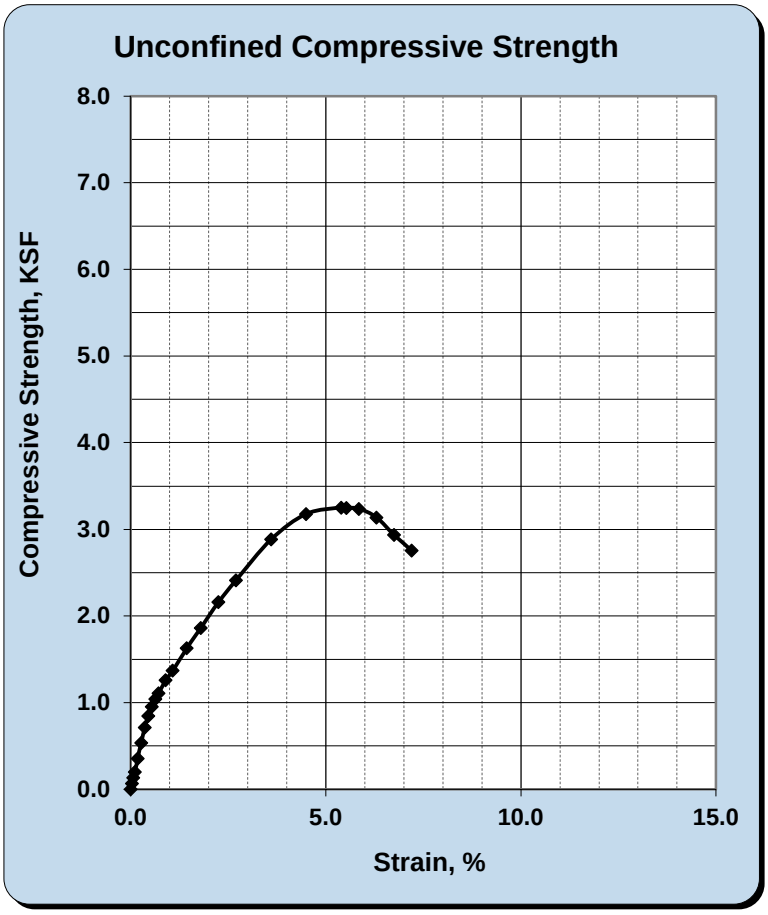
Form No. TR-D2166-01-C
Revision No. : 1LEXd
Revision Date: 07/09/24

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS

ASTM D2166

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	25360033	Report Date:	7/10/2025
Project Name:	South Hopkins Water Tank and Pump House	Test Date(s):	6/27/2025
Client Name:	South Hopkins Water District		
Client Address:	123 S Main St Dawson Springs, KY 42408		
Type:	Intact	Sample Date:	6/5/2025
Location:	B-3	Depth (ft.):	3.2 - 3.7
Sample Description:	LEAN CLAY (CL)		



Failed Specimen



Type of Sample: Intact
Source of Moisture Sample: Entire

Liquid Limit: 42
Plasticity Index: 26
Height to Diameter Ratio: 1.9
Rate of Strain (%/min.): 1
Strain at Failure: 5.4%

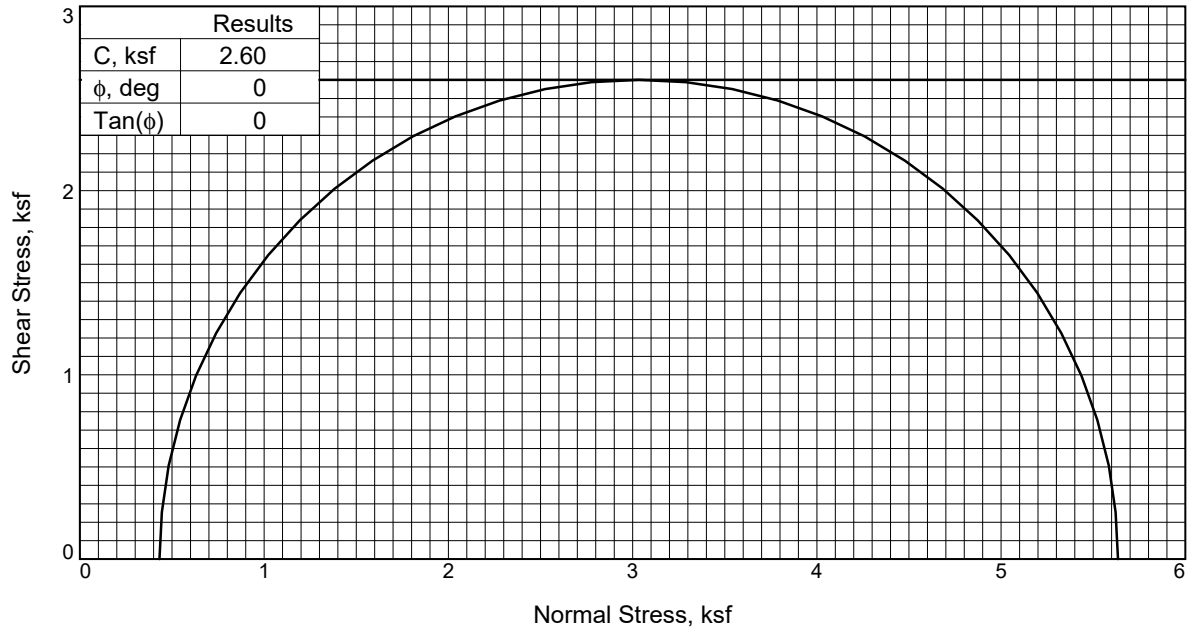
Initial Dry Unit Weight: 104.8 pcf
Initial Water Content: 20.8%
Unconfined Compressive Strength, q_u: **3253** PSF
Undrained Shear Strength, s_u: **1626** PSF

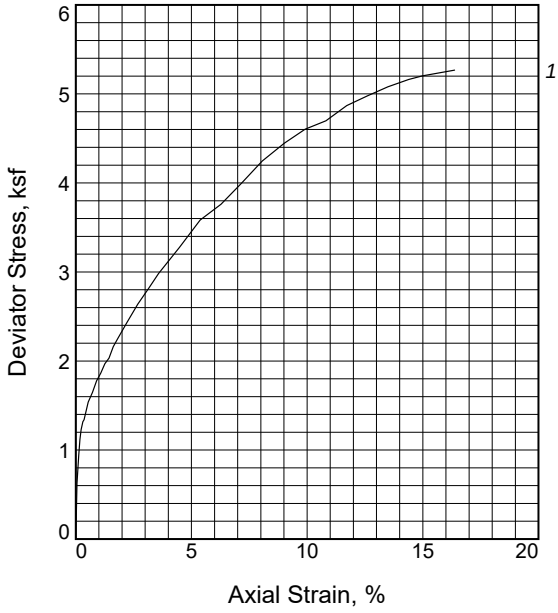
References / Comments / Deviations:

Jacob Folsom	Jacob Folsom	Lab Services Manager	7/22/2025
Technical Responsibility	*Signature*	*Position*	*Date*

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C & phi are not test results but an interpretation of the test results. The designer is responsible for interpreting test data as provided by S&ME.





Sample No.		1
Initial	Water Content, %	22.0
	Dry Density, pcf	105.3
	Saturation, %	100.0
	Void Ratio	0.5883
	Diameter, in.	2.860
	Height, in.	5.558
At Test	Water Content, %	22.0
	Dry Density, pcf	105.3
	Saturation, %	100.0
	Void Ratio	0.5883
	Diameter, in.	2.860
	Height, in.	5.558
Strain rate, %/min.		1.00
Back Pressure, psi		0.00
Cell Pressure, psi		3.00
Fail. Stress, ksf		5.20
Strain, %		15.0
Ult. Stress, ksf		5.20
Strain, %		15.0
σ_1 Failure, ksf		5.63
σ_3 Failure, ksf		0.43

Type of Test:
Unconsolidated Undrained

Sample Type: Intact

Description: LEAN CLAY (CL)

LL= 41 **PL=** 20 **PI=** 21

Assumed Specific Gravity= 2.680

Remarks: Failure criterion is peak deviator stress.

Client: South Hopkins Water District

Project: South Hopkins Water Tank and Pump House

Source of Sample: B-02 **Depth:** 3.0 - 5.0

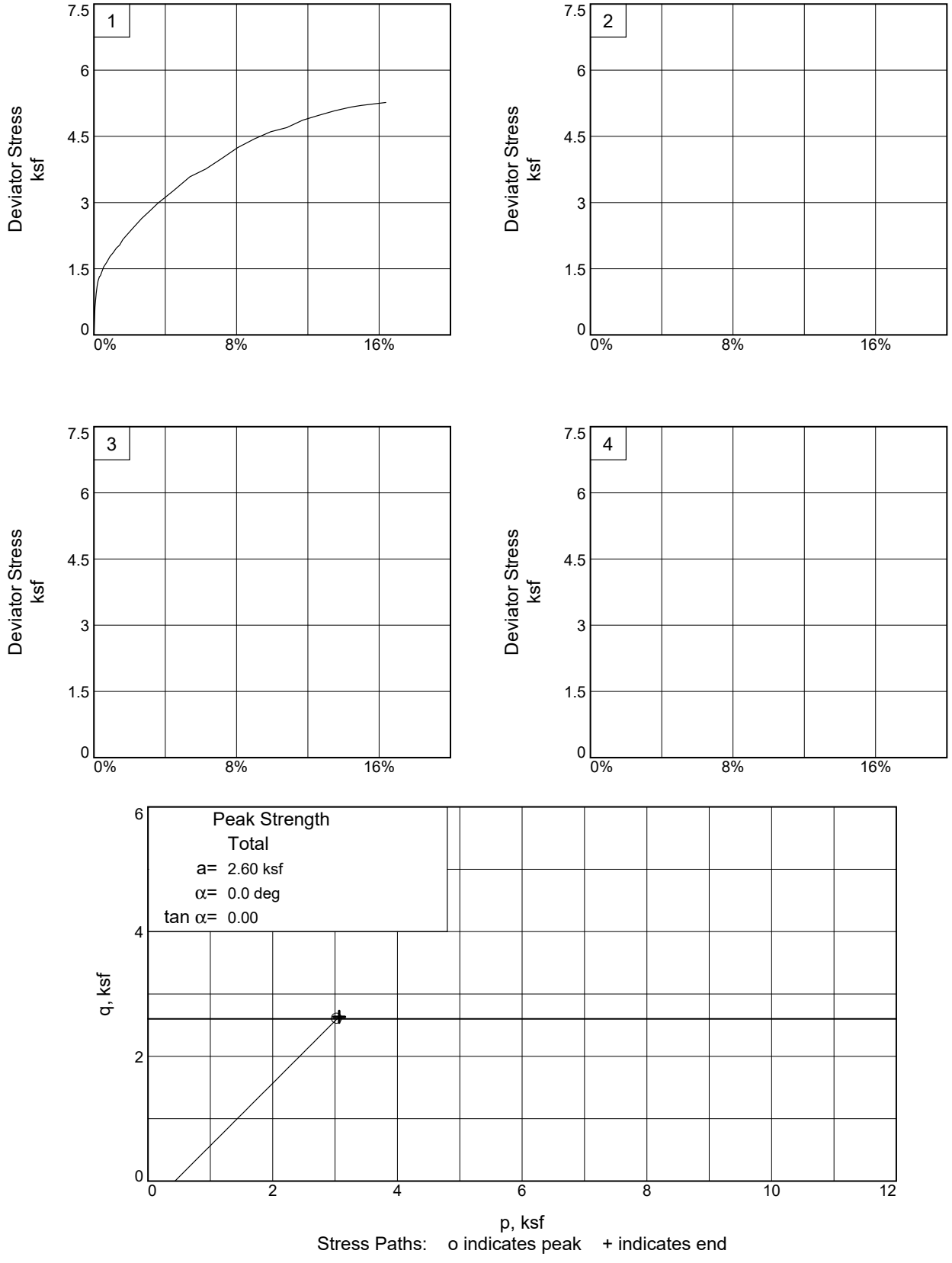
Sample Number: UD-1

Proj. No.: 25360033 **Date Sampled:** 06/05/25

TRIAXIAL SHEAR TEST REPORT
S&ME, Inc.
Lexington, Kentucky

Tested By: J. LaMothe

C & phi are not test results but an interpretation of the test results. The designer is responsible for interpreting test data as provided by S&ME.



Client: South Hopkins Water District

Project: South Hopkins Water Tank and Pump House

Source of Sample: B-02 **Depth:** 3.0 - 5.0 **Sample Number:** UD-1

Project No.: 25360033 **Figure** 2 of 2

S&ME, Inc.

Tested By: J. LaMothe

TRIAXIAL COMPRESSION TEST

Unconsolidated Undrained

7/10/2025
10:33 AM

Date: 06/05/25
Client: South Hopkins Water District
Project: South Hopkins Water Tank and Pump House
Project No.: 25360033
Location: B-02
Depth: 3.0 - 5.0 **Sample Number:** UD-1
Description: LEAN CLAY (CL)
Remarks: Failure criterion is peak deviator stress.
Type of Sample: Intact
Assumed Specific Gravity=2.680 **LL=**41 **PL=**20 **PI=**21
Test Method: ASTM D 2850

Parameters for Specimen No. 1

Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	1218.350	1218.350
Moisture content: Dry soil+tare, gms.	1001.870	1001.870
Moisture content: Tare, gms.	15.790	15.790
Moisture, %	22.0	22.0
Moist specimen weight, gms.	1204.00	
Diameter, in.	2.860	
Area, in.²	6.424	
Height, in.	5.558	
Wet density, pcf	128.5	
Dry density, pcf	105.3	
Void ratio	0.5883	
Saturation, %	100.0	

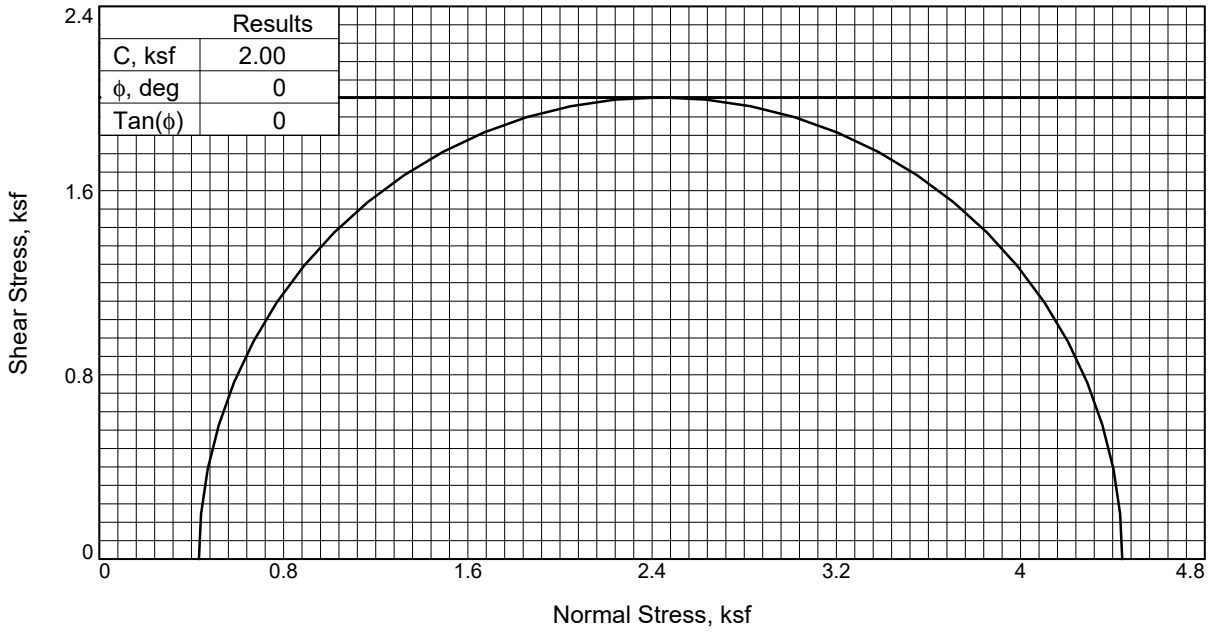
Test Readings for Specimen No. 1

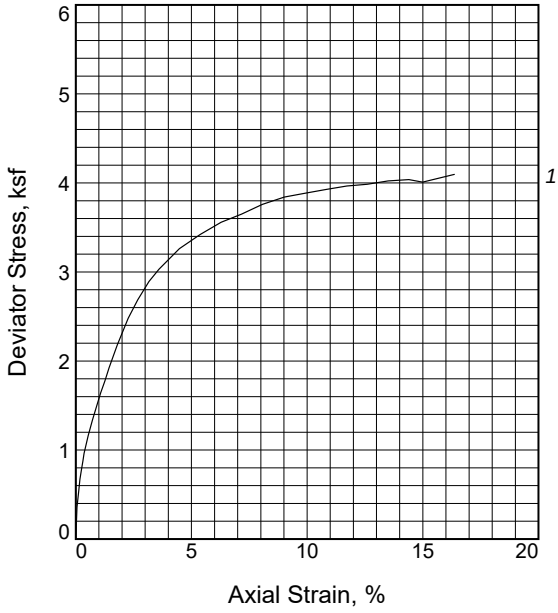
Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.02 cm
Cell pressure = 3.00 psi (0.43 ksf)
Back pressure = 0.00 psi (0.00 ksf)
Strain rate, %/min. = 1.00
Fail. Stress = 5.20 ksf **at reading no.** 31
Ult. Stress = 5.20 ksf **at reading no.** 31

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Princ. Stress ksf	Major Princ. Stress ksf	1:3 Ratio	P ksf	Q ksf
0	0.0000	0.0	0	0.0	0.00	0.43	0.43	1.00	0.43	0.00
1	0.0030	28.0	28	0.1	0.63	0.43	1.06	2.45	0.75	0.31
2	0.0070	42.0	42	0.1	0.94	0.43	1.37	3.18	0.90	0.47
3	0.0100	50.0	50	0.2	1.12	0.43	1.55	3.59	0.99	0.56
4	0.0130	55.0	55	0.2	1.23	0.43	1.66	3.85	1.05	0.61
5	0.0170	59.0	59	0.3	1.32	0.43	1.75	4.05	1.09	0.66
6	0.0200	60.0	60	0.4	1.34	0.43	1.77	4.10	1.10	0.67
7	0.0300	69.0	69	0.5	1.54	0.43	1.97	4.56	1.20	0.77
8	0.0400	74.0	74	0.7	1.65	0.43	2.08	4.81	1.26	0.82
9	0.0500	80.0	80	0.9	1.78	0.43	2.21	5.11	1.32	0.89
10	0.0600	84.0	84	1.1	1.86	0.43	2.29	5.31	1.36	0.93
11	0.0700	89.0	89	1.3	1.97	0.43	2.40	5.56	1.42	0.98
12	0.0800	92.0	92	1.4	2.03	0.43	2.46	5.70	1.45	1.02
13	0.0900	98.0	98	1.6	2.16	0.43	2.59	6.00	1.51	1.08
14	0.1000	102.0	102	1.8	2.25	0.43	2.68	6.20	1.55	1.12
15	0.1230	111.0	111	2.2	2.43	0.43	2.87	6.63	1.65	1.22
16	0.1490	121.0	121	2.7	2.64	0.43	3.07	7.11	1.75	1.32
17	0.1760	130.0	130	3.2	2.82	0.43	3.25	7.53	1.84	1.41
18	0.1990	138.0	138	3.6	2.98	0.43	3.41	7.90	1.92	1.49
19	0.2490	153.0	153	4.5	3.28	0.43	3.71	8.58	2.07	1.64
20	0.2990	169.0	169	5.4	3.58	0.43	4.02	9.30	2.22	1.79
21	0.3490	179.0	179	6.3	3.76	0.43	4.19	9.70	2.31	1.88
22	0.3980	192.0	192	7.2	4.00	0.43	4.43	10.25	2.43	2.00
23	0.4480	206.0	206	8.1	4.25	0.43	4.68	10.83	2.55	2.12
24	0.5010	218.0	218	9.0	4.45	0.43	4.88	11.29	2.66	2.22
25	0.5510	228.0	228	9.9	4.60	0.43	5.04	11.66	2.73	2.30
26	0.6010	235.0	235	10.8	4.70	0.43	5.13	11.87	2.78	2.35
27	0.6510	246.0	246	11.7	4.87	0.43	5.30	12.27	2.87	2.43
28	0.7000	254.0	254	12.6	4.98	0.43	5.41	12.52	2.92	2.49
29	0.7500	262.0	262	13.5	5.08	0.43	5.51	12.76	2.97	2.54
30	0.8000	269.0	269	14.4	5.16	0.43	5.59	12.95	3.01	2.58
31	0.8330	273.0	273	15.0	5.20	0.43	5.63	13.04	3.03	2.60
32	0.9100	281.0	281	16.4	5.27	0.43	5.70	13.19	3.07	2.63

C & phi are not test results but an interpretation of the test results. The designer is responsible for interpreting test data as provided by S&ME.





Sample No.		1
Initial	Water Content, %	21.5
	Dry Density, pcf	103.1
	Saturation, %	94.1
	Void Ratio	0.6046
	Diameter, in.	2.857
	Height, in.	5.556
At Test	Water Content, %	21.5
	Dry Density, pcf	103.1
	Saturation, %	94.1
	Void Ratio	0.6046
	Diameter, in.	2.857
	Height, in.	5.556
Strain rate, %/min.		1.00
Back Pressure, psi		0.00
Cell Pressure, psi		3.00
Fail. Stress, ksf		4.01
Strain, %		15.0
Ult. Stress, ksf		4.01
Strain, %		15.0
σ_1 Failure, ksf		4.44
σ_3 Failure, ksf		0.43

Type of Test:
Unconsolidated Undrained

Sample Type: Intact

Description: LEAN CLAY (CL)

LL= 44 **PL=** 17 **PI=** 27

Assumed Specific Gravity= 2.65

Remarks: Failure criterion is peak deviator stress.

Client: South Hopkins Water District

Project: South Hopkins Water Tank and Pump House

Source of Sample: B-04 **Depth:** 3.0 - 5.0

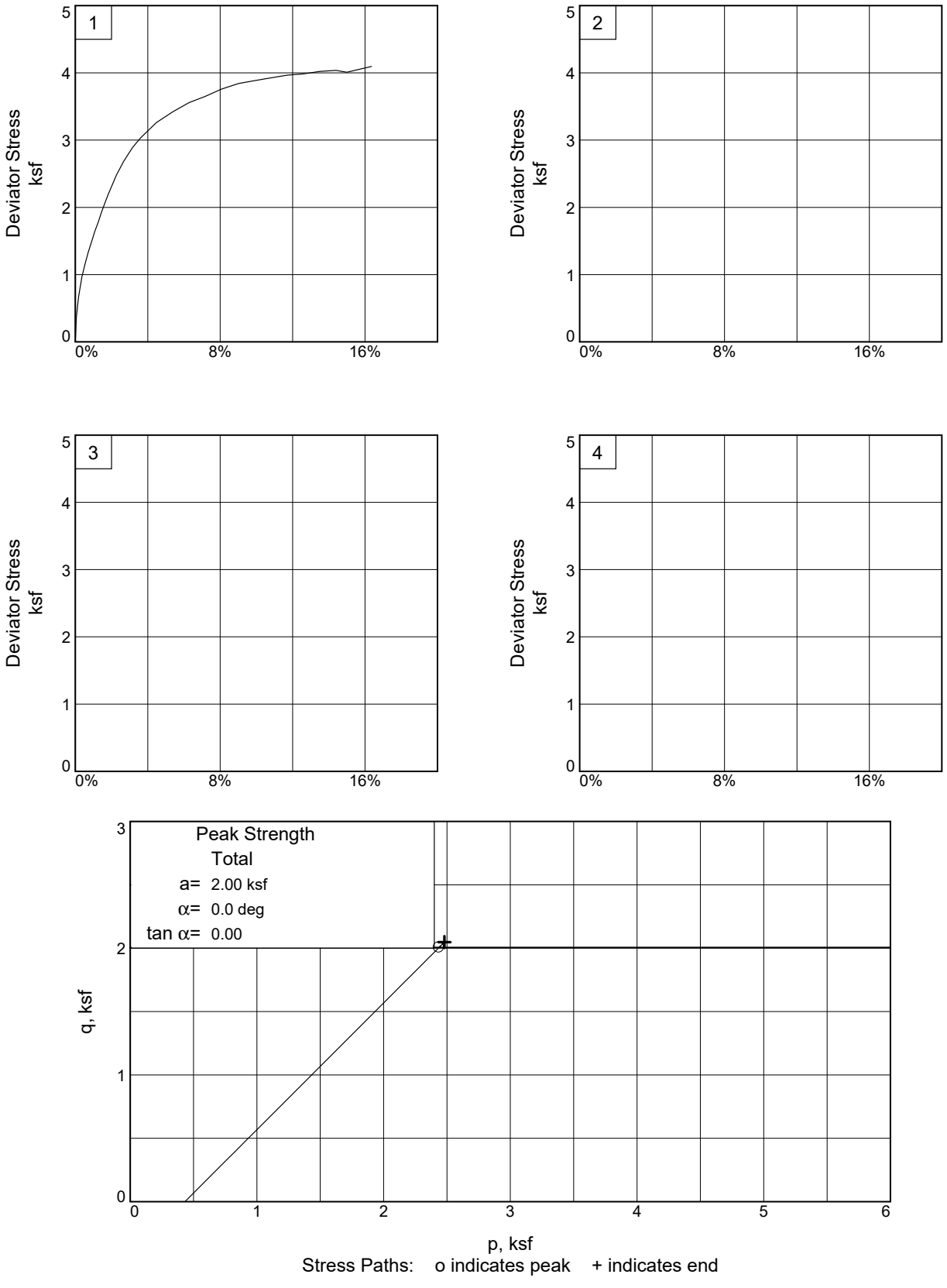
Sample Number: UD-1

Proj. No.: 25360033 **Date Sampled:** 06/05/25

TRIAXIAL SHEAR TEST REPORT
S&ME, Inc.
Lexington, Kentucky

Tested By: M. Bolton

C & phi are not test results but an interpretation of the test results. The designer is responsible for interpreting test data as provided by S&ME.



Client: South Hopkins Water District

Project: South Hopkins Water Tank and Pump House

Source of Sample: B-04 **Depth:** 3.0 - 5.0 **Sample Number:** UD-1

Project No.: 25360033 **Figure** 2 of 2

S&ME, Inc.

Tested By: M. Bolton

TRIAXIAL COMPRESSION TEST

Unconsolidated Undrained

7/10/2025
10:43 AM

Date: 06/05/25
Client: South Hopkins Water District
Project: South Hopkins Water Tank and Pump House
Project No.: 25360033
Location: B-04
Depth: 3.0 - 5.0 **Sample Number:** UD-1
Description: LEAN CLAY (CL)
Remarks: Failure criterion is peak deviator stress.
Type of Sample: Intact
Assumed Specific Gravity=2.65 **LL=**44 **PL=**17 **PI=**27
Test Method: ASTM D 2850

Parameters for Specimen No. 1

Specimen Parameter	Initial	Final
Moisture content: Moist soil+tare, gms.	1185.410	1185.410
Moisture content: Dry soil+tare, gms.	978.760	978.760
Moisture content: Tare, gms.	15.840	15.840
Moisture, %	21.5	21.5
Moist specimen weight, gms.	1170.82	
Diameter, in.	2.857	
Area, in.²	6.411	
Height, in.	5.556	
Wet density, pcf	125.2	
Dry density, pcf	103.1	
Void ratio	0.6046	
Saturation, %	94.1	

Test Readings for Specimen No. 1

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.02 cm
Cell pressure = 3.00 psi (0.43 ksf)
Back pressure = 0.00 psi (0.00 ksf)
Strain rate, %/min. = 1.00
Fail. Stress = 4.01 ksf **at reading no.** 31
Ult. Stress = 4.01 ksf **at reading no.** 31

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Princ. Stress ksf	Major Princ. Stress ksf	1:3 Ratio	P ksf	Q ksf
0	0.0000	0.0	0	0.0	0.00	0.43	0.43	1.00	0.43	0.00
1	0.0030	16.0	16	0.1	0.36	0.43	0.79	1.83	0.61	0.18
2	0.0070	24.0	24	0.1	0.54	0.43	0.97	2.25	0.70	0.27
3	0.0100	30.0	30	0.2	0.67	0.43	1.10	2.56	0.77	0.34
4	0.0140	35.0	35	0.3	0.78	0.43	1.22	2.82	0.82	0.39
5	0.0170	39.0	39	0.3	0.87	0.43	1.31	3.02	0.87	0.44
6	0.0200	43.0	43	0.4	0.96	0.43	1.39	3.23	0.91	0.48
7	0.0300	52.0	52	0.5	1.16	0.43	1.59	3.69	1.01	0.58
8	0.0400	60.0	60	0.7	1.34	0.43	1.77	4.10	1.10	0.67
9	0.0500	67.0	67	0.9	1.49	0.43	1.92	4.45	1.18	0.75
10	0.0600	74.0	74	1.1	1.64	0.43	2.08	4.81	1.25	0.82
11	0.0700	80.0	80	1.3	1.77	0.43	2.21	5.11	1.32	0.89
12	0.0800	87.0	87	1.4	1.93	0.43	2.36	5.46	1.40	0.96
13	0.0900	93.0	93	1.6	2.06	0.43	2.49	5.76	1.46	1.03
14	0.1000	99.0	99	1.8	2.18	0.43	2.62	6.05	1.52	1.09
15	0.1260	113.0	113	2.3	2.48	0.43	2.91	6.74	1.67	1.24
16	0.1490	123.0	123	2.7	2.69	0.43	3.12	7.22	1.78	1.34
17	0.1760	133.0	133	3.2	2.89	0.43	3.32	7.70	1.88	1.45
18	0.2000	140.0	140	3.6	3.03	0.43	3.46	8.02	1.95	1.52
19	0.2490	152.0	152	4.5	3.26	0.43	3.69	8.55	2.06	1.63
20	0.2990	161.0	161	5.4	3.42	0.43	3.85	8.92	2.14	1.71
21	0.3490	169.0	169	6.3	3.56	0.43	3.99	9.24	2.21	1.78
22	0.3980	175.0	175	7.2	3.65	0.43	4.08	9.45	2.26	1.82
23	0.4480	182.0	182	8.1	3.76	0.43	4.19	9.70	2.31	1.88
24	0.5010	188.0	188	9.0	3.84	0.43	4.27	9.89	2.35	1.92
25	0.5510	192.0	192	9.9	3.89	0.43	4.32	9.99	2.37	1.94
26	0.6010	196.0	196	10.8	3.93	0.43	4.36	10.09	2.40	1.96
27	0.6510	200.0	200	11.7	3.97	0.43	4.40	10.18	2.42	1.98
28	0.7000	203.0	203	12.6	3.99	0.43	4.42	10.23	2.42	1.99
29	0.7500	207.0	207	13.5	4.02	0.43	4.45	10.31	2.44	2.01
30	0.8000	210.0	210	14.4	4.04	0.43	4.47	10.35	2.45	2.02
31	0.8330	210.0	210	15.0	4.01	0.43	4.44	10.28	2.44	2.00
32	0.9090	218.0	218	16.4	4.10	0.43	4.53	10.48	2.48	2.05

ADDENDUM NO. 1

PROJECT MANUAL

SOUTH HOPKINS WATER DISTRICT
MADISONVILLE, KENTUCKY
ELEVATED STORAGE TANK AND PUMP STATION PROJECT
CONTRACT 1-2025

Bids will be received until May 12, 2026, at 11 A.M., local time.

This Addendum to the Project Manual is issued to modify, explain, or correct the original Project Manual and is hereby made part of the Contract Documents.

A. DIVISION 00–BIDDING AND CONTRACTING REQUIREMENTS

1. SECTION 00 41 00–BID

   a. Page 00 41 00-5, ARTICLE 5–BASIS OF BID, 5.01.

   REPLACE Bid Page 00 41 00-5 with the attached **Revised** Bid Page 00 41 00-5.

   CLARIFICATION: OWNER will provide all valves and orifices on Tideflex System, CONTRACTOR to provide all piping.

   b. Page 00 41 00-6, ARTICLE 6–TIME OF COMPLETION, 6.01.

   REPLACE Bid Page 00 41 00-6 with the attached **Revised** Bid Page 00 41 00-6.

   CLARIFICATION: "350 calendar days" to "450 calendar days" and "395 calendar days" changed to "450 calendar days" in Paragraph 6.01.

2. SECTION 00 52 00–AGREEMENT

   a. Page 00 52 00-1, Article 3. ENGINEER, 3.01.

   REPLACE Paragraph 3.01 with the following:

   "3.01 OWNER has retained Strand Associates, Inc.® ("ENGINEER") to act as OWNER's representative, assume all duties and responsibilities of ENGINEER, and have the rights and authority assigned to ENGINEER in the Contract except for resident project representative services related to the storage tank and appurtenances. OWNER has retained Wet and Dry Want Inspections to assume these duties and responsibilities and the rights and authority thereto in accordance with the Contract Documents."

   b. Page 00 52 00-2, Article 4. CONTRACT TIMES, 4.02.

   REPLACE "365 calendar days" to "450 calendar days" and "395 calendar days" to "450 calendar days" in Paragraph 4.02.

3. SECTION 00 73 00–SUPPLEMENTARY CONDITIONS

a. Page 00 73 00-15, SUPPLEMENTARY CONDITIONS, SC-9.13 OWNER's Site Representative, 9.13.A.

ADD "related to the storage tank and appurtenances." to the end of the first sentence in SC-9.13.A.

b. Page 00 73 00-15, SUPPLEMENTARY CONDITIONS, SC-10.03 Resident Project Representative, 10.03.

REPLACE SC-10.03 in its entirety with the following:

"Add the following new subparagraph immediately after Paragraph 10.03.A:

1. Strand Associates, Inc.® provided design services for the Project and will assume all duties and responsibilities of ENGINEER in Article 10 with the exception of Paragraph 10.03 in relation to the storage tank and appurtenances.

Add the following new paragraphs immediately after Paragraph 10.03.B:

C. The Resident Project Representative (RPR) will be ENGINEER's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with ENGINEER and CONTRACTOR. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of CONTRACTOR. The RPR will:

1. Conferences and Meetings: Attend meetings with CONTRACTOR, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including CONTRACTOR's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.

2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by CONTRACTOR and consult with ENGINEER concerning acceptability.

3. Liaison:

a. Serve as ENGINEER's liaison with CONTRACTOR. Working principally through CONTRACTOR's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.

b. Assist ENGINEER in serving as OWNER's liaison with CONTRACTOR when CONTRACTOR's operations affect OWNER's on-Site operations.

c. Assist in obtaining from OWNER additional details or information, when required for proper execution of the Work.

4. Interpretation of Contract Documents: Report to ENGINEER when clarifications and interpretations of the Contract Documents are needed and transmit to CONTRACTOR clarifications and interpretations as issued by ENGINEER.

5. Modifications: Consider and evaluate CONTRACTOR's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to ENGINEER. Transmit to CONTRACTOR in writing decisions as issued by ENGINEER.

6. Review of Work and Rejection of Defective Work:

a. Conduct on-Site observations of CONTRACTOR's work in progress to assist ENGINEER in determining if the Work is in general proceeding in accordance with the Contract Documents.

b. Report to ENGINEER whenever RPR believes that any part of CONTRACTOR's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise ENGINEER of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

7. Tests and System Start-ups:

a. Observe that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate OWNER's personnel, and that CONTRACTOR maintains adequate records thereof.

b. Observe, record, and report to ENGINEER appropriate details relative to the test procedures and systems start-ups.

8. Records:

a. Prepare a daily report or keep a diary or log book, and send periodic reports to ENGINEER.

9. Reports:

a. Furnish to ENGINEER periodic reports as required of progress of the Work and of CONTRACTOR's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.

b. Draft and recommend to ENGINEER proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from CONTRACTOR.

c. Notify ENGINEER of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.

10. Payment Requests: Review applications for payment with CONTRACTOR for compliance with the established procedure for their submission and forward with recommendations to ENGINEER, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

11. Certificates, Operation and Maintenance Manuals: During the course of the Work, review materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by CONTRACTOR are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to ENGINEER for review and forwarding to OWNER prior to payment for that part of the Work.

12. Completion:

a. Participate in ENGINEER's visits regarding Substantial Completion.

b. Assist in the preparation of a punch list of items to be completed or corrected.

c. Participate in ENGINEER's visit to the Site in the company of OWNER and CONTRACTOR regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by CONTRACTOR.

d. Observe whether items on the final punch list have been completed or corrected.

D. The RPR will not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).

2. Exceed limitations of ENGINEER's authority as set forth in the Contract Documents.

3. Undertake any of the responsibilities of CONTRACTOR, Subcontractors, or Suppliers.

4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.

5 Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of OWNER or CONTRACTOR.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by ENGINEER.

7. Authorize OWNER to occupy the Project in whole or in part."

B. SPECIFICATIONS

1. DIVISION 13–SPECIAL CONSTRUCTION

a. Page 13 20 00-6, SECTION 13 20 00–STEEL ELEVATED WATER TANK, PART 2–PRODUCTS, 2.01.A.41.

ADD the following new paragraph after Paragraph 2.01.A.41:

"42. Crows nest/corral to be a minimum of 5 feet by 5 feet."

b. Page 13 20 00-12, SECTION 13 20 00–STEEL ELEVATED WATER TANK, PART 3–EXECUTION, 3.06.A.

CHANGE "Chlorination Method 3" to "Chlorination Method 2, Spray Method" in Paragraph 3.06.A.

2. DIVISION 26–ELECTRICAL

   a. Page 26 09 00-4, SECTION 26 09 00–CONTROLS AND INSTRUMENTATION, PART 1–GENERAL, 1.08.A.5.

      ADD the following new paragraph after Paragraph 1.08.A.5:

      "6. Path study to confirm reliable radio communication with the existing South Hopkins Water District SCADA system and mounting antennas at proper height and orientation."

   b. Page 26 09 00-5, SECTION 26 09 00–CONTROLS AND INSTRUMENTATION, PART 1–GENERAL, 1.09.H.

      REPLACE Paragraph 1.09.H with the following:

      "H. All components shall be standard make acceptable to OWNER, with one manufacturer to provide all similar components. The Base Bid System Supplier shall be CITCO Water, Attention Todd Bennett, 4034 Altizer Avenue, Huntington, WV 25705, (800) 999-3484 (O) or (304) 638-7915 (C). See General Conditions and Supplementary Conditions regarding substitutions to the Base Bid system suppliers."

3. DIVISION 33–UTILITIES

   a. Page 33 12 33-24, SECTION 33 12 33–ABOVE GROUND PACKAGED WATER BOOSTER PUMPING STATION–EASTERN BPS, PART 2–PRODUCTS, 2.56.C.

      REPLACE Paragraph 2.56.C in its entirety with the following:

      "C. The distribution panel shall be for use with a 200 amp, 120/240 volt, three phase, four wire electrical service, complete with the following thermal-magnetic branch circuit breakers:
         1. One: 3-Pole, 100 amp Main Breaker.
         2. Two: 3-Pole, 30 amp Pump Motor Breakers, Size Based on Actual VFD Requirements.
         3. One: 3-Pole, 30 amp Surge Protection Device Breaker.
         4. One: 3-Pole, 15 amp Voltage Monitor Breaker.
         5. One: 2-Pole, 100 amp Lighting Panel Breaker."

   b. Page 33 12 33-25, SECTION 33 12 33–ABOVE GROUND PACKAGED WATER BOOSTER PUMPING STATION–EASTERN BPS, PART 2–PRODUCTS, 2.58.

      DELETE Paragraph 2.58 in its entirety.

   c. Page 33 12 33-33, SECTION 33 12 33–ABOVE GROUND PACKAGED WATER BOOSTER PUMPING STATION–EASTERN BPS, PART 2–PRODUCTS, 2.78.A.

      ADD the following new item after Paragraph 2.78.A:

      "2.79 LIGHTING PANEL

         A. The lighting panel shall be a bolt-on panelboard, surface mount, NEMA 1 enclosure for 120/240 VAC, single phase, 3-wire power and with copper bus.

         B. There shall be provided, thermal-magnetic trip circuit breakers as follows
            1. Main breaker, 100 amps.
            2. Branch circuit breakers, as follows:

a. 1-pole, 15-amp motor control panel.
b. 1-pole, 15-amp telemetry panel.
c. 1-pole, 15-amp lights.
d. 1-pole, 15-amp convenience outlets.
e. 1-pole, 15-amp dehumidifier.
f. 2-pole, 30-amp HVAC.
g. 1-pole, 15-amp spare.
h. 1-pole, 15-amp spare.
i. 1-pole, 15-amp spare.
j. 1-pole, 15-amp spare.
k. 1-pole, 15-amp spare."

4. DRAWINGS

a. Detail Drawing Tank Logo

ADD the attached Detail Drawing from Lake Area Sign Company, LLC of the tank logo.

b. Detail Drawing Tideflex Preliminary Mixing Diagram

ADD the attached Detail Drawing of the Tideflex preliminary mixing diagram.

C. DRAWINGS

1. SHEET NO. 2–SITE PLAN

CHANGE General Note No. 8 to: "ALL UNDERGROUND BOLTS, NUTS, AND WASHERS SHALL BE STAINLESS STEEL TYPE 316/316L. ALL UNDER UNDERGROUND FITTINGS AND RESTRAINTS WILL BE DUCTILE IRON WITH MECHANICAL JOINTS ENCASED AND SEALED WITH 8MIL POLYWRAP, PER DIVISION 33."

2. SHEET NO. 6–STANDARD DETAILS

CHANGE Detail A–ELECTRICAL SERVICE POLE DETAIL service disconnect to: "200 AMP 3-BLADE HEAVY DUTY FUSIBLE SAFETY SWITCH IN NEMA 4 ENCLOSURE LABELLED FOR USE AS SERVICE ENTRANCE."

CHANGE Detail A–ELECTRICAL SERVICE POLE DETAIL conductors and conduit to: "4~#3/0, 1~#6 GROUND IN 2-INCH CONDUIT."

3. SHEET NO. 9–BOOSTER PUMP STATION SECTIONS

CLARIFICATION: Rotary docking station shown in Floor Plan is not required. Provide emergency generator receptacle and manual transfer switch as shown on Sheet No. 10 Floor Plan.

CLARIFICATION: Transformer shown in Floor Plan is not required.

4. SHEET NO. 10–BOOSTER PUMP STATION FLOOR PLAN

CLARIFICATION: The VFD fuse panel is not required if individual VFDs are provided with integral fusing and disconnects.

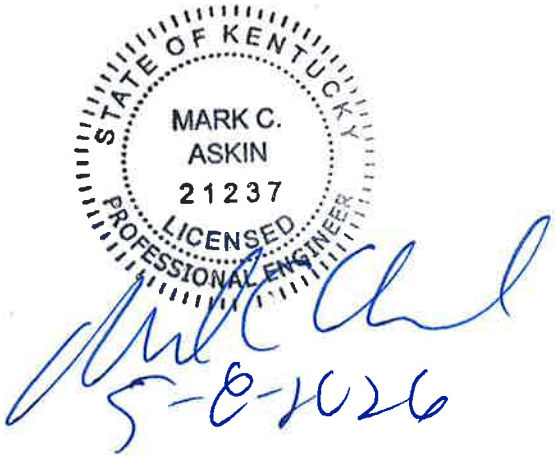
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BIDDERS MUST ACKNOWLEDGE RECEIPT OF THIS ADDENDUM IN THE SPACE PROVIDED IN THE BID FORM

****

Dated at Louisville, Kentucky
May 8, 2026

STRAND ASSOCIATES, INC.®
325 West Main Street, Suite 710
Louisville, KY 40202



BID

SOUTH HOPKINS WATER DISTRICT
MADISONVILLE, KENTUCKY
ELEVATED STORAGE TANK AND PUMP STATION PROJECT
CONTRACT 1-2025

The following prices per item shall be for furnishing and installing the various items of material and work as specified and shown on the Drawings. Bidder agrees to perform the Work as shown on the Drawings and described in the Specifications for the following listed prices. Bidder acknowledges that unit prices have been computed in accordance with Paragraph 13.03 of the General Conditions. Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

NOTE: A price must be bid for each item in the Bid, even though the estimated quantity is zero. Unbalanced or unreasonable unit prices may cause rejection of the Bid.

Item No.	Description	Estimated Quantity	Unit	Bid Unit Price	Bid Price
1.	200,000-GAL Multi-Leg Storage Tank and Appurtenances, INCL Tideflex Mixing System, to be Installed by CONTRACTOR and OWNER Will Provide All Valves and Orifices. CONTRACTOR to Provide All Piping.	1	LS	$	$
2.	175-GAL per Minute Premanufactured Pump Station Delivered and Installed, INCL Portable Generator.	1	LS	$	$
3.	Site Preparation INCL Grading, Foundations, Fencing, Gates, Pavement, DR 14 C900 PVC Piping, Tieing into Existing System, Etcetera, as Shown on Drawings. All Valves and Fire Hydrants to be Supplied by OWNER and Installed by CONTRACTOR.	1	LS	$	$

COMPUTED TOTAL BID CONTRACT 1-2025 (ITEMS 1 THROUGH 3)

_____ Dollars $_____
(Words) (Numbers)

ARTICLE 6–TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete within 450 calendar days after the date when the Contract Time commences to run as provided in Paragraph 4.01 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 450 calendar days after the date when the Contract Time commences to run.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the Contract Times.

ARTICLE 7–ATTACHMENTS TO THIS BID

7.01 The following documents are attached to and made a condition of this Bid:

A. Required Bid security in the form of _____
(Surety2000, Certified Check, Bank Money Order, or Bond)

B. Statement Required Pursuant to KRS 45A.343 (Labor Law Disclosure).

C. 45A.395 Determination of Responsibility–Right of Nondisclosure (Campaign Finance Disclosure).

D. Statement Required Pursuant to KRS 45A.395.

E. Required Affidavit for Bidders Claiming Kentucky Resident Bidder Status (Certificate of Kentucky Resident Bidder Status).

Check the paragraph below that applies to the attached certificate and also provide the Organization Number, if applicable.

1. _____ Bidder is a "resident bidder" as defined in KRS 45A.494(2) of Kentucky's "resident bidder" reciprocal preference statute and submits with this Bid a properly executed and notarized Affidavit that affirms Bidder meets the "resident bidder criteria". Such Affidavit is hereby incorporated and made part of this Bid.

2. _____ Bidder is a "nonresident bidder" as defined in KRS 45A.493(3) of Kentucky's "resident bidder" reciprocal preference statute and the state of residency for the purposes of this administrative regulation shall be its principal office as identified in the Bidder's Certificate of Authority to transact business in Kentucky as filed with the Secretary of State of the Commonwealth of Kentucky, or if it represents and covenants that it is not required to obtain a Certificate of Authority to transact business in the Commonwealth of Kentucky, its mailing address is:

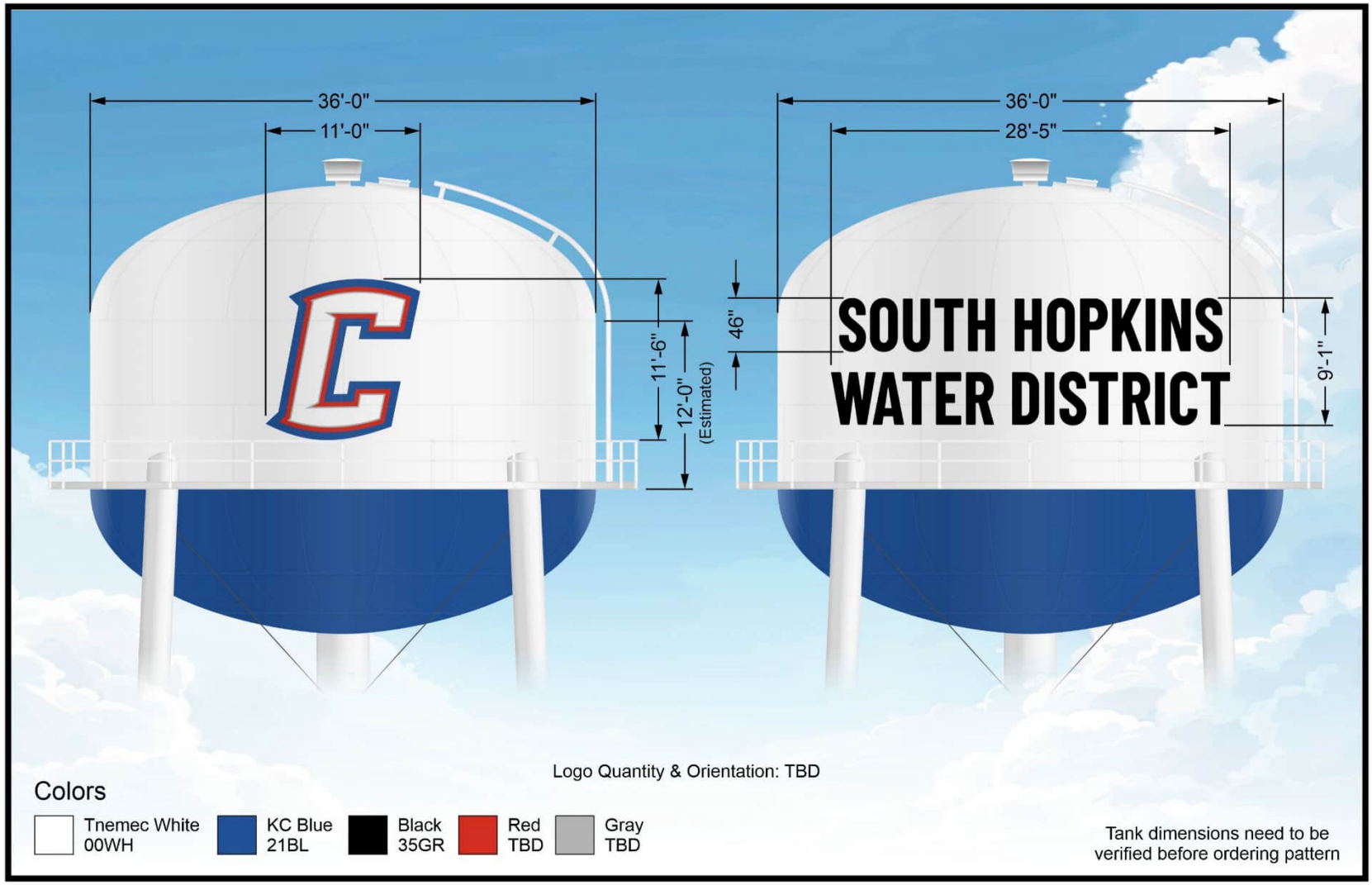
_____

_____

_____

3. Bidder's Organization Number from the Secretary of State of the Commonwealth of Kentucky is _____ [if applicable] and Bidder is qualified to transact business in the Commonwealth or Bidder hereby covenants it will obtain such qualifications prior to award of Contract.

ADDENDUM NO. 1



LAKE AREA SIGN CO., LLC

Danny McKinney / Owner
1375 N. Beglis Pkwy
Sulphur, LA 70663
(337) 625-4179
(337) 794-1564
dannymc@lakeareasignco.com

Client: *Wet or Dry Tank Inspection*
Design: *Dawson Springs, KY (Draft 3)*
Designer: *Timothy Goodeaux*
Date: *5/4/2026*

Date:_____

Signature:_____

☐ **Approved** ☐ **Resubmit**

Notice:
Colors shown are close approximations. Printer and media variations may distort colors from actual paint colors slightly. Renderings are approximate and are provided for a visual aid.
Field verify tank shell height before installing patterns.

Tideflex

Red Valve Company
750 Holiday Drive, Suite 400
Pittsburgh, PA 15220 USA

ANALYSIS BY: Patrick Platt

PRELIMINARY TMS DIMENSIONS

TIDEFLEX MIXING SYSTEM

Reservoir Name:	Hopkins County School 0.2MG Elevated Tank (MLW)
Reservoir Size:	36' DIA. X 28.25' HR.
Reservoir Capacity:	0.2MG
End User:	South Hopkins Water District, KY
Contact:	Jon Blalock
Consultant:	Wet or Dry
Contact:	Jay L Hofman
Red Valve Rep Contact:	Hydro Controls Adam McCarthy

TANK AND TMS DIMENSIONAL TABLE

PROPRIETARY NOTICE

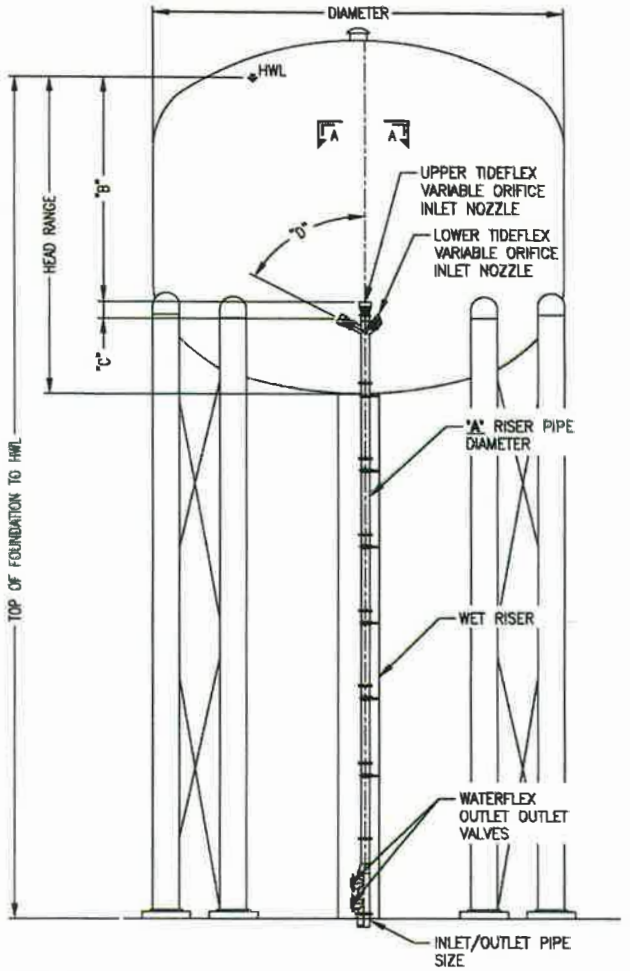
This document contains proprietary information owned by Red Valve Company. It is loaned by Red Valve Company subject to these conditions that it and the information embedded therein shall be used only for record and reference purposes. It shall not be used or caused to be used in any way prejudicial to the interests of Red Valve Company. It shall not be reproduced or copied in whole or in part or disclosed to anyone without the direct written permission of Red Valve Company. And shall be returned upon request.

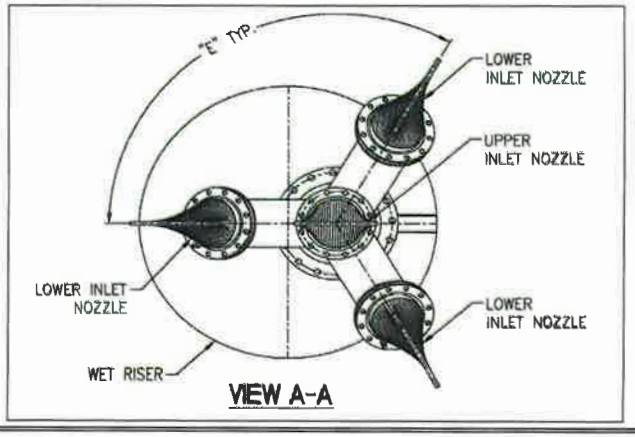
TANK DIMENSIONS		
Bowl Diameter	36.00	Feet
Head Range	28.25	Feet
Depth to LWL:	22.60	Feet
Top of Foundation to HWL:	188.00	Feet
INLET PIPE SIZE	8.00	Inch
OUTLET PIPE SIZE	8.00	Inch
Common (COM) or Separate (SEP)	COM	
TMS DIMENSIONS		
"A" =	8	Inch
"B" =	FINAL TMS DIMENSIONS TO BE BY TIDEFLEX	Feet
(See Notes) "C" =		Feet
"D" =		degrees
"E" =		degrees
UPPER TIDEFLEX INLET NOZZLE		
Quantity	1	
Size	4	Inch
Hydraulic Code	29	
LOWER TIDEFLEX INLET NOZZLES		
Quanity	3	
Size	4	Inch
Hydraulic Code	29	
WATERFLEX OUTLET VALVES		
Quanity	2	
Size	8.00	Inch





Notes:
1. Dim "C" is to the centerline of the "bill" of the Lower Tideflex Inlet Nozzles. The ports off the riser will be lower based on angle "D" and length of elbow and Tideflex.
2. Waterflex Outlet Valves to be located as close to bottom of wet riser as possible.





VIEW A-A

ADDENDUM NO. 1

For more location information please visit www.strand.com

Office Locations

Ames, Iowa | 515.233.0000

Brenham, Texas | 979.836.7937

Cincinnati, Ohio | 513.861.5600

Columbus, Indiana | 812.372.9911

Columbus, Ohio | 614.835.0460

Joliet, Illinois | 815.744.4200

Lexington, Kentucky | 859.225.8500

Louisville, Kentucky | 502.583.7020

Madison, Wisconsin* | 608.251.4843

Milwaukee, Wisconsin | 414.271.0771

Nashville, Tennessee | 615.800.5888

Phoenix, Arizona | 602.437.3733

*Corporate Headquarters

STRAND ASSOCIATES®

Exhibit 6

Hopkins County Fiscal Court
Funding Confirmation

HOPKINS COUNTY FISCAL COURT

Hopkins County Government Center
56 North Main Street
Madisonville, Kentucky 42431
270-821-8294 • Fax 270-821-8295
Email: judgeexecutive@hopkinscounty.net

JUDGE EXECUTIVE
Jack Whitfield, Jr.

EXECUTIVE ASSISTANT
Laura Harvey

September 22, 2026

Mr. Michael Easley, Chairman
South Hopkins Water District
129 S. Main Street
Dawson Springs, Kentucky 42408

Dear Mr. Easley:

This letter is to confirm that the Hopkins County Fiscal Court has allocated **$4,000,000 in Coal Severance Tax funds** for the **U.S. Highway 41 Water Storage Tank Project** of the South Hopkins Water District.

These funds have been designated by the Hopkins County Fiscal Court for use toward the construction of this project.

Please feel free to contact my office if additional information or documentation regarding this allocation is required.

Sincerely,

Jack Whitfield, Jr.
Hopkins County Judge/Executive

MAGISTRATES

Ricky Whitaker District 1 | Buddy Cardwell District 2 | Vicki Thomison District 3 | Ronnie Noel District 4 | Billy Parrish District 5 | Charlie Beshears District 6 | Hannah Myers District 7

Exhibit 7

Division of Water Approval

Andy Beshear
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
300 Sower Boulevard
Frankfort, Kentucky 40601
Phone: (502) 564-2150
Fax: 502-564-4245

Rebecca W. Goodman
SECRETARY

Anthony R. Hatton
COMMISSIONER

March 19, 2026

Jon Blalock
South Hopkins Water District
PO Box 487
Dawson Springs, KY 42408

RE: Elevated Storage Tank & Pump Station Project
Hopkins County, KY
South Hopkins Water District
AI #: 33927, APE20260001
PWSID #: 0540406-26-001

Dear Jon Blalock:

We have reviewed the plans and specifications for the above-referenced project. The plans include the construction of approximately 400 linear feet of 8-inch PVC water line, a 200,000-gallon elevated storage tank, and a duplex pump station with pumps capable of 175 gpm at 70 ft of TDH. This is to advise that plans and specifications for the above referenced project are APPROVED with respect to sanitary features of design, as of this date with the requirements contained in the attached construction permit.

If you have any questions concerning this project, please contact Stephen Kietz at 502-782-0769.

Sincerely,

Terry Humphries, P.E.
Supervisor, Drinking Water Engineering Section
Water Infrastructure Branch
Division of Water

TH:SK
Enclosures
c: Strand Associaties Inc
Hopkins County Health Department
Division of Plumbing

Exhibit 8

Easement

BOOK 850 PAGE 64

EASEMENT AGREEMENT

THIS EASEMENT AGREEMENT is made and entered into by and between **Hopkins County Board of Education**, 320 South Seminary Street, Madisonville, Kentucky, 42431, hereinafter referred to as Grantor, and **South Hopkins Water District**, 129 South Main Street, Dawson Springs, Kentucky, 42408, hereinafter referred to as Grantee.

WITNESSETH: For and in consideration of the desire of the Grantor to assist the Grantee in its charitable endeavors; and

WHEREAS, for and in consideration of the premises stated in this agreement and mutual benefits to both parties, the Grantor does grant, bargain, and transfer unto the Grantee, its successors and assigns, an easement for the installation of water lines and an easement to construct a water tank upon the Grantor's property located at 6625 Hopkinsville Road, Mortons Gap, Kentucky, 42440, more particularly described as follows:

> Unless stated otherwise, any monument referred to herein as an "iron pin set" is a 1/2" diameter rebar 24 inches in length, with an orange cap stamped "PLS 3277". All bearings stated herein are based on the Kentucky South Zone, North American Datum 1983 in U.S. Survey Feet.
>
> A certain tract of land located North of the City of Mortons Gap, Hopkins County, Kentucky, more particularly described as follows:
>
> Beginning at an iron pin set this survey in the west right of way line of Hopkinsville Road, and having Kentucky state plane coordinates, N:1978833.89 and E:1137308.01; thence, leaving the right of way line of said Hopkinsville Road, S 7104'01" W for a distance of 129.65' to an iron pin set this survey; thence, N 2437'01" E for a distance of 70.84' to an iron pin set this survey; thence, N 7125'36" E for a distance of 217.14' to an iron pin set this survey in the said west right of way line; thence, with said right of way line, S 25046'04" E for a distance of 180.00'

65

to the point of beginning, having an area of 1.089 acres and subject to any easements recorded or unrecorded, according to a survey conducted by Thomas W. Crabtree with Ronald Johnson and Associates, PSC on March 31, 2025.

Being a part of the real estate conveyed to Hopkins County Board of Education from Roy Coffman and his wife, Opal Coffman, by deed dated February 17, 1994 of record in Deed Book 526, page 160, Hopkins County Clerk's Office.

TO HAVE AND TO HOLD the above described easement unto the Grantee, its successors and assigns forever, with Covenant of General Warranty of Title, subject to the following conditions:

1. This easement is subject to a reversionary clause that the property reverts back to the exclusive and unrestricted control of the Grantor when the need for the easement no longer exists.

2. The parties agree there is no cash consideration for the easement. The Grantor was preparing to install a fire pump as part of a fire suppression plan but due to the granting of this easement, is not having to do so which would save the Grantor approximately $474,600.00. The parties hereto acknowledge the benefit to the Grantor is greater than the fair market value of the easement and the work the Grantor will now not have to undertake. The fair market value of the property is $110,000.00.

IN TESTIMONY WHEREOF, witness the signatures of the parties hereto on this 3rd day of June, 2025.

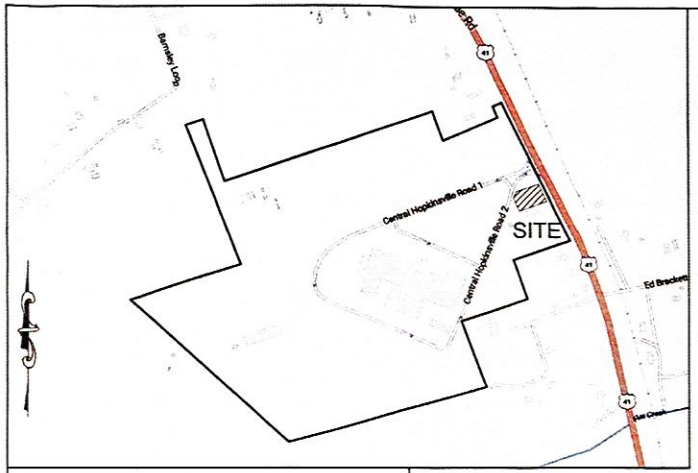
GRANTOR:

Hopkins County Board of Education

By: _____
Kerri Scisney, Chairperson

Attest:

_____
Amy Smith, Superintendent/Secretary



VICINITY MAP

OWNER & CLIENT:
HOPKINS COUNTY BOARD OF EDUCATION
320 S SEMINARY
MADISONVILLE, KY 42431

TOTAL AREA:
1.089 AC

NOTE:
THE PROPERTY SHOWN HEREON IS SUBJECT TO ALL LEGAL EASEMENTS, PRESCRIPTIVE RIGHTS, AND RIGHT OF WAYS.

THE PROFESSIONAL SURVEYOR HAS MADE NO INVESTIGATION OR INDEPENDENT SEARCH FOR EASEMENTS OF RECORD, ENCUMBRANCES, RESTRICTIVE COVENANTS, OWNERSHIP TITLE EVIDENCE, OR ANY OTHER FACTS THAT AN ACCURATE AND CURRENT TITLE SEARCH MAY DISCLOSE.

NOTE:
THIS IS AN EASEMENT SURVEY ONLY, NO DIVISION OR CONSOLIDATION OF PROPERTIES AND IS THEREFORE NOT SUBJECT TO HOPKINS COUNTY SUBDIVISION REGULATIONS.

NOTE:
NO UNDERGROUND UTILITIES WERE LOCATED OTHER THAN THOSE SHOWN ON PLAT USING ABOVE GROUND OBSERVATIONS DURING THE FIELD SURVEY.

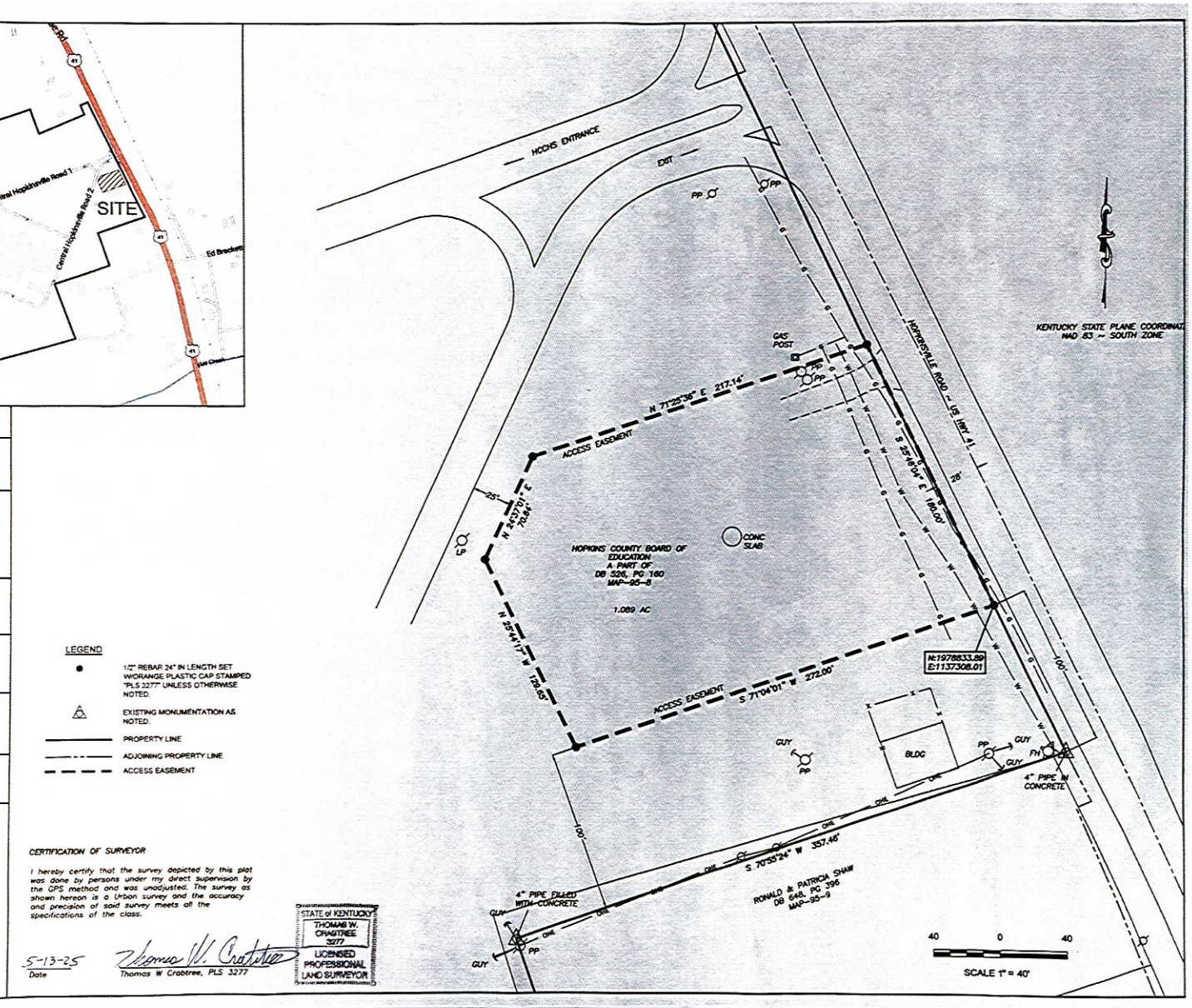
FLOODPLAIN NOTE:
THIS PROPERTY IS NOT LOCATED IN A FLOOD HAZARD AREA AS DETERMINED ON COMMUNITY PANEL NO. 21107 C 360 D EFFECTIVE DATE; MAY 16 2008, ZONE X

HEALTH DEPARTMENT NOTE:
ALL LOTS ARE SUBJECT TO THE INDIVIDUAL SEWAGE DISPOSAL SYSTEM REQUIREMENTS OF THE KENTUCKY DEPARTMENT OF HEALTH.

NOTE:
THIS SURVEY COMPLIES WITH 201 KAR 18:150

GPS USAGE:
THIS SURVEY WAS PERFORMED USING A TRIMBLE R12-I MODEL WITH GLONASS CAPABILITIES AND DUAL FREQUENCY RECEIVERS UTILIZING REAL TIME KINEMATICS (RTK) GLOBAL POSITIONING. ACCURACY EXCEEDED THE ACCURACY OF STANDARDS FOR AN URBAN SURVEY, AS ESTABLISHED BY THE COMMONWEALTH OF KENTUCKY, STANDARDS OF PRACTICE FOR PROFESSIONAL LAND SURVEYORS PER 201 KAR 18:150 (WHICH IS +/- 0.05'+100 PPM). THE BEARINGS AND DISTANCES SHOWN HEREON HAVE NOT BEEN ADJUSTED FOR CLOSURE.

THE BASIS OF BEARINGS SHOWN HEREON ARE BASED ON GLOBAL POSITIONING SYSTEMS, KENTUCKY SOUTH ZONE COORDINATES, NAD83 DATUM. DIFFERENCES IN THE BEARINGS CITED ON THE PLAT AND THOSE CALLED FOR IN THE ORIGINAL DEED ARE DUE TO VARIATIONS BETWEEN MAGNETIC AND GRID NORTH.



LEGEND

- 1/2" REBAR 24" IN LENGTH SET W/ORANGE PLASTIC CAP STAMPED "PLS 3277" UNLESS OTHERWISE NOTED.
- EXISTING MONUMENTATION AS NOTED.
- PROPERTY LINE
- ADJOINING PROPERTY LINE
- ACCESS EASEMENT

CERTIFICATION OF SURVEYOR

I hereby certify that the survey depicted by this plat was done by persons under my direct supervision by the GPS method and was unadjusted. The survey as shown hereon is a Urban survey and the accuracy and precision of said survey meets all the specifications of the class.

5-13-25
Date

Thomas W. Crabtree
Thomas W Crabtree, PLS 3277

STATE of KENTUCKY
THOMAS W. CRABTREE
3277
LICENSED PROFESSIONAL LAND SURVEYOR

DRAWN BY	PROJECT NO.
GAA	25-042
DATE OF SURVEY	DATE OF PLAT
03-31-25	04-21-25
SHEET NO	
1.00	

REVISIONS:

HOPKINS COUNTY SCHOOLS EASEMENT
FOR
SOUTH HOPKINS WATER DISTRICT

RJA RONALD JOHNSON & ASSOCIATES, P.S.C.
ENGINEERING • LAND SURVEYING • ENVIRONMENTAL
24 W Center St Madisonville, KY 42431 (270) 821-6392

606

67

GRANTEE:

South Hopkins Water District

By: _____
Bob Tucker, Chairman

STATE OF KENTUCKY)
)
COUNTY OF HOPKINS)

The foregoing Easement was acknowledged and sworn to before me by Kerri Scisney and Amy Smith, as Chairperson and Superintendent/Secretary, for and on behalf of Hopkins County Board of Education, persons known to me or presenting sufficient evidence of their identification, on this 3 day of ~~May~~ June, 2025.

_____
Notary Public, State at Large, KY
My commission expires: 7/14/27
Notary ID: 714182

STATE OF KENTUCKY)
)
COUNTY OF HOPKINS)

The foregoing Easement was acknowledged and sworn to before me by Bob Tucker, as Chairman, for and on behalf of South Hopkins Water District, a person known to me or presenting sufficient evidence of his identification, on this 3rd day of ~~May~~ June, 2025.

ANITA M BLACK
NOTARY PUBLIC KYNP75361
KENTUCKY STATE AT LARGE
MY COMMISSION EXPIRES AUGUST 3, 2027

_____
Notary Public, State at Large, KY
My commission expires: 8.3.2027
Notary ID: 75361

Prepared by:
FRYMIRE, EVANS, PEYTON,
TEAGUE & CARTWRIGHT, PLLC
Post Office Box 695
Madisonville, KY 42431
(270) 821-6165

_____
J. Keith Cartwright
Attorney at Law
JKC alt 2025Board.Easement HCBOE South Hopkins Water District

2026010272
HOPKINS CO, KY FEE $50.00
PRESENTED / LODGED: 10-05-2026 11:10:55 AM
RECORDED: 10-05-2026
KEENAN WOODRUFF
CLERK
BY: NICOLE COFFMAN
DEPUTY CLERK
BK: DEED 850
PG: 64-67

Exhibit 9

Advertisement for Bids

Pennsylvania court overturns limits on Medicaid coverage for abortions

BY KIMBERLEE KRUESI AND MARC LEVY
ASSOCIATED PRESS

A Pennsylvania court on Monday said that the state's constitution guarantees a right to abortion while striking down a decades-long law banning the use of state Medicaid funds to cover abortion costs.

The ruling by a divided seven-judge panel of the appellate-level Commonwealth Court is a major victory for Planned Parenthood and abortion clinic operators who first sued Pennsylvania over its Medicaid funding restrictions in 2019.

While the case initially centered over state Medicaid limitations, the stakes significantly expanded after the U.S. Supreme Court in 2022 ended nearly a half-century of federal abortion protections by overturning Roe v. Wade.

The court's finding on Monday marks the first time that the right to an abortion is protected by the Pennsylvania constitution, joining a handful of states where reproductive rights advocates have found success in protecting abortion access by pointing to state constitutions.

The case could still be appealed to Pennsylvania's Supreme Court.

"Today, our Commonwealth Court, looking at the Pennsylvania constitution, held that there is a right to reproductive autonomy, and it's the highest possible level of a right," said Susan Frietsche, executive director of the Women's Law Project, which helped represent the clinics.

A spokesperson for Attorney General David Sunday, a Republican, said the office was reviewing the decision and did not say whether it would appeal.

Gov. Josh Shapiro, a Democrat, praised the decision.

"I've long opposed this unconstitutional ban, and as Governor, I did not defend it — because a woman's ability to access reproductive care should never be determined by her income," Shapiro said in a statement.

In 2019, plaintiffs asked the court to order the state's Medicaid program to begin covering abortions, without restriction, arguing that a 1982 Pennsylvania law restricting state Medicaid funding violated the constitutional equal protection rights of low-income women.

The case has since taken several turns, with a lower-court ruling in 2021 that the plaintiffs did not have standing and also saying that they were bound by a state Supreme Court 1985 decision upholding the 1982 law.

However, in 2024, the state Supreme Court overturned the lower court's ruling and also determined that previous court decisions did not fully consider the breadth of state constitutional protections against discrimination beyond those provided by the federal constitution.

The seven judges on the lower court who heard the case largely sided with the plaintiffs on Monday. The majority opinion said the state should invest in maternal and infant health care and other resources if it believes that women should carry a pregnancy to term.

The attorney general's office had argued that the state had an interest in "protecting fetal life" and that the Medicaid coverage exclusion helped support that goal.

"If the state believes certain medical procedures may psychologically harm women, the state can license, regulate, and educate around such care. That is less intrusive than taking an entire medical procedure off the table categorically for some women, some of whom may benefit from that procedure — a fact the Attorney General does not dispute," the majority opinion said.



Provided by HCCHS FFA Facebook

44 FFA members from Hopkins County Central High School made their way to Murray State last week to compete against other FFA teams.

HCCHS

FROM **PAGE A1**

from HCCHS, as well as former West Hopkins and South Hopkins high school alumni with a barbeque.

This year, the team's Alumni Tailgate is being held in conjunction with Strikeout Cancer, an event hosted by the HCCHS baseball team, to support Lee James, a former agriculture teacher and baseball coach for the school.

James was diagnosed with brain cancer in late 2025, and has been undergoing various surgeries and treatments at the Merle M. Mahr Cancer Center. The baseball team is using proceeds from tonight's game against the Dawson Springs Panthers to support both James and the cancer center.

The FFA Tailgate begins at 4:30 p.m. The general public is invited to join in Strikeout Cancer activities, which will begin at 5 p.m. The first pitch of the game will be held at 5:30 p.m. at HCCHS.

HOPKINS

FROM **PAGE A1**

Muhlenberg, and Webster counties, in an effort to spotlight teachers "who demonstrate exceptional skills and dedication to their profession and who inspire and motivate students to achieve their full potential," MCC explained in a press release.

Dawson Springs Superintendent Leonard Whalen also serves as chairman of Regional Education Partnership.

"Ultimately, the strength of our society is reflected in how we support our schools," he said. "Tonight, we're going to recognize the best of the best."

Dr. Ben Littlepage, Professor at Murray State in the Department of Educational Studies, Leadership, & Counseling agreed with Mr. Whalen.

"You represent the very best in our profession," he said to the honorees.

"With this year's nominations, over 120 were received," added MCC's Vice President Dr. Jay Parrent. "So, as Mr. Whalen said, you truly are the best of the best in our classrooms."

Hopkins County Superintendent Dr. Damon Fleming presented the awards to the honorees from his district.

The elementary winner was Chelsea Washer of Southside Elementary School. According to Fleming, Washer is a fifth-grade social studies teacher who makes learning an experience. Routinely, in her classroom, students dig for artifacts or walk in to see her dressed up as an historical figure, which helps her young historians develop confidence and a love for learning.

"Ms. Washer knows that students learn best when they are fully involved," he said. "Her principal describes her as a teacher who truly brings learning to life, and that's clear the moment you walk into her room."

For the middle grades, Bryana Dulin of Browning Springs Middle School was recognized. Fleming explained that the eighth-grade history teacher makes the subject active, meaningful, and connected to the world by encouraging active participation, critical thinking, and deeper understanding. Dulin is also the facilitator of the Bear's Leadership Academy, providing students with opportunities to lead, serve, and connect with their community—building essential skills for the future.

"Ms. Dulin is not just teaching them lessons, she's helping them build those skills and become confident for their future," Fleming added.

Philip Bader, a teacher at Hopkins County Day Treatment, was the high school honoree. Fleming stated that Bader works in alternative education, believing every student deserves an opportunity to succeed by transforming the school's culture from one focused on discipline to one of growth, respect, and second chances.

"He believes every student deserves a real chance to be successful," said Fleming. "Because of his work, students are given a real chance to reset, rebuild, and move forward."

Other Excellence in Teaching award winners for 2026 from the Regional Educational Partnership include: Lee Phillips, Mandy Hooks, and Whitni Boitnott from Caldwell County; Magan Cruce, Jessica DeBurgo, and Nick Martinez from Crittenden County; Bailey Dyer, Melissa Larimore, and Tamara Rice from Dawson Springs; Jacklyn Murphy and Josh Stewart from Muhlenberg County; and Jennie Hopper, Taylor Herzog, and Christina Ramage from Webster County.

PUPIL

FROM **PAGE A1**

community school grant, the program officially concluded in December of 2025. Even with its sudden end, the program has had a lasting impact on the district.

"While the formal role of community schools director no longer exists, the core mission of supporting the whole child and strengthening school-community connections remains a priority," said Gamblin. "This work will continue as part of my role as director of pupil personnel, ensuring that the progress made through the grant is maintained and built upon moving forward."

Gamblin earned a bachelor's degree in elementary education, master's degree in teacher leadership, and Rank I in education administration, all from Murray State University. She also holds the additional certifications for Director of Pupil Personnel and Instructional Supervisor.

She was a finalist for the 2018 Valvoline Kentucky Teacher of the Year Award and received the 2022 Leadership Award presented by the African American Coalition of Hopkins County.

She is the President of the Hopkins County Young Professionals, a board member for Hopkins County Happy Feet, Hopkins County Chamber of Commerce, and Hopkins County Crime Stoppers, and a member of Leadership Hopkins County Class of 2024-2025.

While serving as DPP on an interim basis, Superintendent Dr. Damon Fleming said Gamblin has demonstrated strong leadership, sound judgment, and a deep commitment to supporting students, families, and staff.

"Her steady guidance and collaborative approach have helped ensure continuity and progress within the department," he said. "With a strong background in student services and a clear understanding of our school community's needs, Wendy is well-positioned to lead the Pupil Personnel team moving forward. We are confident that she will continue to build on the important work already underway and further strengthen the support systems that serve our students."

CANNABIS

FROM **PAGE A3**

group of teens who used cannabidiol (CBD) did not show the same pattern.

"These results point to THC as a likely driver of the changes we're seeing," Wade said. "It also highlights how complicated cannabis products can be, especially since some products labeled as CBD may still contain THC."

While the differences seen in the study were described in the press release as "relatively modest," the researchers say they still matter because the brain is rapidly developing in adolescence, and even small changes to memory, attention, or thinking speed can affect school performance and daily life.

"Delaying cannabis use supports healthy brain development," Wade said. "As cannabis becomes more widely available, it's important for families and teens to understand how it may affect the developing brain."

Further, the researchers said in the release that the study does not prove that cannabis use directly causes these changes, noting that other factors — such as environment or personality — may play a role, although they said they did account for many of these influences in the study.

(Editor's note: In 2021, the latest data available on the Youth Risk Behavior Surveillance System report, 11.9% of Kentucky's high school students were considered current marijuana users, a designation given to those who used marijuana one or more times during the 30 days before the survey.)

ADVERTISE WITH US

LEGAL NOTICE

SECTION 00 11 13
ADVERTISEMENT TO BID
SOUTH HOPKINS WATER DISTRICT
MADISONVILLE, KENTUCKY
ELEVATED STORAGE TANK AND PUMP STATION PROJECT
CONTRACT 1-2025

The South Hopkins Water District (OWNER) is requesting Bids for the construction of the following Project:
Elevated Storage Tank and Pump Station Project
Contract 1-2025

Electronic Bids for the construction of the Project will be received by OWNER until May 12, 2026, at 11 A.M., local time. At that time the Bids received will be publicly downloaded and read aloud via teleconference. The login information for the teleconference is as follows: (309) 205-3325, Conference ID 918 4658 3355.

The Project includes the following Work: A new 200,000-gallon elevated tank and 175-gallon-per-minute pump station.

Complete digital Project Bidding Documents are available at www.strand.com or at www.questcdn.com. Download the digital Bidding Documents for $75 by inputting Quest project number 10127611 on the website's project search page. Please contact QuestCDN.com at (952) 233-1632 or info@questcdn.com for assistance with free membership registration, downloading, and working with this digital Project information.

For this Project, Bids will ONLY be received and accepted via the online electronic Bid service through QuestCDN.com. To access the electronic Bid Form, download the Project Documents and click the Online Bidding.

All Bidders submitting a sealed Bid shall obtain the Bidding Documents from QuestCDN.com or from Strand Associates, Inc.® Bidders who submit a Bid must be a Plan Holder of record at the Issuing Office. Bids from Bidders who are not on the Plan Holders List may be returned as not being responsive.

The Bid must be accompanied by Bid security made payable to OWNER in an amount of 5% of the Bidder's maximum Bid price.

A wage rate determination is not a requirement of this Project.

Contract award shall be made based on the lowest responsive and responsible Bidder.

This Bid is subject to Kentucky Revised Statutes Section 45A.490 through 45A.494, which in general provides that a "resident bidder" of Kentucky is to be given a bidding preference over a "nonresident bidder" who is registered in a state that gives preference to its in-state resident bidders over a Kentucky resident bidder. The bidding preference is to be the same as that stipulated for the state of the "nonresident bidder." If the state of a "nonresident bidder" provides no specific preference, then "resident" and "nonresident bidders" are to be treated the same when evaluating Bids.

All Bidders must comply with all Federal, State, and City Equal Employment Opportunity laws and regulations which prohibit discrimination in employment regarding race, creed, color, sex, or national origin.

All taxes are the responsibility of the successful Bidder unless specifically exempted in the Bidding Documents.

A pre-bid conference will be held at 10 A.M., local time, on April 27, 2026, at Dunn Missionary Baptist Church, 4855 Charleston Road, Dawson Springs, KY 42408. Bidders are required to attend and participate in the conference.

The Strand Associates, Inc.® project manager is Mark C. Askin, P.E. and can be contacted at Strand Associates, Inc.®, 325 West Main Street, Suite 710, Louisville, KY 40202, (502) 583-7020 regarding the Project.

For all further requirements regarding Bid submittal, qualifications, procedures, and Contract award, refer to the Instructions to Bidders that are included in the Bidding Documents.

Published by the authority of the South Hopkins Water District
Mike Easley, Chairman
Dated at Madisonville, Kentucky
April 21, 2026

AFFP
SECTION 00 11 13

Affidavit of Publication

STATE OF KY }
COUNTY OF HOPKINS } SS

Melanie Miller, being duly sworn, says:

That she is Accounting Clerk of the The Messenger, a newspaper of general circulation, printed and published in Madisonville, Hopkins County, KY; that the publication, a copy of which is attached hereto, was published in the said newspaper on the following dates:

April 21, 2026

Publisher's Fee: $ 284.15

That said newspaper was regularly issued and circulated on those dates.
SIGNED:

Subscribed to and sworn to me this 21st day of April 2026.

LEONA A. HENDRIX NOTARY ID KYNP12859 MY COMMISSION EXPIRES 10/10/2028 PUBLIC STATE AT LARGE, KY.

70050742 71457303

Kayla Goodaker
South Hopkins Water District
129 S Main St
Dawson Springs, KY 42408

SECTION 00 11 13
ADVERTISEMENT TO BID
SOUTH HOPKINS WATER DISTRICT
MADISONVILLE, KENTUCKY
ELEVATED STORAGE TANK AND PUMP STATION PROJECT
CONTRACT 1-2025

The South Hopkins Water District (OWNER) is requesting Bids for the construction of the following Project:

Elevated Storage Tank and Pump Station Project
Contract 1-2025

Electronic Bids for the construction of the Project will be received by OWNER until May 12, 2026, at 11 A.M., local time. At that time the Bids received will be publicly downloaded and read aloud via teleconference. The login information for the teleconference is as follows: (309) 205-3325, Conference ID 918 4658 3355.

The Project includes the following Work: A new 200,000-gallon elevated tank and 175-gallon-per-minute pump station.

Complete digital Project Bidding Documents are available at www.strand.com or at www.questcdn.com. Download the digital Bidding Documents for $75 by inputting Quest project number 10127611 on the website's project search page. Please contact QuestCDN.com at (952) 233-1632 or info@questcdn.com for assistance with free membership registration, downloading, and working with this digital Project information.

For this Project, Bids will ONLY be received and accepted via the online electronic Bid service through QuestCDN.com. To access the electronic Bid Form, download the Project Documents and click the Online Bidding.

All Bidders submitting a sealed Bid shall obtain the Bidding Documents from QuestCDN.com or from Strand Associates, Inc.®

Bidders who submit a Bid must be a Plan Holder of record at the Issuing Office. Bids from Bidders who are not on the Plan Holders List may be returned as not being responsive.

The Bid must be accompanied by Bid security made payable to OWNER in an amount of 5% of the Bidder's maximum Bid price.

A wage rate determination is not a requirement of this Project.

Contract award shall be made based on the lowest responsive and responsible Bidder.

This Bid is subject to Kentucky Revised Statutes Section 45A.490 through 45A.494, which in general provides that a "resident bidder" of Kentucky is to be given a bidding preference over a "nonresident bidder" who is registered in a state that gives preference to its in-state resident bidders over a Kentucky resident bidder. The bidding preference is to be the same as that stipulated for the state of the "nonresident bidder." If the state of a "nonresident bidder" provides no specific preference, then "resident" and "nonresident bidders" are to be treated the same when evaluating Bids.

All Bidders must comply with all Federal, State, and City Equal Employment Opportunity laws and regulations which prohibit discrimination in employment regarding race, creed, color, sex, or national origin.

All taxes are the responsibility of the successful Bidder unless specifically exempted in the Bidding Documents.

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The Strand Associates, Inc.® project manager is Mark C. Askin, P.E. and can be contacted at Strand Associates, Inc.®, 325 West Main Street, Suite 710, Louisville, KY 40202, (502) 583-7020 regarding the Project.

For all further requirements regarding Bid submittal, qualifications, procedures, and Contract award, refer to the Instructions to Bidders that are included in the Bidding Documents.

Published by the authority of the South Hopkins Water District
Mike Easley, Chairman
Dated at Madisonville, Kentucky
April 21, 2026

Exhibit 10

Bid Tabulations

Elevated Storage Tank and Pump Station Project, Contract 1-2026, South Hopkins Water District (#10127611)
Owner: South Hopkins Water District
Solicitor: Strand Associates, Inc.
05/12/2026 11:00 AM CDT

						Caldwell Tanks, Inc.		Maguire Iron, Inc.		Pittsburg Tank & Tower Co. Inc	
Section Title	Line Item	Item Code	Item Description	UofM	Quantity	Unit Price	Extension	Unit Price	Extension	Unit Price	Extension
Elevated Storage Tank and Pump Station Project							$3,487,000.00		$3,719,000.00		$4,140,800.00
	1	BASE-1	200,000-GAL Multi-Leg Storage Tank and Appurtenances, INCL Tideflex Mixing System, to be Installed by CONTRACTOR and OWNER Will Provide All Valves and Orifices. CONTRACTOR to Provide All Piping.	LS	1	$1,874,487.00	$1,874,487.00	$2,458,000.00	$2,458,000.00	$2,515,800.00	$2,515,800.00
	2	BASE-2	175-GAL per Minute Premanufactured Pump Station Delivered and Installed, INCL Portable Generator.	LS	1	$957,113.00	$957,113.00	$475,000.00	$475,000.00	$1,050,000.00	$1,050,000.00
	3	BASE-3	Site Prep. (Grading, Foundations, Fencing, Gates, Pavement, DR 14 C900 PVC Piping, Tieing into Exist. System, Etc). Valves & Fire Hydrants to be Supplied by OWNER, Installed by CONTRACTOR.	LS	1	$655,400.00	$655,400.00	$786,000.00	$786,000.00	$575,000.00	$575,000.00
Base Bid Total:							$3,487,000.00		$3,719,000.00		$4,140,800.00

We certify that the above is a complete tabulation of all the bids received by South Hopkins Water District on May 12, 2026 for the titled Project.

STATE OF KENTUCKY
MARK C. ASKIN
21237
LICENSED PROFESSIONAL ENGINEER

10-5-2026

Exhibit 11

Acquired Property

Detailed Estimate of Acquired Property Classified According To The Uniform System of Accounts for Class A/B Water Districts and Associations

South Hopkins Water District
U.S. 41 Water Storage Tank Project

Account No.	Account Description	Estimate
304	Structures & Improvements	$ 513,000
311	Pumping Equipment	$ 781,000
330	Distribution Reservoirs & Standpipes	$2,706,000
	TOTAL	**$4,000,000**