Department of Public Works
Ramona Carter P.E., MPA
Director

THE COUNTY OF
POWHATAN
VIRGINIA

3834 Old Buckingham Road, Suite A
Powhatan, Virginia 23139

Tel 804-598-5605
Fax 804-598-7835
www.powhatanva.gov

INVITATION FOR BIDS

Issue Date:	March 13, 2017
Title:	500,000 Gallon Elevated Water Storage Tank Replacement
Issuing Entity:	County of Powhatan, Virginia Department of Public Works
Period of Contract	380 days Substantial Completion

SEALED BIDS SUBJECT TO THE TERMS, CONDITIONS, AND SPECIFICATIONS HEREIN WILL BE RECEIVED 2:00PM ON APRIL 18, 2017 LOCAL PREVAILING TIME AT WHICH TIME THEY WILL BE PUBLICLY OPENED AND MADE A PART OF THE PUBLIC RECORD FOR FURNISHING THE GOODS/SERVICES DESCRIBED HEREIN. BIDS SHALL BE SUBMITTED IN A SEALED CONTAINER. THE FACE OF THE CONTAINER SHALL BE CLEARLY MARKED IN THE LOWER LEFT CORNER AS FOLLOWS:

IFB#: 2017-03
For: 500,000 Gallon Elevated Water Storage Tank

All inquiries for information should be directed to:

Ramona Carter, P.E., MPA
Public Works Director
Powhatan County
3849 Old Buckingham Road
Powhatan, VA 23139
Office: 804.598.5764 | Fax: 804.598.4821
rcarter@powhatanva.gov

Sealed bids shall be mailed, delivered by courier, or hand delivered to:

County of Powhatan
Department of Finance
Attention: Charla Schubert
3834 Old Buckingham Road, Suite B
Powhatan, VA 23139

Bids must be submitted by the date and time stated above or they will remain unopened. No allowance will be made for postmark or error in delivery to incorrect address. It is the sole responsibility of the Contractor to ensure timely and correct delivery of bid to the address above.

PRE-BID CONFERENCE: There will be no pre-bid conference for this project.

This public body does not discriminate against faith-based organizations in accordance with the Code of Virginia, § 2.2-4343.1 or against a bidder or offeror because of race, religion, color, sex, national origin, age, disability, or any other basis prohibited by state law relating to discrimination in employment.

Bid Documents;

Bid documents which include drawings, specifications and forms may be obtained from:
Wes Hunnius, P.E.,Timmons Group 1001 Boulders Parkway, Suite 300 Richmond, VA 23225
Telephone: (804) 200-6500 between the hours of 9:00 a.m. and 5:00 p.m. for a fee of $__30.00___ non-refundable, beginning March 13, 2017

Bid Documents are also open for public inspection at the following locations:
1.____Powhatan County Homepage Website
2.____eVA_____

Obligation of Contractor: By submitting a bid, the Contractor covenants and agrees that he has satisfied himself, from his own investigation of conditions to be met, that he fully understands his obligation and that he will not make any claim for, or have right to cancellation or relief from the resulting contract because of any misunderstanding or lack of information.

Contractor further agrees that conditions herein have been carefully read and this bid is submitted subject to all requirements stated herein. The undersigned hereby acknowledges and agrees, if this l bid is accepted, to furnish all services agreed upon in strict accordance with contract.

Name and Address of Firm: _____

_____

_____

_____

Date:

By: _____
(Signature in Ink)

Name: _____
(Please Print)

Title: _____
(Please Print)

FEI/FIN NO. _____

Phone: _____

Fax: _____

Email: _____

State Corporation Commission (SCC) ID number _____

Powhatan County Business License No. (if applicable) _____

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SECTION I – INVITATION FOR BID DETAIL

A. PURPOSE

The purpose of this project is to provide fire protection to the County school bus garage and the new junior high school properties currently under construction.

B. PROJECT DESCRIPTION

The project consists of supply and installation of a 500,000 gallon elevated water storage tank, supply and install a 12" water line along Route 13 to connect the bus garage property and the new junior high school property to the tank, and construction of a non-potable well and associated pumps to fill the tank.

C. SUBMISSION AND ADDITIONAL INFORMATION

SUBMISSION AND ADDITIONAL INFORMATION
Submit bid, using forms furnished in this IFB and filling in all blank spaces, addressed as indicated on the front page of this solicitation.

Contractors shall include the following with their submission:

- Completed Signature Page (Page 3)
- Certificate of Non-Collusion (Page 9)
- Completed Bid Form (Pages 7)
- Bid Security (See Instructions Page18 section 2.21)
- Reference List (Page 11)

CONTRACTORS REQUEST FOR INFORMATION & CLARIFICATION

Questions pertaining to the specifications of this IFB will be accepted from any and all bidders but must be in writing and directed to the individual identified on the cover page. Unauthorized contact with other Powhatan County staff may result in disqualification of the bidder. Deadline for **Request for information (RFI) must be received by 5:00pm, April 11, 2017**. RFIs are to be emailed to rcarter@powhatanva.gov and will be promptly responded to via email to all bidders present at the pre-bid conference. It is the responsibility of the Contractors to ensure they have received all addenda. Addenda can be found on the eVA solicitation page or on the Powhatan County webpage under "Bids Opportunities."

Offeror's are reminded that changes to the invitation, in the form of addenda, may be issued between the issue date and within Five (5) days before the opening/closing of the solicitation.

All addenda should be signed and submitted before the time and date of the opening/closing of the bid and must accompany the bid.

CONTRACT PERIOD

The contract period shall be from Notice to Proceed and be substantially complete within 380 calendar days.

PAYMENT TERMS

See General Terms and Conditions (Article 15 General Contractors Compensation)

AWARD

The award will be made to the lowest responsive and responsible bidder meeting the requirements of the solicitation.

D. SPECIFICATIONS

DIVISION 9: FINISHES

09-9724 STEEL WATER STORAGE TANK PAINTING

DIVISION 22: PLUMBING

22-0700 MECHANICAL INSULATION

22-1113 PIPE VALVES AND FITTINGS

DIVISION 26: ELECTRICAL

26-0519 LOW-VOLATAGE ELECTRICAL POWER CONDUCTORS AND CABLES

26-0526 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

26-0529 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

26-0533 RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

26-0544 SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

26-0553 IDENTIFICATION FOR ELECTRICAL SYSTEMS

26-2416 PANELBOARDS

26-2714 UTILITY SERVICE ENTRANCE

26-2726 WIRING DEVICES

26-2813 FUSES

26-2913 ENCLOSED CONTROLLERS
26-5119 LED INTERIOR LIGHTING

DIVISION 33: UTILITIES
33-0910 SEQUENCE OF OPERATION
33-1123 WATERSUPPLY WELL
33-1133 WELL PUMP
33-1233 SUBMERSIBLE MIXER
33-1619 ELEVATED WATER STORAGE TANK

DIVISION 40: PROCESS INTEGRATION
40-7313 PRESSURE GAUGES AND TRANSMITTERS

APPENDICES
APPENDIX A- GEOTECHNICAL REPORT

PLANS: SHEETS TS, A1.0, A1.1, A2.0, A2.1

E. SUBMITTALS

Submit shop drawings as detailed in each Division Section of the Technical Specifications.

BID FORM

BID FORM

IFB # 2017-03
500,000 Gallon Elevated Water Storage Tank

THIS BID IS SUBMITTED TO:
Department of Finance
Attention: Charla Schubert
3834 Old Buckingham Road, Suite B
Powhatan, VA 23139

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

2. BIDDER accepts all of the terms and conditions of the Advertisement and Invitation to Bid and Instructions to Bidders, including, without limitation, those dealing with the disposition of Bid Security. This Bid will remain subject to acceptance for sixty (60) business days after the day of Bid opening. BIDDER will sign and submit the Agreement with the Bonds and other documents required by the Bidding Requirements within fifteen business days after the date of OWNER's Notice of Award.

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

a) has examined and carefully studied the Bidding Documents and the following addenda receipt of all which is hereby acknowledged:

b) has visited the site and become familiar with and is satisfied as to the general, local and site conditions that may affect cost, progress, performance and furnishing of the Work;

c) is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work;

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

e) has given the County written notice of all conflicts, errors, ambiguities or discrepancies that BIDDER has discovered in the Contract Documents and the written resolution thereof by the County is acceptable to BIDDER, and the Contract Documents are generally sufficient to indicate

and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

4. BIDDER understands that work is to start no later than thirty (30) days after contract is executed. Time from Notice to Proceed shall be three hundred and eighty (380) consecutive **calendar** days.

BID FORM

THE FOLLOWING PRICING IS SUBMITTED FOR THE POWHATAN COUNTY 500,000 GALLON ELEVATED WATER STORAGE TANK PROJECT.

Total Base Bid shall be to provide all supervision, equipment, labor, mobilization and materials necessary to complete the work as described per all terms, conditions and specifications herein. Contract award will be based on the **TOTAL BASE BID AMOUNT** (including any properly submitted bid modifications) that the Owner, in its discretion, decides to award.

***PRICES QUOTED SHALL BE FOB DESTINATION.**

Part A – Virginia Contractor's Registration Number

Name	***License Number***	***Class***

PRINT legibly or provide a copy of current license.

For a **TOTAL LUMP SUM BASE BID** of: $_____

Basis of Award: Award will be made to the lowest responsive bidder based on the lowest LUMP SUM BASE BID provided unit prices are not unreasonable.

ACKOWLEDGE RECEIPT OF:

Addendum #1_____

Addendum #2_____

Addendum #3_____

CERTIFICATION OF NON-COLLUSION

The undersigned, acting on behalf of_____,
does hereby certify in connection with the procurement and bid to which this certification of Non-Collision is attached that:

This bid is not the result of, or affected by, any act of collusion with another person engaged in the same line of business or commerce: nor is this bid the result of, or affected by, any act of fraud punishable under Article 1.1 of Chapter 12 of Title 18.2 Code of Virginia, 1950 as amended (§ 18.2-498.4 et seq.)

The undersigned certifies that all statements of fact in such bid are true; that such bid was not made in the interest of, or on the behalf of any undisclosed person, partnership, company, association, organization, or corporation; that such bid is genuine and not collusive or sham; that said Bidder has not directly or indirectly. By agreement, communication or conference with anyone, attempted to induce action prejudicial to the interests of the Owner which is to award the Contract, or any other Bidder, or anyone else interested in the proposed Contract; and further, that prior scheduled opening and reading of bids, said Bidder;

1) Did not directly or indirectly induce or solicit anyone else to submit a false or sham bid;
2) Did not directly or indirectly collude, conspire, connive or agree with anyone else that said Bidder or anyone else would submit a false or sham bid, or that anyone should refrain from bidding or withdraw his bid;
3) Did not, in any manner, directly or indirectly, seek by agreement, communication or conference, with anyone to raise or fix the bid price of said Bidder or of anyone else, or to raise or fix overhead, profit or cost element of his bid price, or that of anyone else;
4) Did not directly or indirectly submit his bid or any breakdown thereof, or the contents thereof, or divulge information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository or any member or agent thereof, or any group of individuals, except to the awarding authority, to any person or persons who have a partnership or other financial interest with said Bidder in his business; and

5) Did not include in his bid price, any fees, dues, charges, or assessments because he was required to do so by reason of his membership, or affiliation with any association, corporation, organization, partnership, company, individual or group of individuals, or because of any agreement or understanding with anyone that he would do so.

_____
Signature of Company Representative

_____
Print Name

_____
Title

_____
Name of Company

_____
Date

ACKNOWLEDGEMENT
STATE OF VIRGINIA
County of Powhatan, to wit:

The foregoing Certification of Non-Collusion bearing the signature of_____

and dated _____ was subscribed and sworn to before the

undersigned notary public by _____ on _____.

_____
Notary Public

My commission expires:_____

PREBID QUESTION FORM
(use a separate form for each question submitted)

Date:

Project: 500,000 Gallon Elevated Water Storage Tank
Powhatan County Virginia
3880 Old Buckingham Road
Powhatan, Virginia 23139

The following question concerns Drawing Sheet (number):_____
_____
_____
_____
_____
_____
_____

The following question concern Specification Section (number):_____, page:_____, paragraph:_____

_____
_____
_____
_____
_____

ALL RESPONSE TO QUESTIONS WILL BE MADE BY ADDENDUM.

Question submitted by:_____
Name Organization

Send to: Ramona Carter, P.E., MPA
Public Works Director
3849 Old Buckingham Road
Powhatan, VA 23139

Email: rcarter@powhatanva.gov
Fax: 804.598.4821

AWARD

The award will be made to the lowest responsive and responsible Contractor meeting the requirements of this solicitation.

EXPERIENCE

Bidders shall furnish satisfactory evidence with their bids of their ability to perform the work as specified. This evidence should include five (5) years' experience as a general contractor and a list of at least three (3) references for similar projects.

QUALIFICATIONS OF CONTRACTORS

The County reserves the right to conduct any tests it may deem advisable and to make all evaluations. The County may make such reasonable investigations as deemed proper and necessary to determine the ability of the Contractor to perform the services/furnish the goods and the Contractor shall furnish to the County all such information and data for this purpose as may be requested. The County reserves the right to inspect offer's physical facilities prior to award to satisfy questions regarding the Contractors capabilities. The County further reserves the right to reject any bids if the evidence submitted by, or investigations of such Contractor fails to satisfy the County that such Contractor is properly qualified at carry out the obligations of the contract and to provide the services and/or furnish the goods of this IFB.

REFERENCES

1

Contract Date	**Client Name & Address**	**Contract Amount**
Contact Name, Phone and Email		
Project Title, Location and Description		

2	Contract Date	Client Name & Address	Contract Amount
	Contact Name, Phone and Email		
	Project Title, Location and Description		

3	Contract Date	Client Name & Address	Contract Amount
	Contact Name, Phone and Email		
	Project Title, Location and Description		

SECTION II –INSTRUCTIONS

COUNTY OF POWHATAN, VIRGINIA INSTRUCTIONS TO BIDDERS
For
PROCUREMENT OF CONSTRUCTION AND RELATED SERVICES

The general instructions, rules and conditions which follow apply to procurement of construction and construction related services conducted by the County of Powhatan, unless otherwise specified. Bidders are expected to inform themselves fully as to all applicable terms, conditions, instructions, requirements and specifications, before submitting bids. Failure to do so will be at the bidder's own risk, and relief cannot be secured on the plea of error.

Subject to all laws, policies, resolutions and regulations of the Commonwealth of Virginia and the County of Powhatan, and all applicable rules, regulations and limitations, if any, imposed by legislation of the Federal government, bids submitted in response to a solicitation issued by the County of Powhatan will bind bidders to the conditions and requirements herein set forth, unless otherwise expressly specified in the solicitation.

SECTION 1: DEFINITIONS

1.1 "*Agency*" means any department, agency, authority, commission, board or other unit in the administrative service of the County.

1.2 "*Bid*" means the offer of a bidder to provide specific goods or services at specified prices and/or other conditions specified in the solicitation.

1.3 "*County*" means the County of Powhatan, Virginia and its agencies, officials, officers, employees, agents and designated representatives.

1.4 "*Contractor*" shall have the same meaning as "successful bidder," as set forth below.

1.5 "*Construction Documents*" shall mean the plans, specifications, approved change orders, revisions, addenda and other information approved by the County, which set forth in detail the Work to be performed for a construction Project.

1.6 "*Goods*" means all material, equipment, supplies, printing and automated data processing hardware and software.

1.7 "*Informality*" means a minor defect or variation of a bid from the exact requirements of a solicitation, which does not affect the price, quality, quantity or delivery schedule for the goods or services being procured.

1.8 "*Invitation for Bids,*" "*Invitation to Bid,*" and "*IFB*" shall each mean a competitive sealed bidding procurement process by which a request is made to prospective suppliers (bidders) for their quotation on goods or services desired by the County. The issuance of an IFB will contain or incorporate by reference the specifications and contractual terms and conditions applicable to the procurement.

1.9 "*Purchasing Agent*" means the head of the County's Purchasing Department, or a designated contact person acting for him or at his direction.

1.10 "*Responsible Bidder*" means a bidder having the capability in all respects to perform fully the contract requirements, and who has the moral and business integrity and reliability which will assure good faith performance of the contract sought to be procured, and who has been pre-qualified, if required.

1.11 "*Responsive Bidder*" means a bidder who has submitted a bid or proposal which conforms in all material respects to the IFB.

1.12 "*Services*" means any work performed by an independent contractor wherein the service rendered does not consist primarily of acquisition of equipment or materials, or the rental of equipment, materials and supplies.

1.13 "*Solicitation*" means the process of notifying prospective bidders that the County wishes to receive bids on a set of requirements to provide goods or services. The notification of County requirements may consist of public advertising, the mailing of an IFB or the public posting of notices.

1.14 "*State*" means the Commonwealth of Virginia.

1.15 "*Successful bidder*" means the lowest responsive and responsible bidder to whom a contract is awarded as a result of a competitive sealed bidding procedure conducted by the County. The term "contractor" and "general contractor," as used herein, shall mean "successful bidder."
1.16 "*Regulations*: The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the work.
1.17 "*Install"*: The term "install" describes operations at the project site including the actual unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations.
1.18 "*Installer*": The term "installer" is the CONTRACTOR or another entity engaged by the CONTRACTOR, either as an employee, SUBCONTRACTOR, or CONTRACTOR of lower tier, who performs a particular construction activity including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.
a) The term "EXPERIENCED", when used with the term "installer", means having successfully completed a minimum of 3 previous projects similar in size and scope to this project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.
b) Trades: Using terms such as 'carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter". It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.
c) Assigning Specialists: Certain sections of the specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the CONTRACTOR has no option. However, the ultimate responsibility for fulfilling contract requirements remains with the CONTRACTOR.
d) This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the work. It is also not intended to interfere with local trade-union jurisdictional settlements and similar conventions.
1.19 "*Consultant"* refers to the County's designated consultant, who may represents the OWNER to perform observation on the construction of the contract contained herein.

SECTION 2: TERMS, CONDITIONS, INSTRUCTIONS APPLICABLE TO PROCUREMENT

2.01 Bids must be submitted in a sealed envelope with the outside marked in the lower left hand corner as follows:

IFB# 2017-U1
FOR: 500,000 Gallon Elevated Water Storage Tank-Powhatan County
License No. _____ Class _____ Expires _____

Each bidder is solely responsible for delivering his bid to the correct location on or before the date and time on which bids are scheduled to be received by the County. Any bid/modification received at the office designated in the solicitation after the exact time specified for receipt of the

bid/modification is considered a late bid/modification. A late bid/modification cannot be considered for award.

2.02 The time of receipt of a bid at the specified location is the time/date stamp of such location on the bid wrapper or other documentary evidence of receipt maintained by the specified location. No consideration will be given to date of postmark.

2.03 The County reserves the right to accept or reject any or all bids in whole or in part and to waive any informality in the bid. Informality shall be defined as a minor defect or variation from The exact requirements which does not affect the price, quality, quantity or delivery schedule.

2.04 The specification herein is intended to indicate the character, quality and/or performance of the goods or services desired. Unless qualified by provision "No Substitute" the name of a brand, manufacturer or catalog designation does not restrict the bidder to that brand or manufacturer. Alternates to the specified goods or service will be considered to the extent that such action is deemed in the best interest of the County.

2.05 The County will assume no responsibility for oral instruction or interpretation. Any question regarding the procurement solicitation shall be in writing (electronic transmission is preferred.) and directed to Ramona Carter at rcarter@powhatanva.gov**. Questions must be received by 5:00 P.M. April 11th, 2017.** Questions submitted beyond the time specified above may be left unanswered if sufficient time does not allow a response to all prospective bidders without causing an unacceptable delay in the process.

2.06 Modification of or corrections to bids are not acceptable after bids have opened. Erroneous bids may be reclaimed or superseded any time prior to bid opening time. Any new bid must be marked as in 1.01 with the additional notation "Supersedes all previous submissions."

a) Any bidder may withdraw or modify its bid, by a writing containing the original signature of the bidder, which writing must be received by the County prior to the date and time set for submission of bids. Withdrawal or modification shall be delivered by one of the following means: (i) hand delivery by the bidder itself, a courier, or other delivery service; (ii) by mail (no consideration shall be given to any postmark); or (iii) by email or facsimile received prior to the date and time set for submission of bids, followed by written confirmation containing the original signature of the bidder, where the County is able to determine that the written confirmation was or has been sent out by the bidder prior to the date and time set for submission of the bids, or (iv)by marking(s) on the exterior of the bid submission envelope, but only if the marking is dated and includes the original signature of the bidder. If written confirmation of an email or facsimile communication is not, in fact, received by the County within five days following the date and time set for submission of bids, no consideration will be given to the requested withdrawal or modification.

b) Written withdrawals or modifications of bids should not reveal the bid price contained in the previously submitted sealed bid, but should simply provide the desired addition, subtraction or modification, so that the final price or terms of the bid will not be known to the County until the sealed bids are opened.

2.07 Identity of bidders, except in the case of construction contracts, will not be disclosed prior to bid opening.

2.08 Each bidder is and shall be subject to the provisions of the Virginia Governmental Frauds Act, Virginia Code, Title 18.2, Chapter 12, Article 1.1. In compliance with this law, each bidder is required to submit a certification that its bid, or any claim resulting therefrom, is not the result of, or affected by, any act of collusion with another person engaged in the same line of business or commerce, or any act of fraud punishable under the Act. Any bidder who knowingly makes a

false statement on the Certificate of No Collusion shall be guilty of a felony, as provided in Virginia Code §18.2-498.5. As part of this bid a notarized Certificate of No Collusion must be submitted with the bid.

2.09 The County is exempt from the payment of Federal and State taxes. Include only taxes applicable to the project in this bid. Prices bid must be net, exclusive of taxes. Include only taxes applicable to the project in this bid.

2.10 Public notice of the award of this contract, or the announcement of the decision to award this contract, shall be given in the following manner: posting of a notice on the County web page. Tabulations of bids are a matter of public record and are available upon request.

2.11 Awards shall be based on determination of the lowest responsive and responsible bidder. No contract may be awarded to a bidder who is determined by the Purchasing Agent to be non-responsible. No contract may be awarded to a bidder who is determined by the Purchasing Agent to be non-responsible. In determining the responsibility of a bidder, the following criteria will be considered:

a). The ability, capacity or skill of the bidder to perform the contract or provide the services required;

b). Whether the bidder can perform the contract or provide the service promptly, or within the time specified, without delay or interference;

c). The character, integrity, reliability, reputation, judgment, experience and efficiency of the bidder;

d). The quality of performance on previous contracts or services, for the County or others;

e). The previous and existing compliance by a bidder with laws and ordinances relating to the contract or service;

f). The sufficiency of the financial resources and ability of the bidder to perform the contract or provide the service;

g). The quality, availability, and adaptability of the goods or services to the particular use required;

h.. The number and scope of any conditions attached to the bid;

i). Whether the bidder is in arrears to the County on a debt or contract or is in default on a surety to the County, and whether the bidder's County taxes or assessments are delinquent;

j). Such other information as may be secured by the Purchasing Agent, having a bearing on the decision to award the contract.

Upon request by the County, it shall be the responsibility of each bidder to ensure that the bid submitted contains information sufficient to enable the County to evaluate each of the above-referenced criteria.

2.12 All prices submitted must be FOB Destination - Freight Prepaid and Allowed.

2.13 Unless otherwise noted any equipment bid shall be new, unused, of current production and standard to the manufacturer. Where any part or nominal appurtenances of equipment are not described it shall be understood that all equipment and appurtenances standard to or recommended by the manufacturer for complete and safe use shall be included as part of this bid.

2.14 A Safety Data Sheet is required for all chemicals proposed to be furnished as a result of this bid. The SDS must; list all ingredients which constitute more than 1% of the product (.1% for known or suspected carcinogens); identify the product by common or chemical name; provide physical and chemical characteristics of any hazardous components; list any known acute or chronic health effects; specify exposure limits, precautionary measures, and emergency and first aid procedures.

2.15 Every contract over $10,000 shall include the following provisions:

Non-discrimination Clause:
During the performance of this contract, the General Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, disability or any other basis prohibited by law relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of the contractor. The General Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause. Also, the General Contractor, in all solicitations or advertisements for employees placed by or on behalf of the contractor, will state that it is an equal opportunity employer.

Drug-Free Workplace Clause
During the performance of this contract the contractor agrees as follows: (i) to provide a drug-free workplace for the contractor's employees; (ii) to post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition; and (iii) state in all solicitations or advertisements for employees placed by or on behalf of the contractor that the contractor maintains a drug-free workplace. For the purposes of this paragraph, "drug-free workplace" means a site for the performance of work done in connection with the contract awarded to a contractor in accordance with this procurement transaction, where the contractor's employees are prohibited from engaging in the unlawful manufacture, sale distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the contract.

2.16 The County of Powhatan does not discriminate against faith based organizations.

2.17 If the bid determined to be the lowest responsive and responsible bid exceeds available funds, the County may, at its discretion, negotiate with that bidder to obtain a contract price within available funds. The process for negotiating with an apparent low bidder, should the lowest bid exceed available funds, shall be as follows: the County and/or its designated representative, and the Apparent Low Bidder, together, will review the Project and attempt to find mutually agreeable proposed changes that will effectively reduce the cost of the Project. The apparent low bidder will present documented and substantiated proposed deductions in the Project cost, for each potential project change, which will allow the County to re-evaluate each proposed deduction. The parties will endeavor to negotiate a reasonable price for the entire Project which does not exceed available funds. In the event that such negotiations fail, the County may terminate negotiations with the apparent low bidder and repeat the foregoing process with the next lowest responsive and responsible bidder, until a successful contract can be negotiated within available funds or until negotiations appear useless, at which time all negotiations will be terminated

2.18 It is the policy of the County of Powhatan to facilitate the establishment, preservation and strengthening of small businesses and businesses owned by women and minorities (SWAM) and to encourage their participation in the County's procurement activities. Toward that end, the County of Powhatan encourages SWAM businesses to compete for County projects. In addition, the County strategy encourages all bidders to provide for the participation of SWAM businesses through partnerships, joint ventures, subcontracts or other contractual opportunities on projects. Bidders are asked, as part of their submission, to describe any planned use of such businesses in fulfilling this contract.

2.19 The Bidder shall, *within 10 days after Notice of Award*, at its own expense, provide and maintain during the entire performance period of this contract at least the following types and minimum amounts of insurance, in addition to unemployment compensation and workers compensation insurance:
i. Comprehensive General Liability, including Premises and Operations; Contractor's Protective Liability; Products Liability including Completed Operations Coverage; and Contractual Liability for this contract. Limits $1,000,000 per incident / $3,000,000 Total Bodily Injury (including death); $1,000,000 per incident / $3,000,000 Total Property Damage
ii. Comprehensive Automobile Liability, including all Owned Automobiles, Non-Owned Automobiles and Hired Car Coverage: Limits: $1,000,000 per incident / $3,000,000 Total Bodily Injury (including death)
$1,000,000 per incident / $3,000,000 Total Property Damage
iii. Employer's Liability for Participants not covered by Workers Compensation Insurance in an amount not less than $100,000.

Bidder shall not perform any work on this project unless bidder has obtained, and continues to maintain for the duration of such work, such workers' compensation coverage as may be required pursuant to the provisions of Chapter 8 (Code Section 65.2-800 et seq.) of Title 65.2 of the Code of Virginia, 1950, as amended. Bidder shall not allow any subcontractor to perform any work on a County construction project unless the subcontractor has obtained, and continues to maintain for the duration of such work, such worker's compensation coverage as may be required pursuant to the provisions of Chapter 8 (Code Section 65.2-800 et seq.) of Title 65.2 of the Code of Virginia, 1950, as amended. Bidder shall include the provisions of this paragraph within each of its subcontracts, so as to bind each subcontractor.

A Certificate of Insurance shall be submitted within 10 days after Notice of Award and included as a part of the resulting contract by reference.

The Contractor shall furnish to the County a binder adding the County as an additional insured on all policies except those pertaining to Workers Compensation and including the following language: "The above described policies shall not be canceled, modified, or amended or coverage reduced without the issuing company providing 30 days advance written notice to the County of Powhatan."

Should insurance coverage be changed or cancelled, regardless of the reason, the Contractor shall furnish evidence of new coverage and submit a new and valid binder evidencing the required insurance. Failure to deliver a new and valid binder will result in suspension of all payments until the new binder is furnished.

All insurance required by this agreement shall be and remain in full force and effect for the life of the contract.

No contract shall be binding upon the County until the all insurance requirements and policies, required herein have been filed with the County (if requested) and all have been approved as to form and sufficiency by the County Attorney.

2.20 The Contractor agrees to save, defend, hold harmless, and indemnify the County, and all of its officers, departments, agencies, agents, and employees (collectively the "County") from and against any and all claims, losses, damages, injuries, actions, fines, penalties, costs (including court costs and attorney's fees), charges, liability, or exposure, however caused, resulting from, arising out of, or in any way connected with the Contractor 's negligent or wrongful acts, errors or omissions in the performance or nonperformance of its work called for by the Contract Documents, including such acts, errors or omissions of Contractor's employees, servants or agents.

2.21 BID BOND

Each bid submitted in response to this IFB shall be accompanied by a bid bond in an amount equal to five percent (5%) of the total monetary amount of the bid.

i. The bid guarantee may be either (i) a certified or cashier's check made payable to "The County of Powhatan, Virginia," or (ii) a bid bond made payable to "The County of Powhatan, Virginia." The bid guarantee shall be for the purpose of promising and guaranteeing that the bidder will not withdraw its bid for a period of 30 days following bid opening. The proceeds of the bid guarantee shall be and remain the sole property of the County, as liquidated damages, should the successful bidder fail to execute a contract, proof of all required insurance and endorsements and all required payment and performance bonds within five days of the County's issuance of notice of award of the contract.

ii. The bid guarantees of all except the three lowest bidders will be returned within three (3) days after bid opening. The remaining bid guarantees will be returned as soon as the County has received a fully-executed contract, or within 75 days after bid opening, whichever occurs first.

iii. An attorney-in-fact who executes a bid guarantee must file with the guarantee a certified and dated copy of the written power of attorney which authorizes them to act. Such power of attorney shall be submitted and attached to the Bid Bond.

iv. In lieu of a bid bond, a bidder may furnish a cashier's check or cash escrow in the face amount required for the bid bond. If approved by the County attorney, a bidder may furnish a personal bond, property bond or bank or savings and loan association's letter of credit on certain designated funds in the face amount required for the bid bond. Approval shall be granted only upon a determination by the County attorney that the alternative form of security proffered affords protection to the County equivalent to a corporate surety's bond.

2.22 PERFORMANCE AND PAYMENT BOND

The successful bidder shall execute a performance and payment bond for not less than 100% of the amount of the contract award and shall furnish same to the Purchasing Agent within 10 days of notice of award contract. Such bond shall guarantee faithful performance by the contractor and indemnify the County from all claims from subcontractors for any amount due on account of labor, materials or services furnished. No contract shall be binding upon the County until such bond has been filed with the County and approved by the County Attorney.

2.23 The Virginia Uniform Statewide Building Code applies to the Work and is administered by the local Building Official. The Building Permit will be obtained by the General Contractor and paid for by the Contractor. All other permits, local license fees, business fees, taxes or similar assessments shall be obtained and paid for by the Contractor.

2.24 The bidder shall include with bid a proposed schedule for completion or work to be performed.

2.25 The successful bidder is prohibited from assigning, transferring, conveying, subletting or otherwise disposing of resulting contract or its right, title or interest therein or its power to execute

such contract to any other persons, company or corporation without the previous consent and approval in writing by the County.

2.26 Each bidder must carefully examine all documents and plans (including, without limitation, specifications and drawings, and the form contract) made available by the County for inspection by potential bidders, prior to submission of a bid. In addition, each bidder, prior to submission of a bid, must use whatever means necessary to satisfy itself of the extent and requirements of the Project and of the actual conditions under which the Project is to be performed. Comprehensive or detailed information of existing Site conditions may not be included in the Contract Documents; therefore, prior to bid submission, the Contractor must visit and examine the Site. Submission of a bid shall be deemed evidence that the bidder has visited the Site of the Project, that the bidder has familiarized itself with existing conditions at the Site (including without limitation, areas for storage of materials and equipment), and that the bidder is satisfied that it can construct the Project, in accordance with the Construction Documents, for the price(s) specified within its bid. Contractors will not be allowed or provided additional compensation as relief from the consequences of an error in their bids, including, without limitation errors which are attributable to conditions or factors which could have been identified by thorough examination of the Site and the Contract documents (including, without limitation, boring reports and subsurface condition reports, if available) prior to submission of a bid.

2.27 A pre-construction conference will be held during the period after the award of the Contract and before the mobilization phase of the project. The Project Manager will discuss requirements of such matters as project coordination and review, construction schedules, progress schedules, and reports, Contract Change Orders, Insurance, Safety, Accommodation to Traffic, and other items pertinent to the Project. All parties to this conference should be prepared to discuss any problems anticipated with the execution of the work under this Contract. A summary of the conference shall be prepared by the Engineer and distributed to the County and the Contractor. The Contractor shall acknowledge receipt of the Engineer's summary in writing to the County. The Contractor shall submit for approval plans for a field office, if applicable, storage yard including any fencing or protective barriers, and staging area including any gravel surfaced area.

2.28 More than one bid from an individual, firm, partnership, corporation, affiliate, or association under the same or different names, received in response to a single solicitation, will be rejected. Reasonable grounds for believing that a bidder is interested in more than one bid or proposal for a solicitation both as a bidder and as a subcontractor for another bidder will result in rejection of all bids or proposals in which the bidder is interested. However, a firm acting only as a subcontractor may be included as a subcontractor for two or more bidders submitting a bid or proposal for the work.

2.29 A bidder for a construction contract, other than a contract for construction or maintenance of public highways, may withdraw a bid from consideration after bid opening if the price bid was substantially lower than the other bids due solely to a mistake therein, provided the bid was submitted in good faith and the mistake was a clerical mistake as opposed to a judgmental mistake, and was actually due to an unintentional arithmetic error or an unintentional omission of a quantity of work, labor or material made directly in the compilation of the bid, if the unintentional arithmetic error or unintentional omission clearly can be shown by objective evidence drawn from inspection of original work papers, documents and materials used in the preparation of the bid sought to be withdrawn.

a) If a bid contains both clerical and judgment mistakes, a bidder may withdraw his bid from consideration if the price bid would have been substantially lower than the other bids due solely

to the clerical mistake that was an unintentional arithmetic error or an unintentional omission of a quantity of work, labor or material made directly in the compilation of a bid which shall be clearly shown by objective evidence drawn from inspection of original work papers, documents and materials used in the preparation of the bid sought to be withdrawn.

b) The bidder shall give notice in writing to the purchasing agent of a claim of right to withdraw a bid, within two (2) business days after the conclusion of the opening of the bids and shall submit original work papers with such notice.

c) If the purchasing agent denies the withdrawal of the bid, he shall notify the bidder in writing, stating the reasons for the decision; in that event, the purchasing agent, or his designee, shall award the contract to the bidder at the bid price, provided such bidder is responsible and responsive.

2.30 The agreement to be entered into by the parties shall consist of the contract agreement, which may be a purchase order, the bid submitted by the successful bidder, all supplemental, general and/or special conditions, all specifications and any attachments to the original request for bids submitted to be prospective bidders, and drawings including all modifications thereof, all of which shall be referred to collectively as the Contract Documents.

2.31 This Agreement shall be governed by and construed in accordance with the laws of the Commonwealth of Virginia and of the United States of America. All litigation arising out of this Agreement shall be commenced and prosecuted in the Circuit Court of the County of Powhatan, Virginia. The contractor shall comply with applicable federal, state and local laws and regulations.

2.32 When the owner is required by the Contract Documents to give written notice, demand or other communication to the Contractor, the Owner's notice, demand or communication shall be deemed to be given when it is deposited in the United States mail, postage pre-paid, and addressed to the address of the Contractor stated in the Agreement or at such other address as the Contractor designates in writing to the Owner.

2.33 The Contractor certifies that it does not, and will not during the performance of the Contract, employ illegal alien workers or otherwise violate the provisions of the federal Immigration Reform and Control Act of 1986.

2.34 The Contract is governed by the applicable provisions of the Powhatan County Purchasing Procedures, as amended.

2.35 Except as provided herein, or by applicable law, all proceedings, records, contracts and other public records relating to procurement transactions shall be open to the inspection of any citizen, or any interested person in accordance with the Virginia Freedom of Information Act and the Virginia Public Procurement Act.

a) Cost estimates relating to a proposed procurement transaction, prepared by or for the County, shall not be open to public inspection.

b) Any competitive sealed bidding bidder, upon request, shall be afforded the opportunity to inspect bid records within a reasonable time after the opening of all bids but prior to award, except in the event that the County decides not to accept any of the bids and to reopen the contract, postpone the contract or not contract at all. Otherwise, competitive sealed bid records shall be open to public inspection only after award of the contract.

c) Any inspection of procurement transaction records shall be subject to reasonable restrictions to ensure the security and integrity of the records.

d) Trade secrets and proprietary information submitted by a bidder in connection with a procurement transaction shall not be subject to public disclosure; however, the bidder must invoke the protections of Section 2.2-4342 of the Virginia Code IMMEDIATELY UPON SUBMISSION of the data or other materials, and must specifically designate the data or other materials to be

protected and state the reasons why protection is necessary. The County will not be liable for any damages sustained by a bidder who fails to follow the procedures designated by Virginia Freedom of Information Act, the Virginia Public Procurement Act, and the Powhatan County Code as being prerequisite to protection of trade secrets or proprietary information.

2.36 It is expressly agreed that nothing under the Contract shall be subject to arbitration, and any references to arbitration are expressly deleted from the Contract Documents.

2.37 Any bidder organized or authorized to transact business in the Commonwealth pursuant to Title 13.1 or Title 50 of the Code of Virginia MUST include in its bid or proposal the identification number issued to it by the State Corporation Commission. Any bidder not required to be authorized to transact business in the Commonwealth as a foreign business entity under Title 13.1 or Title 50 of the Code of Virginia or as otherwise required by law MUST include in its bid or proposal a statement describing why the bidder is not required to be so authorized. No bidder failing to provide the required information shall receive an award unless a waiver of this requirement and the administrative policies and procedures established to implement Section 2.2-4311.2 of the Code of Virginia is granted by the County Administrator. The County may void any contract with a business entity if the business entity fails to remain in compliance with the provisions of Section 2.2-4311.2 of the Code of Virginia

2.38 Bidders are required under the Virginia Contractors' licensing laws (Section 54.1-1112, Virginia Code) to show evidence of contractor's license.

Bids without such notation shall remain unopened.

Bidder shall place on the outside of the envelope containing the bid the following:

License No. _____ Class _____ Expires _____

SECTION III GENERAL TERMS AND CONDITIONS

GENERAL TERMS AND CONDITIONS
FOR CONSTRUCTION CONTRACTS

DEFINITIONS AND INSTRUCTIONS FOR INTERPRETATION

When one of the following words, terms or phrases is used in this contract, it shall be interpreted or construed first, as defined below; second, according to its generally-accepted meaning in the construction industry; and third, according to its common and customary usage.

As-built drawings: Drawings submitted by the Contractor or subcontractor at any tier and at close out showing the construction of a particular structure or work as actually completed under the contract. "As-built drawings" shall be synonymous with "Record drawings."

Builder: The General Contractor to whom a Contract [NOT DEFINED] for Construction has been awarded by the County

Change Order: A document issued on or after the effective date of the Contract for Construction, which is agreed to by the Contractor and approved by the County, and which authorizes an addition, deletion or revision in the Work, including any adjustment in the Contract Price and/or the Contract Completion Date. A change order, once signed by all parties required to sign it, is incorporated into and becomes a part of the Contract.

Change Directive: A construction change directive is a written order signed by the County, directing a change in the work prior to agreement on adjustment (if any) in the contract price or contract time, or both.

County: The County of Powhatan, Virginia, including all its officers, officials, agencies, departments, divisions, and all of the employees and agents thereof.

Claim: A demand or assertion by one party seeking, as a matter of right, an adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract for Construction. The term "claim" also includes other disputes and matters in question between the County and the General Contractor arising out of or relating to the Contract. Claims must be initiated by written notice. The responsibility to substantiate claims rests with the party making the claim.

Construction: The term used to include new construction, reconstruction, renovation, restoration, major repair, demolition and all similar work upon buildings and ancillary facilities, including any draining, dredging, excavation, grading or similar work upon real property.

Construction Documents: Plans, specifications, approved change orders, revisions, and addenda, and other information approved by the County, which set forth in detail the Work to be performed for this Construction Project.

Contract Documents: The Contract entered into by the parties shall consist of this Contract, the original Invitation for Bids (IFB) and all specifications, drawings and addenda thereto, the bid submitted by the General Contractor, other documents identified in the Contract, modifications issued subsequent to execution of the Contract and the Project manual, which shall be referred to collectively as the Contract Documents.

Contract Price: The dollar amount for which the Builder agrees to perform the Work which is the subject of the Contract For Construction.
Contract Specifications: The written requirements for materials, equipment, systems, standards and workmanship for the Work and for performance of related services.
Contractor. An alternative way of referring to the General Contractor, the person with whom the County has entered into the Contract for Construction.
Defective: An adjective which, when modifying the word "work" refers to work that is unsatisfactory, faulty, deficient, does not conform to the Contract Documents, or which does not meet the requirements of inspections, standards, tests or approvals required by the Contract Documents.
Drawing: A page or sheet of the Construction Plans which presents a graphic representation, usually drawn to scale, showing the technical information, design, location and dimensions of various elements of the Work. The graphic representations include, but are not limited to: plan views, elevations, transverse and longitudinal sections, large and small scale sections and details, isometrics, diagrams, schedules, tables and/or pictures.
Field Order: A written order issued by the County's inspector/Representative which clarifies or explains the plans or specifications, or any portion or detail thereof, without changing the design, the Contract Price, the time for Substantial Completion or the date of Final Completion.
Final Completion: The stage of construction when the Work has been completed in accordance with the Contract for Construction and the County has received all documents and items necessary for closeout of the Work.
General Contractor: Also referred to within the Contract for Construction as the "Contractor," this is the person with whom the County has entered into the Contract for Construction.
Hazardous Substances: The term "Hazardous Substance" shall have the same meaning and definition as set forth in the Comprehensive Environmental Response Compensation and Liability Act as amended, 42 USC § 6901 et seq., and regulations promulgated thereunder (collectively "CERCLA") and any corresponding state or local law or regulation, and shall also include: (a) any Pollutant or Contaminant as those terms are defined in CERCLA; (b) any Solid Waste or Hazardous Constituent as those terms are defined by, or are otherwise identified by, the Resource Conservation and Recovery Act as amended, 42 USC § 6901 et seq., and regulations promulgated thereunder (collectively "RCRA") and any corresponding state or local law or regulation; (c) crude oil, petroleum and fractions of distillates thereof; (d) any other material, substance or chemical defined, characterized or regulated as toxic or hazardous under any applicable law, regulation, ordinance, directive or ruling; and (e) any infectious or medical waste as defined by any applicable federal or state laws or regulations.
Occupancy, beneficial: The condition after Substantial Completion but prior to Final Completion, at which time the Project is sufficiently complete and systems operational such that the County could, after obtaining necessary approvals and certificates, occupy and utilize the space for its intended use. Guarantees and warranties applicable to that portion of the Work begin on the date the County accepts the Project for such Beneficial Occupancy, unless otherwise specified in the Supplemental General Conditions or by separate agreement.

Occupancy, partial: Partial occupancy or use occurs when the County occupies or uses any completed or partially completed portion of the work, at a stage when such portion is designated by a separate agreement between the County and the General Contractor, in accordance with Section 12.2 of these General Terms and Conditions.
Person: The term "person" includes any individual, corporation, partnership, association, company, business, trust, joint venture or other legal entity.
Plans: The term used to describe the group or set of project-specific drawings which are included in the Contract Documents.
Product Data: Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the General Contractor, or a subcontractor, manufacturer, supplier or distributor, to illustrate materials or equipment for some portion of the Work.
Professional: An individual or entity, including but not limited to an architect, engineer, geo-technical engineer or consultant, land surveyor, landscape architect, or other professional engaged directly by the County to provide design, engineering, testing or other services in relation to the Project.
Project: The planned construction undertaking which is the subject of this Contract for Construction.
Project Manual: A volume assembled for the Work, which may include the bidding requirements, specifications, sample forms, documents, etc.
Related Party: Any affiliated entities of the County of Powhatan (including, without limitation, agencies, departments, divisions or commissions of the County of Powhatan) and their respective officers, officials, office holders, and employees.
Samples: Samples are physical examples, which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.
Shop Drawings: Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the General Contractor or a subcontractor, manufacturer, supplier or distributor, to illustrate some portion of the Work.
Site: The geographical location where the Project is to be constructed, and where the Work by the General Contractor is to be performed.
Specifications: That part of the Project Manual/Contract Documents containing the written administrative requirements and the technical descriptions of materials, equipment, construction systems, standards, and workmanship which describe the proposed Work in detail and provide information for a Building Official to determine code compliance and for the Contractor to perform the Work.
Subcontractor: A person having a direct contract with the General Contractor, or with any other subcontractor, for the performance of the Work. The term "subcontractor" includes any person who provides on-site labor but does not include any person who only furnishes or supplies materials for the Project.
Submittals: Documents prepared by the General Contractor or a subcontractor, manufacturer, supplier or distributor, consisting of: Shop, fabrication, setting or installation drawings, diagrams, illustrations, schedules, samples, brochures, performance charts, instructions, diagrams, or other, similar data or items. The purpose of submittals is to demonstrate conformance of some portion of the Work with the requirements of the Contract Documents.

Substantial Completion: The stage in the progress of the Work when the Work, or designated portion thereof, is sufficiently complete in accordance with the Contract Documents so that the County can occupy or use the Work for its intended purpose(s).
Supplier: A manufacturer, fabricator, distributor or vendor who provides material(s) for the Project but who does not provide on-site labor.
Total Project Construction Cost: The total cost to the County to complete construction of the Project, including, without limitation, the Work, the cost of utilities, the cost of fees for permits and licenses required to be obtained by the General Contractor, and modifications necessitated by local conditions.
Work: The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the General Contractor to fulfill the General Contractor's obligations.
In construing this Construction Contract, the parties hereto agree that the following standards and directives shall apply:
Computation of Time: When the Contract requires any notice to be given, or an act to be done, a certain time before a specified event or deadline, then there must be that time, exclusive of the day for such specified event or deadline, but the day on which the notice is given or an act done shall be counted as part of the time. When the Contract requires any notice to be given, or an act to be done, within a certain time after a specified event or deadline, then that time shall be allowed in addition to the day on which the specified event or deadline occurred. When the last day fixed by this Contract for the commencement of any action, or the giving of any notice, falls on a Saturday, Sunday, legal holiday, or any day on which the Powhatan County Administrative Offices are closed, then the notice or act may be given on the next day that is not a Saturday, Sunday, legal holiday, or other day on which the Powhatan County Administrative Offices are closed.
Day: Unless otherwise specified, the word "*day*" shall be construed to mean a calendar day.
Headlines.: The headlines of the several articles, sections and paragraphs of this Contract are intended as mere catchwords to indicate the contents of the articles, sections or paragraphs, and such headlines shall not be deemed or construed as titles of such articles, sections or paragraphs, or as any part thereof, nor, unless otherwise expressly provided by the Contract, shall any headlines be so deemed or construed following any amendment or modification of a particular article, section or paragraph.
Month: Unless otherwise expressed, the word *"month*" shall be construed to mean a calendar month.
Severability: In the event that any provisions of this Contract, or the application of any requirements stated herein to any person or circumstances, are determined invalid by a court of competent jurisdiction, such judicial determination shall not affect the validity of other provisions or requirements of this Contract which can be given effect without the invalid provisions or applications.

ARTICLE 1
THE CONTRACT DOCUMENTS
1.1 Minimum Requirements: Requirements established by the Construction Documents shall be considered as the minimum which will be accepted.

1.2 County Disclaimer of Warranty: The County has requested that the Professional(s) prepare documents for the Project, including the plans and specifications for the Project, which are to be complete, accurate, coordinated, and adequate for bidding, negotiating and constructing the Work. However, the County makes no representation or warranty, of any nature whatsoever, to the General Contractor concerning such documents. The General Contractor hereby acknowledges and represents that it has not, does not, and will not rely upon any representations or warranties by the County concerning such documents, as no such representations or warranties have been or are hereby made.

1.3 Conflicts in Documents: In the event of any conflict, discrepancy, or inconsistency among any of the documents which make up this Contract for Construction, the following shall control:

(i) As between figures given on plans and scaled measurements, the figures shall govern;

(ii) As between large-scale plans and small-scale plans, the large-scale plans shall govern;

(iii) As between plans and specifications, the requirements of the specifications shall govern;

(iv) As between the General Conditions of the Construction Contract and the plans or specifications, the General Conditions shall govern;

(v) As between the Construction Contract Form and the General Conditions of the Construction Contract, the Contract Form shall govern.

(vi) As between the Supplemental Conditions and any General Conditions or the Contract Form, the Supplemental Conditions shall govern.

1.4 Shop Drawings and Submittals: Shop drawings and other submittals from the General Contractor or its subcontractors and suppliers do not constitute a part of this Contract. The General Contractor shall not perform any Work requiring shop drawings or other submittals unless such shall have been approved in writing by the County representative. All Work requiring approved shop drawings or other submittals shall be done in strict compliance with such approved documents; however, approval by the County shall not be evidence that Work installed or performed pursuant thereto conforms with the requirements of this Contract. The County shall not have any duty to review partial submittals or incomplete submittals. The General Contractor shall maintain a submittal log which shall include, at a minimum, the date of each submittal, the date of any resubmittal, the date of any approval or rejection, and the reason for any approval or rejection. The General Contractor shall have the duty to carefully review, inspect and examine any and all submittals before submission of same to the County. By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the General Contractor represents that it has determined and verified materials, field measurements and field construction criteria related thereto, or that it will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

1.5 Contract Changes: The General Contractor understands and agrees that the Contract for Construction cannot be changed except as expressly provided by the Contract Documents. No act, omission or course of dealing by the parties shall alter the requirement that modifications of this Contract for Construction can be accomplished only by written documents signed by the parties.

1.6 On-Site Documents. The General Contractor shall keep an updated copy of this Contract for Construction at the Site. Additionally, the Contractor shall keep copies of all approved shop drawings and other submittals at the Site.

ARTICLE 2
GENERAL CONTRACTOR'S REVIEWS AND EVALUATIONS

2.1 Sufficiency of Construction Documents: Prior to submission of its Bid, but in all events prior to signing this Contract for Construction, the General Contractor has received and carefully reviewed and evaluated the Construction Documents and agrees that the Construction Documents are complete, accurate, adequate, consistent, coordinated and sufficient for bidding, negotiating, costing, pricing and construction of the Project.

2.1.1 The General Contractor acknowledges its continuing duty to review and evaluate the Construction Documents during the performance of its services and shall immediately notify the County about any

(i) problems, conflicts, defects, deficiencies, inconsistencies or omissions it discovers in or among the Construction Documents; and,

(ii) variances it discovers between the Construction Documents and any applicable laws, statutes, building codes, rules and regulations.

2.1.2 If the General Contractor performs any Work which it knows or should have known involves:

(i) a recognized problem, conflict, defect, deficiency, inconsistency or omission in the Construction Documents; or

(ii) a variance between the Construction Documents and requirements of applicable laws, statutes, building codes, rules and regulations, without notifying the County and prior to receiving written authorization from the appropriate County Representative to proceed, the General Contractor shall be responsible for the consequences of such performance.

2.2 Sufficiency of Site Conditions: Prior to submission of its Bid, but in all events prior to signing this Contract For Construction, the General Contractor certifies that it has:

(i) visited the Site and become familiar with local conditions under which the Project is to be constructed and operated; and,

(ii) reviewed and familiarized itself with the Site survey and any existing structures on the Site, and gathered all other information necessary for a full understanding of its obligations under this Contract.

2.3 In addition, if the Scope of the Work involves modifications to or remodeling of an existing structure(s) or other man-made feature(s) on the Site, the General Contractor certifies that it has:

(i) reviewed all available as-built and record drawings, plans and specifications; and,

(ii) thoroughly inspected the structure(s) and man-made feature(s) to be modified or remodeled prior to submission of its Bid, but in all events prior to signing this Contract For Construction.

2.4 Claims against the County or Related Parties resulting from the General Contractor's failure to familiarize itself with the Site or pertinent documents shall be deemed waived by the General Contractor.

2.5 The General Contractor shall commence performance of its obligations under this Contract for Construction, upon receipt of a written notice to proceed issued by the County.

ARTICLE 3
GENERAL CONTRACTOR'S DUTIES, OBLIGATIONS AND RESPONSIBILITIES

3.1 Performance of Work: The General Contractor shall supervise and complete its obligations under this Contract For Construction, using its best skill and attention. The General Contractor shall furnish management, supervision, coordination, labor and services which

(i) expeditiously, economically and properly complete its scope of the Work;

(ii) comply with the requirements of this Contract For Construction; and,

(iii) are performed in a workmanlike manner and in accordance with the standards currently practiced by persons and entities performing or providing comparable management, supervision, labor and services on projects of similar size, complexity and cost.

3.1.1 The General Contractor shall not damage, endanger, compromise or destroy any part of the Work or the Site, including by way of example, and without limitation: work being performed by others on the Site, monuments, stakes, bench marks and other survey points, utility services, and existing features, improvements or structures on the Site. Should the General Contractor damage, compromise or destroy any part of the Project or the Site, the General Contractor shall be fully and exclusively responsible for and bear all costs associated therewith.

3.1.2 All services rendered by the General Contractor shall be performed by or under the immediate supervision of persons possessing expertise in the discipline of the service being rendered.

3.1.3 The General Contractor shall, in the performance of its obligations under this Contract for Construction, cooperate and communicate with the County and all other persons or entities working for or with the County, as necessary for satisfactory and timely completion of the Project.

3.1.4 The General Contractor understands and acknowledges that the Scope of Work referred to in this Contract for Construction may be only part of the Project and that the Project may include the construction of other structures or other construction activities on the same Site. The General Contractor shall conduct all its activities so as not to interfere with the construction of, or other construction activities on the Site.

3.1.5 The General Contractor shall conduct all its activities so as not to interfere with ongoing business and other activities at the site. The General Contractor shall perform construction services and conduct all activities only in such locations and in such manner as specifically contemplated by the Construction Documents.

3.1.6 The General Contractor shall obtain all licenses necessary to use any invention, article, appliance, process or technique, of whatever kind, and shall pay all royalties and license fees associated therewith. The General Contractor shall hold the County, its officers, agents and employees, harmless from and against any loss or liability for or on account of the infringement of any patent rights in connection with any invention, process, technique, article or appliance manufactured or used in the performance of this Contract for Construction, including its use by the County; unless such invention, process, technique, article or appliance is specifically named by the County in the specifications or plans as being acceptable for use in carrying out the Work. If, before using any invention, process, technique, article or appliance specifically named in the specifications or plans as acceptable for use in carrying out the Work, the General Contractor has or acquires information that the

same is covered by letters of patent, making it necessary to secure the permission of the patentee, or other, for the use of the same, the General Contractor shall promptly advise the County. The County may direct that some other invention, process, technique, article or appliance be used. Should the General Contractor have reason to believe that the invention, process, technique, article or appliance so specified is an infringement of a patent, and fail to inform the County, the General Contractor shall be responsible for any loss or liability due to the infringement.

3.2 Compliance with Governmental Requirements:

3.2.1 The General Contractor shall comply with all applicable laws, statutes, codes, building codes, rules, regulations and lawful orders of all governmental, public and quasi-public authorities and agencies having jurisdiction over the Work, the Project and the Site;

3.2.2 The General Contractor shall prepare and file documents required to obtain and shall obtain all necessary governmental approvals and permits for construction of the Project, including building permit(s); and,

3.2.3 The General Contractor shall give all notices required of it by governmental authorities relating to the Work, the Project, or the Site.

3.2.4 This Construction Contract and all other contracts and subcontracts are subject to the provisions of Articles 3 and 5, Chapter 4, Title 40.1 of the Code of Virginia, relating to labor unions and the "right to work." The General Contractor and its subcontractors, whether residents or nonresidents of the Commonwealth of Virginia, who perform any Work related to the Project, shall comply with all of said provisions.

3.2.5 By signing this Construction Contract, the General Contractor certifies that it does not and will not during the performance of the Contract violate the provisions of the Federal Immigration Reform and Control Act of 1986, which prohibits employment of illegal aliens.

3.2.6 The provisions of all rules and regulations governing safety as adopted by the Safety Codes Commission of the Commonwealth of Virginia, as issued by the Department of Labor and Industry under Title 40.1 of the Code of Virginia, shall apply to all Work under this Contract. Inspectors from the Department of Labor and Industry shall be granted access to the Work for inspection without first obtaining a search or administrative warrant.

3.2.7 The Virginia Uniform Statewide Building Code applies to the Work and is administered by the local Building Official. The Building Permit will be obtained by the General Contractor and paid for by the Contractor. All other permits, local license fees, business fees, taxes or similar assessments shall be obtained and paid for by the Contractor.

3.2.8 The General Contractor, if not licensed as an asbestos abatement contractor or a roofing/flooring/siding (RFS) contractor in accordance with §54.1-514 of the Code of Virginia, shall have all asbestos-related Work performed by subcontractors who are duly licensed as asbestos contractors or RFS contractors, as appropriate for the Work.

3.2.9 If the Contract Documents indicate that lead-based paint is present on existing materials, components or surfaces, the General Contractor shall conform to the following: (1) The requirements set forth in 59 Federal Register 45,672 (September 2, 1994) Proposed Rule - *Lead; Requirements for Lead-based Paint Activities (Proposed Rules)* in selecting and performing the means, methods and procedures for performing the Work. When the Final Rule, to be codified at 40 CFR 745, supersedes the Proposed Rule, the General Contractor shall be responsible for conforming to the Final Rule, as of the effective date set forth therein; (2) The requirements for employee protection contained in 29 CFR Part 1926, Subpart D,

and the requirements for record-keeping contained in 29 CFR Part 1910; and (3) The Virginia Department of Labor and Industry's Emergency Regulation published in the May 27, 1996 Virginia Register, requiring, among other things, that a permit be issued to the lead abatement contractor, or any subsequent regulation issued by DLI.

3.2.10 If the General Contractor violates laws or regulations that govern the Project, the General Contractor shall indemnify and hold the County harmless from and against any fines and/or penalties that result from such violation. To the extent that such violation is the result of negligence or other actionable conduct of the General Contractor, the General Contractor shall indemnify and hold the County harmless against any third party claims, suits, awards, actions, causes of action or judgments, including but not limited to attorney's fees and costs incurred thereunder, that result from such violation.

3.3 Safety: Safety shall be a prime concern of the General Contractor at all times. The General Contractor shall be solely responsible for and have control over the means, methods, techniques, sequences and procedures for coordinating and performing construction, including Site safety and safety precautions and programs.

3.4 Concurrent Records: For any period in which it is engaged in activities on the Site, the General Contractor shall, concurrently with its performance, maintain detailed daily records of activities on the Site. Upon request, the County shall be provided copies of such records.

3.5 As-Built Drawings: The General Contractor shall maintain at the Site at least one copy of all drawings, specifications, addenda, approved shop drawings, change orders, submittals, and other modifications, in good order and accurately marked, depicting all changes as they occur during construction. The as-built drawings shall be available at all times to the County, and the County's consultants, including quality control and testing agency personnel. The drawings shall be neatly and clearly marked in color during construction to record all variations made during construction, and the General Contractor shall include such supplementary notes and details necessary to clearly and accurately represent as-built construction.

3.5.1 This clause shall be included in all subcontracts. It shall be the responsibility of the Contractor to ensure that all as-built drawings prepared by subcontractors are complete, accurate and submitted.

3.6 Quality Control And Testing: Unless otherwise provided in this Contract For Construction, the County shall select the quality control and testing agencies and pay for the cost of specified measures and tests required by the Construction Documents. The General Contractor shall be responsible for the coordination of all tests and inspections and shall arrange for tests and inspections to be conducted as necessary to avoid any interference with the progress of Work. No claims for extension of time or extra costs will be allowed on account of any testing, retesting, inspection, re-inspection, or rejection of Work when defective or deficient Work is found.

3.7 Incident Reporting: The General Contractor shall immediately notify the County both orally and in writing, of the nature and details of all incidents which may adversely affect the quality or progress of the Work including, but not limited to, union jurisdictional disputes, accidents, delays, damages to Work and other significant occurrences.

3.8 Hazardous Substances Notice: The General Contractor shall immediately notify the County, both orally and in writing, of the presence and location of any physical evidence of, or information regarding, environmental contamination on the Site (including but not

limited to Hazardous Substances and petroleum releases) of which it becomes, or reasonably should have become, aware. If the General Contractor encounters environmental contamination (including but not limited to Hazardous Substances and petroleum releases), the General Contractor shall:
(i) immediately stop performance of Work or that portion of the Work affected by or affecting such contamination;
(ii) secure the contaminated area against intrusion;
(iii) not disturb or remove the contamination;
(iv) not proceed, or allow any subcontractor or supplier to proceed, with any Work or other activities in the area affected by such contamination until directed to do so by the County; and,
(v) take any other steps necessary to protect life and health.

3.9 County's Use of and Access to the Site: The General Contractor shall perform the Work so as not to interrupt any ongoing business operations or other construction activities on the Site.

3.9.1 The General Contractor shall provide the County, Related Parties, and other consultants, trade contractors, subcontractors and suppliers, access to the Site for performance of their activities, and shall connect and coordinate its construction activities and operations with those of others. The General Contractor understands and acknowledges that the County or its Related Parties may need access to or use of certain areas of the Site on which Work is being or has been performed, prior to the General Contractor's achievement of Substantial Completion. The General Contractor agrees that no such occupancy, access or use shall constitute the County's acceptance of any Work.

3.9.2 Except as specifically contemplated by the Construction Documents, the General Contractor shall not enter any occupied area of the Site or Structure unless first approved and scheduled by the County.

3.10 Site Control and Cleanup: During construction, the General Contractor shall maintain good order on the Site. The General Contractor shall maintain the Site in a reasonably clean condition during performance of the Work and shall periodically remove from the Site all construction debris. Upon completion of the Work, the General Contractor shall remove from the Site all construction materials and waste, rubbish, other debris, equipment, sheds and similar items related to, produced by or required for its scope of the Work and shall thoroughly clean the Site of all debris, trash, excess materials and equipment. No final payment will be made to the General Contractor until satisfactory final clean-up is accomplished and inspection is made by the County accompanied by the General Contractor. If the County must engage in clean-up activities at any time during the construction period, the full cost of the clean-up shall be deducted from moneys due the General Contractor, and the General Contractor shall pay any deficiency amount to County.

ARTICLE 4
GENERAL CONTRACTOR'S PERSONNEL, SUBCONTRACTORS, AND SUPPLIERS

4.1 Project Staffing: The General Contractor shall staff the Project with qualified individuals and entities responsible for its obligations and performance hereunder.

4.1.1 The General Contractor shall, in writing, on or before the Commencement Date specified in the Notice to Proceed issued by the County, name a Superintendent (the "Builder's Representative") to serve as its primary communication contact with the County and the County's Representative and who shall:
(i) shall be in attendance at the Project site during the performance of the Work
(ii) shall represent the General Contractor
4.1.2 The Contractor shall employ a competent Superintendent and any necessary assistants to ensure supervisory attendance at the Project site during the progress of the Work. The Superintendent shall have full authority to represent the Contractor and all communications given to the Superintendent shall be as binding as if given to the Contractor.
4.1.3 It is understood that such Superintendent shall be acceptable to the Owner and shall be one who will be continued in that capacity for duration of this project, unless he ceases to be on the Contractor's payroll. The Superintendent shall not be employed on any other project during the performance of this Contract.
4.1.4 The General Contractor shall employ persons skilled in the tasks assigned to them and shall contract with subcontractors and suppliers skilled in the tasks assigned to them and capable of working harmoniously with all trades, crafts and other individuals on the Project. The General Contractor shall use its best efforts to minimize the likelihood of any strike, work stoppage or other labor disturbance.
4.1.5 The General Contractor shall immediately remove from the Site, for the duration of the Project, any personnel, including personnel of any subcontractor, making an inappropriate racial, sexual or ethnic comment, statement or gesture toward any other individual.
4.1.6 The General Contractor shall immediately remove from the Site, for the duration of the Project, any personnel, including personnel of any subcontractor, who is incompetent or careless.
4.1.7 During the performance of this Construction Contract, the General Contractor shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, disability or any other basis prohibited by law relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of the contractor. The General Contractor shall be required to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause. Also, the General Contractor, in all solicitations or advertisements for employees placed by or on behalf of the contractor, shall be required to state that it is an equal opportunity employer. The General Contractor shall be required to include the provisions of this paragraph in every subcontract or purchase order of over $10,000, so that the provisions will be binding upon each subcontractor or vendor.
4.1.8 During the performance of this contract the contractor shall be required:
(i) to provide a drug-free workplace for the contractor's employees;
(ii) to post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition; and

(iii) to state in all solicitations or advertisements for employees placed by or on behalf of the contractor that the contractor maintains a drug-free workplace. For the purposes of this paragraph, "drug-free workplace" means the Site for the performance of services or the provision of goods in connection with the specific contract resulting from this solicitation at which site the contractor's employees are prohibited from engaging in the unlawful manufacture, sale distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the Contract. The General Contractor shall include the provisions of this paragraph in every subcontract, so that the provisions will be binding upon each subcontractor.

4.1.9 The General Contractor shall not perform any construction work unless he has obtained, and continues to maintain for the duration of such work, such workers' compensation coverage as may be required pursuant to the provisions of Chapter 8 (§65.2-800 et seq.) of Title 65.2 of the Code of Virginia, 1950, as amended. Contractor shall not allow any subcontractor to perform any work on a County construction project unless the subcontractor has obtained, and continues to maintain for the duration of such work, such worker's compensation coverage as may be required pursuant to the provisions of Chapter 8 (§65.2-800 et seq.) of Title 65.2 of the Code of Virginia, 1950, as amended. Contractor shall include the provisions of this paragraph within each of its subcontracts, so as to bind each subcontractor.

4.2 Subcontractor / Supplier Contracts: The General Contractor shall enter into written contracts with its subcontractors and suppliers, if any, and those written contracts shall be consistent with this Contract for Construction. It is the intent of the County and the General Contractor that the obligations of the General Contractor's subcontractors and suppliers, if any, inure to the benefit of the County and the General Contractor, and that the County be a third-party beneficiary of the General Contractor's agreements with its subcontractors and suppliers.

4.2.1 The General Contractor shall, within 15 days after signing the Contract for Construction, notify the County in writing of the names of all subcontractors proposed for the principal parts of the Work, and of such others as the County may direct. Where the specifications establish qualifications or criteria for subcontractors, manufacturers or persons performing Work on the Project, the General Contractor shall be responsible for ascertaining that those proposed meet the criteria or qualifications. The General Contractor shall not employ or utilize any subcontractor that the County may, within a reasonable time, object to as unsuitable. Neither the County nor the County Representative shall direct the General Contractor to contract with any particular subcontractor unless provided in the specifications or Invitation for Bids.

(i) The General Contractor shall not change any subcontractor previously approved unless approved by the County prior to the change becoming effective.

4.2.2 The General Contractor shall make available to each subcontractor and supplier, if any, prior to the execution of written contracts with any of them, a copy of the pertinent portions of this Contract For Construction, including those portions of the Construction Documents to which the subcontractor or supplier will be bound, and shall require that each subcontractor and supplier shall similarly make copies of applicable parts of such documents available to its respective subcontractors and suppliers.

4.2.3 The General Contractor shall engage each of its subcontractors and suppliers with written contracts which preserve and protect the rights of the County and include the acknowledgment and agreement of each subcontractor or supplier that the County is a third-party beneficiary of the contract. The General Contractor's agreements with its subcontractors and suppliers shall require that in the event of default under, or termination of, this Contract for Construction, and upon request of the County, the General Contractor's subcontractors and suppliers will perform services for the County.
4.2.4 The General Contractor shall include in its agreements with its subcontractors and supplier(s) a provision which contains the acknowledgment and agreement of the subcontractor or supplier that it has received and reviewed the applicable terms, conditions and requirements of this Contract For Construction that are included by reference in its written contract with the General Contractor, and that it will abide by those terms, conditions and requirements.
4.2.5 The County may select a particular subcontractor for a certain part of the Work and designate on the Invitation for Bids that the subcontractor shall be used for the part of the Work indicated and that the subcontractor has agreed to perform the Work for the subcontract amount stipulated on the bid form. The General Contractor shall include the stipulated amount, plus his Contractor markups, in the bid. In such case, the General Contractor shall be responsible for that subcontractor and its work, and the subcontractor shall be responsible to the General Contractor for its work, just as if the General Contractor had selected the subcontractor.
4.3 The General Contractor shall be fully responsible to the County for all acts and omissions of his agents and employees and all succeeding tiers of subcontractors and suppliers performing or furnishing any of the Work. Nothing in the Contract Documents shall create any contractual relationship between the County and any subcontractor, supplier or other person, nor shall it create any obligation on the part of the County to pay for or to see to the payment of any money or monies due to any subcontractor, supplier or other person except as may otherwise be required by law.
4.4 The General Contractor shall be fully responsible for its invitees to and at the Site, and for those of its subcontractors, suppliers and their employees, including any acts or omissions of any such invitee.
4.5 The General Contractor agrees that it alone is responsible for all dealings with its subcontractors and suppliers, and their subcontractors, employees and invitees, including, but not limited to: the subcontractors' or suppliers' claims, demands, actions, disputes and similar matters, unless specifically provided otherwise by this Contract or by statute.
4.6 Resolution Of Trade Disputes: The General Contractor shall promptly resolve claims, complaints, labor disputes and disputes over assignment of work tasks by and among its subcontractors and suppliers.

ARTICLE 5
GOODS, PRODUCTS AND MATERIALS
5.1 Quality of Materials: The General Contractor shall furnish goods, products, materials, equipment and systems which:
(i) comply with the requirements of this Contract For Construction;

(ii) conform to applicable specifications, descriptions, instructions, drawings, data and samples;
(iii) are new and standard to the manufacturer(unless otherwise specified or permitted) and without damage;
(iv) are of quality, strength, durability, capacity or appearance equal to or higher than that required by the Construction Documents;
(v) are merchantable;
(vi) are free from defects; and,
(vii) beyond and in addition to those required by manufacturers' or suppliers' specifications where such additional items are required by the Construction Documents.

5.2 Installation And Use Of Materials: All goods, products, materials, equipment and systems named or described in the Construction Documents, and all others furnished as equal thereto shall, unless specifically stated otherwise, be furnished, used, installed, employed and protected in strict compliance with the specifications, recommendations and instructions of the manufacturer or supplier, unless such specifications, recommendations or instructions deviate from accepted construction practices, or the Construction Documents, in which case the General Contractor shall so inform the County and the County shall proceed as directed by that Professional, unless otherwise directed by the County. The General Contractor shall coordinate and interrelate all trade contracts and subcontracts, to ensure compatibility of goods, products, materials, equipment and systems required by the Construction, and to ensure the validity of all warranties and guarantees.

5.3 Unsuitable Materials: With respect to goods, products, materials, equipment or systems which the General Contractor knows or should have known are unsuitable or unavailable at the time of Bid submission, no claim with respect to the unsuitability or unavailability of such goods, products, materials, equipment or systems will be entertained unless such a claim, stating proposed alternatives, was made in writing and submitted with the original Bid. Approval by the County of substitute goods, products, materials, equipment or systems does not mean or imply final acceptance by the County and that Professional, should such items be defective or not as previously represented. Should the General Contractor furnish any approved goods, products, materials, equipment or systems different from or in addition to those required by the Construction Documents, which require supplemental materials or installation procedures different from or in addition to those required for specified items, the General Contractor shall provide such goods, products, materials, equipment or systems at no increase in the Construction Contract Price.

5.4 Security For Work In Progress: The General Contractor shall provide its own security for its Work in progress and for the goods, products, materials, equipment, systems, construction machinery, tools, devices and other items required, used or to be used for its scope of the Work.

ARTICLE 6
DOCUMENTS AND INFORMATION

6.1 Information from County: The County shall provide the General Contractor with information reasonably necessary to assist the General Contractor in performing its services including, if applicable:
(i) the Site legal description and any required survey;

(ii) all written and tangible material in its possession concerning conditions below ground at the Site;
(iii) if the Project involves an existing structure, all available drawings, plans, specifications and structure system information with respect to such structure; and,
(iv) the County's pertinent Project dates and key milestone dates.
6.2 Resolution of Questions: The General Contractor shall resolve all questions concerning the Construction Documents with the Professional who has prepared the documents.
6.3 Processing of Documents: When requested to do so by the County, the General Contractor shall process documents, and provide other reasonably required drawings, services and certifications, necessary to enable the County to:
(i) obtain financing or insurance for the Project;
(ii) obtain approvals, permits and Certificates of Occupancy for the Project, which approvals are not otherwise required to be obtained by General Contractor; and,
(iii) represent that the Work complies with requirements of governmental agencies having jurisdiction over the Project.
6.4 Sufficiency of County Information: The furnishing of information by the County to the General Contractor shall not relieve the General Contractor of its responsibility to evaluate information and documents provided by the County. The General Contractor shall timely notify the County in writing of any additional information needed or services required from the County in order for the General Contractor to perform the Work.

ARTICLE 7
SUBMITTALS
7.1 Submittal Schedule: Within a reasonable time, but no later than fifteen (15) days after execution of the Contract for Construction, the General Contractor shall timely prepare and transmit to the designated County Representative a schedule for provision of all anticipated shop drawings and other submittals. The schedule shall:
(i) include submittals required by the specifications;
(ii) be in a format acceptable to the Representative; and,
(iii) set forth specific dates for submission of the listed submittals. The General Contractor shall review and approve all submittals prior to submission to the County.
7.2 Processing Of Submittals: The General Contractor shall in timely fashion review, approve if appropriate, and forward shop drawings and other submittals to the County for review and approval along with such detail and information as the County requires. No part of the Work dealt with by a submittal shall be fabricated or performed by the General Contractor, except at his own risk, until such approval has been given.
7.2.1 The County Representative is responsible to the County, but not to the General Contractor, to verify that the submittals conform to the design concept and functional requirements of the plans and specifications, that the detailed design portrayed in shop drawings and proposed equipment and materials shown in submittals are of the quality specified and will function properly, and that the submittals comply with the Contract For Construction.
7.2.2 The General Contractor shall perform all Work in accordance with approved submittals. Approval of the General Contractor's submittals by the County shall not relieve

the General Contractor from responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals.

7.2.3 The General Contractor shall furnish to the County Representative for approval the name of the manufacturer, the model number, and other identifying data and information respecting the performance, capacity, nature and rating of any machinery and mechanical or other equipment which the Contractor contemplates incorporating in the Work. When Submittals are required for materials, the General Contractor shall furnish full information concerning the material or articles which it contemplates incorporating in the Work. When required, samples shall be submitted for approval by the County, at the Contractor's expense, with all shipping charges prepaid. Machinery, equipment, material and articles installed or used without required approval(s) shall be at the risk of subsequent rejection.

7.2.4 Submittals shall be forwarded to the County Representative sufficiently in advance of construction requirements to allow reasonable time for the County's review. Submittals shall be accompanied by a letter of transmittal which shall list the Project Title, the Submittals included, the specification section number applicable to each, and the date shown on each Submittal. Submittals shall be complete in every respect and shall be bound in sets. Each Submittal shall be clearly marked to show each item, component, and/or optional feature proposed to be incorporated into the Project. Cross reference to the plans or specifications shall be made as needed to identify the use for which the item or component is intended.

7.2.5 The General Contractor shall check all Submittals for compliance with the requirements of the Contract Documents. The Contractor shall be solely responsible for checking all dimensions and coordinating all materials and trades to ensure that the components or products proposed, individually or in combination, will fit in the space available and that they will be compatible with other components or products provided. The Contractor shall clearly note, in writing, any and all items which deviate from the requirements of the Contract Documents, and the reason(s) for deviation shall be included with the Submittal. Deviations shall be marked in bold face type or lettering and listed on a separate page or pages containing the heading "DEPARTURES FROM DRAWINGS AND SPECIFICATIONS." Submission of any Submittal to the Representative shall constitute the Contractor's certification that the equipment and material shown in the Submittal is that proposed to be incorporated into the Project, is in compliance with the Contract drawings, specifications and other requirements of the Contract Documents (unless otherwise indicated), and can be installed in the allocated spaces.

7.2.6 If a Submittal indicates a departure from the requirements of the Contract Drawings, Specifications or other requirements of the Contract Documents, the County Representative may reject the Submittal, or, if he deems it to have merit, may recommend it to the County, who shall approve or reject it as the County, in its sole discretion, sees fit. Any departure from the Contract Documents must be further authorized by a Change Order.

ARTICLE 8
GENERAL CONTRACTOR'S INSPECTION OF
AND CORRECTION OF DEFECTIVE OR INCOMPLETE WORK

8.1 Rejection And Correction Of Work In Progress: During the course of Project, the General Contractor shall inspect and promptly reject any Work
(i) which does **not** conform to the Construction Documents; or

(ii) which does not comply with any applicable law, statute, code, building code, rule or regulation of any governmental, public and quasi-public authorities and agencies having jurisdiction over the Site, the Work or the Project.

8.1.1 The General Contractor shall promptly correct or require the correction of all rejected Work, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The General Contractor shall bear all costs of correcting such Work, including additional testing and inspections and compensation for all services and expenses necessitated by such correction.

8.1.2 The General Contractor shall bear the cost of correcting destroyed or damaged Work, whether completed or partially completed, of the County or other trade contractors or subcontractors caused by the General Contractor's correction or removal of rejected Work.

8.2 Covered Or Concealed Work: If a portion of its scope of the Work has been covered, the General Contractor shall, if notified to do so by the County, uncover the designated portion for observation and then replace it.

8.2.1 If the designated portion of the Work was covered contrary to the request of the County, or to requirements specifically expressed in the Construction Documents, the General Contractor shall receive no additional compensation for the costs of uncovering and replacement or modification of the Construction Schedule.

8.2.2 If the designated portion of the Work was covered prior to a specific request by the County that it remain uncovered, the General Contractor shall receive additional compensation for the costs of uncovering and replacement or modification of the Construction Schedule(s) only if the designated portion of the Work was in conformance with the Construction Documents.

ARTICLE 9

CHANGE ORDERS AND CHANGES TO THE WORK

9.1 Change Order Requests: Any party to the construction process may request changes to the Work, compensation or applicable schedules.

9.1.1 With respect to such requests for changes by the General Contractor, the General Contractor shall prepare and submit a change order request to the designated County Representative.

9.1.2 With respect to requests for changes by parties other than the General Contractor, the General Contractor shall promptly review and respond to any such change order requests submitted by the County or Professional.

9.1.3 When requested to do so, the General Contractor shall prepare and submit to the County or Professional, drawings, specifications or other data in support of a change order request.

9.1.4 Each change order shall detail time and monetary impacts of the change, whether the change order is considered alone or with all other changes the course of the project.

9.2 County-Directed Changes: The County, by Construction Change Directive, and without invalidating or breaching the Contract, may direct the General Contractor to implement changes in the Work so long as the Work the County is requiring is not outside of the general scope of this Contract For Construction, and the General Contractor, upon written direction from the County, shall proceed with such change.

9.2.1 The County Representative, without the County's prior approval, may authorize or direct the General Contractor to make minor changes in the Work which are consistent with the intent of the Construction Documents and which do not involve a change in Project cost, time for construction, Project scope, or approved design elements, and the General Contractor shall promptly carry out such changes. Any such minor changes shall be implemented by a written field order and executed by the General Contractor.
9.2.2 Construction Change Directives may be utilized to order changes in the Work within the general scope of the Contract, consisting of additions, deletions or other revisions, the Contract Price and Contract Time to be adjusted accordingly. A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order. Upon receipt of a Construction Change Directive, the General Contractor shall promptly proceed with the change in the Work involved and shall advise the Representative of the General Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining any proposed adjustment in the Contract Price or Contract Time. A Construction Change Directive signed by the General Contractor indicates the agreement of the General Contractor therewith. Such agreement shall become effective immediately and shall be recorded as a Change Order.
9.3 Administration Of Changes: The County Representative will administer and manage all change order requests and change orders and will prepare required drawings, specifications and other supporting data as necessary in connection with minor changes, change order requests and change orders.
9.4 Compensation For Changes: With respect to all change order requests involving credit to the County or additional compensation to the General Contractor, the General Contractor shall:
(i) obtain from subcontractors and suppliers the best possible price quotations;
(ii) review such quotations to ascertain whether they are reasonable;
(iii) prepare an itemized accounting together with appropriate supporting data, including reasonable expenditures by, and savings to, those performing the scope of the Work involved in the proposed change; and,
(iv) provide a reasonable price quotation to the designated County Representative.
9.4.1 If price quotations for change order requests are determined by the County to be unreasonable, the General Contractor shall, in writing, justify said quotations or provide additional back-up materials. If after review of the additional information the County determines the quotation is unreasonable, the County may require the General Contractor to perform the subject Work on a time and material basis.
9.4.2 The General Contractor shall be allowed no additional compensation for any costs, fees or expenses incurred in performing services already required by this Contract for Construction, and shall not be entitled to additional reimbursement for its home office, other non-job site or indirect overhead expenses, or tools necessary for construction.
9.4.3 It is the responsibility of the General Contractor to review and approve all pricing of additional work required of its subcontractors and suppliers.
9.4.4 Under no circumstances may any change order(s) be used to increase the amount of this fixed price contract, without adequate consideration to the County, for any purpose, including, but not limited to, relief of the General Contractor from the consequences of an error in its bid.

9.4.5 The following may constitute allowable costs for changes in the Work, subject to 9.4.2, above:
(i) Labor costs for employees directly employed in the change in the Work, including salaries and wages plus the cost of payroll charges and fringe benefits and overtime premiums, if such premiums are explicitly authorized by the County;
(ii) Materials incorporated into the change to the Work, including costs of transportation and storage, if applicable;
(iii) Equipment incorporated in the changed Work or equipment used directly in accomplishing the Work. If rented expressly for accomplishing the change, the cost shall be the rental rate according to the terms of the rental agreement, which the County shall have the right to approve in advance. If owned by the Contractor, the costs shall be a reasonable price based upon the life expectancy of the equipment and the purchase price of the equipment;
(iv) costs of increases in premiums for the Standard Labor and Material Payment Bond and the Standard Performance Bond, provided coverage for the cost of the change in the Work results in such increased costs. At the County's request, the Contractor shall provide proof of his notification to the Surety of the change in the Work and of the Surety's agreement to include such change in its coverage. There shall be no Contractor mark-up to the cost of the increase in the premium;
(v) Contractor and Subcontractor overhead costs as follows: if a Subcontractor, at any tier, does all or part of the changed Work, the Subcontractor's markup on that Work for overhead and profit shall not exceed ten percent (10%) and the Contractor's markup of a Subcontractor's Work, and all intervening tiers of Subcontractors, shall not exceed a total of ten percent (10%); if the General Contractor does all or part of the changed Work, then its markup for overhead and profit on the changed Work it performs shall not exceed ten percent (10%)
(vi) other costs, expressly agreed to by the County in writing that are directly attributable to the change in Work, with the exception of those set forth below.
9.4.6 Allowable costs for changes in the Work shall **exclude** the following:
(i) Costs due to the negligence of the Contractor, any Subcontractor, Supplier, their employees or other persons for whom the Contractor is responsible, including, without limitation, costs for correction of defective Work, for improper disposal of material, for equipment wrongly supplied, for delay in performing the Work, or for delay in obtaining materials or equipment;
(ii) Home office expenses including payroll costs for the Contractor's officers, executives, administrators, project managers, accountants, counsel, engineers, timekeepers, estimators, clerks, and other similar administrative personnel employed by the Contractor, whether at the Site or in the Contractor's principal or branch office for general administration of the Work; these costs are deemed overhead included in the percentage markups allowable in 9.4.4, above.
(iii) Home and field office expenses, including, without limitation: expenses of home and branch offices, Contractor's capital expenses, interest on Contractor's capital used for the Work, charges for delinquent payments, small tools, incidental job costs, rent, utilities, telephone and office equipment and other general overhead expenses..

9.4.7 All Change Orders must state that the Contract Time for Completion or Completion Date is not changed, or that the Time for Completion/Completion Date is either increased or decreased by a specific number of days. The old Time for Completion/Completion Date, and if changed, the new Time for Completion/Completion Date must be stated on the face of each Change Order.

9.4.8 The acceptance by the General Contractor of any payment made by the County under a Change Order shall be and operate as a release to the County of all claims by the Contractor and of all liability owing to the Contractor for all things done or furnished in connection with the Work described in the Change order. The execution of any Change order by the County shall not be an acceptance of any Work or materials not in accordance with the Contract Documents, nor shall it relieve the Contractor of responsibility for faulty materials or workmanship, or operate to release the Contractor or his surety from any obligation arising under the Contract or any Performance or Payment Bond.

9.5 Performance Of Changes: Upon receipt of an field order or change order the General Contractor shall proceed to promptly perform the change in the Work. All changes in the Work shall be performed under applicable conditions of the Construction Documents.

9.6 Disputes Regarding Changes: If the General Contractor disputes a decision regarding:

(i) whether a change has occurred;

(ii) whether a change in the Work will result in adjustment of its compensation or applicable schedules; or

(iii) the amount of any adjustment of compensation or applicable schedules, the General Contractor shall notify the County in writing of the dispute, as provided below. Once placed in dispute the General Contractor shall nevertheless carry out the change, if directed so to do by County. The General Contractor will not prejudice any claim that it may have with respect to that change so long as the General Contractor notifies the County in writing; however, failure to timely notify the County in writing shall constitute the General Contractor's waiver of any claim resulting from the change.

9.6.1 In the event a change order request is approved by the County in the absence of an agreement with the General Contractor as to cost, time, or both, the appropriate Representative will:

(i) receive and maintain all documentation pertaining thereto required of the General Contractor;

(ii) examine such documentation on the County's behalf;

(iii) take such other action as may be reasonably necessary or as the County may request; and,

(iv) make a written recommendation to the County concerning any appropriate adjustment in the construction cost or time.

9.7 Necessity for Signed Writing: No act, omission or course of dealing shall alter the requirement that change orders must be in writing and signed by the County, and that change orders are the exclusive method for effecting any adjustment to the General Contractor's compensation or applicable schedules. The General Contractor understands and agrees that neither its compensation nor applicable schedules can be changed by implication, oral agreement, or unwritten change order. The execution of a change order by the General Contractor shall constitute conclusive evidence of the General Contractor’s agreement to the ordered changes in the Work, to the Construction Contract as thus

amended, to the Contract Price as amended, and to the time for performance by the General Contractor. The General Contractor, by executing the change order, waives and forever releases any claim against the County for additional time or compensation, with respect to the changes specified therein.

9.8 Consent of Surety. The General Contractor shall notify and obtain the consent and approval of the General Contractor's surety with reference to all change orders, if such notice, consent or approval is required by the County, the surety or by applicable law. The General Contractor's execution of the change order shall constitute the General Contractor's warranty to the County that the surety has been notified of, and consents to such change order, and the surety shall be conclusively deemed to have been notified of such change order and to have expressly consented thereto.

9.9 Work Subject to Change Order. Neither the General Contractor nor any subcontractor(s) shall commence any work which is, or by provisions of this Contract is required to be, the subject of a change order, unless and until the required Change Order has been fully executed by both the County and the General Contractor.

ARTICLE 10
FINANCIAL CLAIMS AND LIENS

10.1 Notification Regarding Liens: The General Contractor shall immediately notify the County, both orally and in writing, of the nature and details of any mechanics' liens, construction liens, builder's trust fund claims, or claims of any type made by anyone against the County, the General Contractor or any subcontractor or supplier of any of them or against the Project whether or not such claims arise from the Work.

10.2 Discharge of Liens: The General Contractor shall take all action necessary to obtain the prompt discharge of any liens or claims filed against the Project. If any lien or claim filed against the Project is not discharged and released by the claimant, the General Contractor shall, within a reasonable period of time, but in no event more than fourteen (14) calendar days after request and at its own cost, promptly obtain discharge and release of such lien or claim by filing the appropriate bond. If the General Contractor fails to have any such lien or claim discharged and released, or fails to file the appropriate bond, the County shall have the right to pay all sums necessary to obtain such a discharge and release, and the General Contractor shall bear and be liable to the County for all expenses incurred by the County in so doing, including, without limitation, reasonable attorney's fees.

ARTICLE 11
COUNTY'S CONSULTANT(S), PROFESSIONAL(S)
AND CONSTRUCTION ADMINISTRATION

11.1 County's Designated Representative: Unless otherwise directed by the County, the Representative designated on Page 1 of this Contract for Construction shall act as the County's representative from the effective date of this Contract until one (1) year from the date the General Contractor achieves Substantial Completion.

11.2 The Representative will:

(i) be the County's design representative during performance of the Work;

(ii) consult with and advise the County on all design and technical matters;

(iii) be the County's representative in dealing with the General Contractor on all such matters; and,
(iv) administer this Contract For Construction.
11.2.1 Unless otherwise directed by the County, the County and the General Contractor shall communicate with each other in the first instance through the designated Representative. The County's instructions, directions and other relevant communications or directives to the General Contractor will be issued through the designated Representative.
11.2.2 The designated Representative will act as initial interpreter of the requirements of this Contract For Construction and as the County's advisor on claims.
11.3 Site Visits: The County Representative will visit the Site with sufficient frequency for familiarization with the progress and quality of the Work and to inspect the Work for substantial compliance with:
(i) this Contract For Construction, including approved shop drawings and other submittals;
(ii) the Construction Schedule; and,
(iii) applicable laws, statutes, codes, building codes, rules or regulations of all governmental, public and quasi-public authorities and agencies having or asserting jurisdiction over the Project.
11.4 Rejection Of Work: The County Representative may disapprove or reject Work which does not comply with:
(i) this Contract For Construction including approved shop drawings and other submittals; or
(ii) applicable laws, statutes, codes, building codes, rules or regulations of any governmental, public and quasi-public authorities and agencies having or asserting jurisdiction over the Project.
11.5 Evaluations: The County Representative will review and evaluate the results of all inspections, tests and written reports required by this Contract and by any governmental entity having or asserting jurisdiction over the Project. The Representative will take appropriate action on test results, including acceptance, rejection, requiring additional testing or corrective work, or such other action deemed appropriate by the Representative. The Representative will promptly reject Work which does not conform to and comply with testing requirements.
11.5.1 The Representative may require inspection or testing of any Work in addition to that required by this Contract For Construction or governmental entities having or asserting jurisdiction over the Project when such additional inspections and testing is necessary or advisable, whether or not such Work is then fabricated, installed or completed. The Representative will take appropriate action on all such special testing and inspection reports, including acceptance, rejection, requiring additional testing or corrective work, or such other action deemed appropriate by the Professional(s).
11.6 Submittal Activities: The Representative will review and approve, reject or take other appropriate action on submittals (e.g., shop drawings, product data, samples, proposed equal materials or equipment and requested substitutions) within not more than fourteen (14) calendar days, and will not approve any submittals unless such submittals conform with
(i) the Project design concept;
(ii) this Contract For Construction; and

(iii) the County's budgeted Total Project Construction Cost. The Representative's review of submittals shall not constitute final acceptance of materials or equipment furnished or installed if such materials or equipment should be defective or not as represented by approved submittals or as otherwise required by the Construction Documents. The General Contractor remains responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for selecting fabrication processes, for techniques of assembly, and for performing its scope of the Work.

11.7 Professional Interpretations: The Professional shall, when requested to do so in writing by the General Contractor, promptly and so as to cause no unnecessary delay, render written or graphic interpretations and decisions necessary for the proper execution of the Work. The Professional's interpretations and decisions relating to artistic effect shall be final, if not inconsistent with this Contract and the Plans.

11.8 Change Order Activities: The Representative will consult with and advise the County concerning, and will administer and manage, all change order requests and change orders on behalf of the County.

11.9 Pay Application Activities: The County Representative will review applications for payment, including such accompanying data, information and schedules as the Representative requires to determine the amounts due to the General Contractor and shall authorize payment by the County to the General Contractor in writing. After the General Contractor's scope of the Work is determined to be finally complete and the Representative determines that the General Contractor has completed the Scope of the Work, the Representative will determine whether the General Contractor is entitled to final payment, and if so, the Representative will certify that determination to the County in writing.

11.10 Representative Relationship to General Contractor: The duties, obligations and responsibilities of the General Contractor under this Contract For Construction shall not be changed, abridged, altered, discharged, released, or satisfied by any duty, obligation or responsibility of the Representative. The General Contractor shall not be a third-party beneficiary of any agreement by and between the County and the Representative. The duties of the General Contractor to the County shall be independent of, and shall not be diminished by, any duties or obligations of any Professional to the County.

ARTICLE 12
INSPECTION, CORRECTION OF WORK, AND PROJECT CLOSE OUT

12.1 Substantial Completion: Substantial Completion of the General Contractor's Work shall be deemed to have occurred on the first day on which both of the following circumstances exist:

(i) the General Contractor's Work passes, or has passed, a Substantial Completion inspection, and

(ii) the General Contractor has produced all required Substantial Completion documentation and items.

12.1.1 The General Contractor shall accomplish Substantial Completion of its scope of the Work on or before the required date of Substantial Completion specified in this Construction Contract.

12.1.2 When the General Contractor believes that its Work, or a portion thereof which the County agrees to accept separately, is substantially complete, it shall notify the County that its Work is ready for a Substantial Completion inspection.

12.1.3 At or prior to the substantial completion inspection, the General Contractor will prepare and furnish to the Representative a Declaration of Substantial Completion, which at a minimum must:

(i) contain a blank for entry of the date of Substantial Completion, which date will fix the commencement date of warranties and guaranties and allocate between the County and the General Contractor responsibility for security, utilities, damage to the Work and insurance;

(ii) include a list of items to be completed or corrected prior to final payment and state the time within which the General Contractor will complete or correct listed items; and:,

(iii) contain signature lines for the County, the General Contractor and the Representative.

12.1.4 Upon receipt of notification from the General Contractor the Representative will coordinate with the County and the General Contractor a date for inspection of the Work to determine whether the Work is substantially complete.

12.1.5 At inspection(s) to determine whether the General Contractor's Work is substantially complete, the Representative will:

(i) inspect the General Contractor's Work;

(ii) list additional items to be completed or corrected; and,

(iii) determine, in consultation with the County, whether Substantial Completion of the General Contractor's Work has occurred.

12.1.6 If the General Contractor's Work is determined not to be substantially complete, the General Contractor shall continue to prosecute the Work until the Work is substantially complete and the inspection process shall be repeated at no additional cost to the County until the Work is determined to be substantially complete.

12.1.7 On or prior to the date of Substantial Completion, the General Contractor shall deliver to the appropriate Representative keys, permits, the certificate of occupancy, and other necessary and customary documents and items pre-requisite for the County's occupancy and use of the Work for its intended purpose. The Representative will obtain and review Substantial Completion documentation and items, and will inform the General Contractor of any deficiencies.

12.1.8 When the County, the General Contractor and the representative agree that the General Contractor's Work has passed the Substantial Completion inspection and the General Contractor has produced the required Substantial Completion documentation and items, they shall each sign the Declaration of Substantial Completion declaring the Work substantially complete and establishing the actual date of Substantial Completion. The Declaration of Substantial Completion shall also include a list of and time line for the completion of Work needing completion and correction.

12.2 Partial Occupancy or Use. The County may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate written agreement with the General Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Work. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the County and General Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage (if any),

security, maintenance, heat, utilities, damage to the Work, and Insurance, and if the County and the General Contractor have also agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. Consent of the General Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work at the time of partial occupancy or use shall be determined by written agreement between the County and the Contractor, or if no agreement is reached, by decision of the Architect. When the General Contractor considers a portion of the Work partially occupied or used by the County to be substantially complete, the General Contractor shall prepare a list and submit it to the County as provided by Section 12.1

12.3 Final Completion: Final Completion of the General Contractor's Work shall be deemed to have occurred on the first day on which both of the following circumstances exist:

(i) the General Contractor's Work passes, or has passed a Final Completion inspection, and

(ii) the General Contractor has produced all required Final Completion close-out documentation and items.

12.3.1 The General Contractor shall accomplish Final Completion of its scope of the Work on or before the required date of Final Completion specified in this Construction Contract.

12.3.2 When the General Contractor believes its scope of the Work is finally complete, the General Contractor shall notify the County and the Representative that the Work is ready for a Final Completion inspection.

12.3.3 Upon receipt of such notification from the General Contractor, the Representative will coordinate with the County and the General Contractor a date for inspection of the Work to determine whether the Work is finally complete.

12.3.4 At the Final Completion inspection to determine whether the General Contractor's Work is finally complete, the Representative will:

(i) inspect the General Contractor's Work;

(ii) determine whether the General Contractor has satisfactorily completed or corrected all items on the list included with the Declaration of Substantial Completion;

(iii) determine whether the General Contractor's Work complies with

(a) this Contract For Construction;

(b) applicable laws, statutes, codes, building codes, rules or regulations of all governmental, public and quasi-public authorities and agencies having jurisdiction over the Project; and,

(c) applicable installation and workmanship standards;

(iv) determine whether required inspections and approvals by the official(s) having or asserting jurisdiction over the Project have been satisfactorily completed; and,

(iv) determine, in consultation with the County, whether the General Contractor's Work is finally complete.

12.3.5 If the General Contractor's Work is not finally complete, the General Contractor shall continue to prosecute the Work until the Work is finally complete and the inspection process shall be repeated at no additional cost to the County until the Work is finally complete.

12.3.6 On or prior to the date of Final Completion, the General contractor shall deliver to the County Representative the following Final Completion close-out documentation and items:

(i) all operating and instruction manuals not previously produced during commissioning and required maintenance stocks;

(ii) one paper set, and one electronic file of complete as-built drawings and markups;

(iii) certification and affidavit that all insurance required of the General Contractor beyond final payment, if any, is in effect and will not be canceled or allowed to expire without notice to the County;
(iv) written consent of the surety(ies), if any, to final payment;
(v) full, final and unconditional waivers of mechanics or construction liens, releases of builder's trust fund or similar claims, and release of security interests or encumbrances on the Project property from each contractor, subcontractor, supplier or other person or entity who has, or might have a claim against the County or the real property which is the subject of this Construction Contract;
(vi) full, final and unconditional certification and affidavit that all of the General Contractor's obligations to contractors, subcontractors, suppliers and other third parties for payment for labor, materials or equipment related to the Project have been paid or otherwise satisfied;
(vii) all written warranties and guarantees relating to the labor, goods, products, materials, equipment and systems incorporated into the General Contractor's scope of the Work, endorsed, countersigned, and assigned as necessary;
(viii) affidavits, releases, bonds, waivers, permits and other documents necessary for final close-out of Work;
(ix) a list of any item(s) due but unable to be delivered and the reason for non-delivery; and,
(x) any other documents reasonably and customarily required or expressly required herein for full and final close-out of the General Contractor's Work.
12.3.6 The County Representative will review and determine the sufficiency of all Final Completion close-out documentation and items required for Final Completion which are submitted by the General Contractor, and will immediately inform the General Contractor of any deficiencies and omissions.

ARTICLE 13
GENERAL CONTRACTOR'S WARRANTIES AND GUARANTEES
13.1 One-Year Warranty: In addition to the warranties and guarantees set forth elsewhere in this Contract For Construction, for a period of one (1) year after the date of Substantial Completion, or the date of acceptance by the County, whichever is later, the General Contractor shall, upon request by the County, promptly correct all failures or defects in the Work.
13.1.1 The General Contractor shall schedule, coordinate and participate in a walk-through inspection of the Work one (1) month prior to the expiration of the one-year correction period, and shall notify the County, and any necessary subcontractors and suppliers of the date of the walk-through inspection, and request their participation therein. The purpose of the walk-through inspection will be to determine if there are defects or failures which require correction
13.1.2 Should the General Contractor fail to promptly correct any failure or defect, the County, a Related Party, or any successor in interest or assignee of either, may take whatever action(s) it deems necessary to remedy the failure or defect and the General Contractor shall promptly reimburse the County or Related Party for any expenses or damages incurred as a result of the General Contractor's failure to correct the failure or defect.
13.1.3 Nothing contained in this Section 13.1 shall be construed to establish a period of limitation with respect to the General Contractor's obligations under this Contract For

Construction. This Section 13.1 relates only to the General Contractor's specific obligations with respect to the Work, and has no relationship to the time within which the General Contractor's contractual obligations under this Contract For Construction may be enforced, nor to the time within which proceedings may be commenced to establish the General Contractor's liability with respect to any contractual obligations set forth within this Section 13.1 or contained elsewhere within this Construction Contract.

13.2 Express Warranties and Guarantees - General Contractor: In addition to the warranties and guarantees set forth elsewhere herein, the General Contractor expressly warrants and guarantees to the County:

13.2.1 that the Work complies with the Construction Documents as well as all applicable laws, statutes, codes, building codes, rules and regulations of all governmental, public and quasi-public authorities and agencies having jurisdiction over the Project;

13.2.2 that all goods, products, materials, equipment and systems incorporated into the Work conform to applicable specifications, descriptions, instructions, drawings, data and samples and shall be and are:

(i) new (unless otherwise specified or permitted) and without apparent damage or defect;

(ii) of quality equal to or higher than that required by the Construction Documents; and,

(ii) merchantable; and

(iv) that all management, supervision, labor and services required for the Work is and shall be in compliance with the requirements of this Contract For Construction, and that the Work is and shall be performed in a workmanlike manner.

13.3 Express Warranties and Guarantees - Subcontractors And Suppliers: The General Contractor shall require that each of its subcontractors and suppliers provide written warranties, guarantees and other undertakings to the County and the General Contractor in a form identical to the warranties, guarantees and other undertakings set forth in this Contract For Construction which warranties, guarantees and undertakings shall run to the benefit of the County, Related Parties, and the successors in interest and assigns of each, as well as the General Contractor.

13.4 Non-Exclusivity and Survival: The warranties and guarantees set forth in this Article, shall be in addition to all other warranties, whether express, implied or statutory, and they shall survive the County's payment, acceptance, inspection of or failure to inspect the Work, and review of the Construction Documents.

13.5 Commencement of Obligations: Unless otherwise specified, all of the General Contractor's warranty and guaranty obligations, including the time period(s) for all written warranties and guarantees of specifically-designated equipment required by the Construction Documents, shall begin on the actual date of Substantial Completion or the date of acceptance by the County, whichever is later.

ARTICLE 14
COUNTY'S DUTIES, OBLIGATIONS AND RESPONSIBILITIES

14.1 County's Representative: The County shall designate a Representative to serve as the County's primary communication contact with the General Contractor. The name and address of the County's Designated Representative shall be as set forth on Page 1 of the Contract for Construction.

14.2 County's General Duties

14.2.1 The County shall timely compensate the General Contractor in accordance with this Contract For Construction.
14.2.2 Unless otherwise specifically required to be provided by the General Contractor within the scope of Work, the County shall secure and pay for all Project testing.
14.2.3 The County shall review documents prepared by the General Contractor in a timely manner and in accordance with schedule requirements. Review by the County shall be solely for the purpose of determining whether such documents are generally consistent with the County's intent. No review of such documents shall relieve the General Contractor of any of its responsibilities with respect thereto.
14.2.4 The County shall not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, nor shall the General Contractor, for any of the foregoing purposes, be deemed the agent of the County.

ARTICLE 15
GENERAL CONTRACTOR'S COMPENSATION
15.1 Unit Prices: If any portion of the Contract Price is determined by the application of unit prices, the number of units contained in the General Contractor's Compensation Schedule is an estimate only, and the compensation to the General Contractor shall be determined by the actual number of units incorporated in, or required by, the Work.
15.2 Schedule of Values: Within the time designated within this Contract for Construction, the General Contractor shall prepare and present to the County the General Contractor's schedule of values, apportioning the Construction Contract Price among the different elements of the scope of the Work, for purposes of periodic and final payment. The General Contractor's Schedule of Values shall be presented in the format, and with such detail and supporting information, requested of the General Contractor by the County. The General Contractor shall not imbalance or artificially inflate any element of its Schedule of Values. If the Schedule of Values is determined to be inappropriate, or if any supporting documentation or data is deemed to be inadequate, the Schedule of Values shall be returned to the General Contractor for revision or for additional supporting documentation or data. Upon the County's acceptance of the Schedule of Values, as evidenced by the Representative's signature, the Schedule of Values shall be used to process and pay the General Contractor's payment requests and shall be deemed to constitute a reasonable, balanced basis for payment of the Contract Price to the General Contractor. The Schedule of Values shall not be changed without written change order authorized by the County.
15.3 Invoicing Procedures: In accordance with the procedures and requirements set forth in this Article, the General Contractor shall invoice the County and the County shall pay the General Contractor the Construction Contract Price.
15.3.1 Not less than once every thirty (30) calendar days following the Commencement Date, but no more frequently than once per calendar month, the General Contractor shall submit invoices to the County requesting payment in accordance with the Schedule of Values for labor and services rendered during the preceding thirty (30) calendar days. Each invoice shall contain such detail and be backed up with whatever supporting information the County requests. At a minimum the invoice shall:
(i) state the total Construction Contract Price;

(ii) state the amount due for labor, materials and equipment provided during the preceding 30 days; and with respect to amounts invoiced for materials or equipment necessary for the Project and properly stored at the Site (or elsewhere if offsite storage is approved in writing by the County), be accompanied by written proof that the County has title to such materials or equipment and that such material and equipment is fully insured against loss or damage;
(iii) provide an itemized statement or other general breakdown of the various phases or parts of the General Contractor's Scope of Work, as related to the Construction Contract Price;
(iv) state the value of the various phases or parts actually performed during the period covered by the invoice;
(v) state any previously invoiced amounts and credit payments made;
state the total amount due, less any retainage; and,
(vii) have attached such lien waivers, or other documentation verifying the General Contractor's payment to subcontractors and suppliers as the County may request, in their sole discretion.

15.4 Payment Procedures: The General Contractor's invoices, and any other requests for payments authorized by this Contract, must be approved by the County Representative and must meet the minimum requirements set forth in section 15.3, above, as condition(s) precedent to the County's obligation to pay. Payments issued by the County shall be deemed timely if postmarked at least two (2) business days before the Payment Date identified within the Contract for Construction, or any alternative payment due date stated in this Article.

15.4.1 The required payment date shall be either:
(i) the date on which payment is due under the terms of this Construction Contract; or (ii) if such date is not established by the Contract, not more than forty-five days after goods or services are received or not more than forty-five days after an invoice in a form acceptable to the County is rendered, whichever is later. Separate payment dates may be specified for contracts under which goods or services are provided in a series of partial deliveries or executions, to the extent any such contract specifically provides for separate payment for such partial delivery or execution. In the event that any invoice contains a defect or impropriety which would prevent payment by the Payment Date, the County shall notify the General Contractor in writing of such defect or impropriety. Any disputed amounts determined by the County to be payable to the General Contractor shall be due thirty (30) days from the date the dispute is resolved.

15.4.2 The County's signature to this Construction Contract constitutes its certification that, as of the date of signature, public funds are available and have been appropriated in the amount specified in the original Contract documents as and for the Contract Price. Payment and performance obligations of the County are expressly conditioned upon the availability of and appropriation by the County of public funds therefore in each subsequent fiscal year. When public funds are not appropriated or are otherwise unavailable to support continuation of performance by the County in a subsequent fiscal period, this contract and the County's obligations hereunder shall automatically expire, without liability or penalty to the County, and the General Contractor shall be reimbursed for the reasonable value of any non-recurring costs incurred but not amortized in the price of the products, supplies or services delivered under this Construction Contract. Within a reasonable time following

County Council's adoption of a budget, the County shall provide the Contractor with written notice of any non-appropriation or unavailability of funds affecting this Contract.

15.4.3 If Contractor is an individual, then he or she shall provide the County with his Social Security Number on or before commencement of performance of construction services under this Contract. If Contractor is a proprietorship, partnership, or corporation, then Contractor shall provide its federal employer identification number(s) to the County on or before its commencement of performance of construction services under this Contract.

15.4.4 Unless otherwise specified within the Contract Documents, the County will make progress payments to the contractor, in installments based upon an estimated percentage of completion. With each installment, the contractor shall be paid at least ninety-five percent (95%) of the total amount earned, as determined and approved by the Representative, withholding the balance as retainage, to assure faithful performance of the contract. Amounts withheld may be included in the final payment to the contractor. Where the General Contractor utilizes a subcontractor in connection with a County construction contract, and the subcontract provides for progress payments, then the General Contractor shall be subject to the same percentage limitations with respect to progress payments made to subcontractors.

15.4.5 The General Contractor shall have the option to use an escrow account procedure for utilization of the County's retainage funds, when contracting directly with the County for contracts involving $200,000 or more of public funds, where portions of the contract price are to be retained, where such contracts are for: construction of highways, roads, streets, bridges, parking lots, demolition, clearing, grading, excavating, paving, pile driving, drainage structures and the installation of water, gas, sewer lines and pumping stations. In the event a Contractor elects to utilize the escrow account procedure, then any sub such public project which provides for progress payments shall be subject to the same escrow account procedures.

(i) the Contractor shall indicate its election to use the escrow account procedure, by completing the escrow agreement form and contract included in the Bid Documents for this Project. The form and contract shall be submitted to the County within fifteen (15) calendar days after the Contractor is notified of the award of the contract. If the escrow agreement form and contract are not submitted within the 15 day period, then the Contractor shall forfeit its right to the use of the escrow account procedure.

(ii) In order to have retained funds paid to an escrow agent, the Contractor, the escrow agent, and the surety shall execute an escrow agreement form. The Contractor's escrow account shall be a trust company, bank or savings institution with its principal office located in the Commonwealth of Virginia.

(iii) This escrow account procedure shall not apply to public contracts for construction of railroads, public transit systems, runways, dams, foundations, installation or maintenance of power systems for the generation and primary and secondary distribution of electric current ahead of the customer's meter, the installation or maintenance of telephone, telegraph or signal systems for public utilities or the construction or maintenance of solid waste or recycling facilities and treatment plants.

15.5 County's Right to Refuse Payment: The Representative's approval of the General Contractor's invoice shall not preclude the County from exercising any of its remedies under this Contract. In the event of a dispute, payment shall be made on or before the Payment Date

for amounts not in dispute, subject to any set-offs claimed by the County. The County shall have the right to refuse to make payment of any invoice, and, if necessary, may demand the return of a portion or all of the amount previously paid to the General Contractor due to:
(i) the General Contractor's failure to perform its scope of the Work in compliance with the requirements of this Contract For Construction or any other agreement between the parties;
(ii) the General Contractor's failure to correctly and accurately represent the work performed in a payment request, or otherwise;
(iii) the General Contractor's performance of its scope of the Work at a rate or in a manner that, in the County's opinion, is likely to result in the Project or any portion of the Project being inexcusably delayed;
(iv) the General Contractor's failure to use funds previously paid the General Contractor by the County, to pay General Contractor's Project-related obligations including, but not limited to, the General Contractor's subcontractors, materialmen, and suppliers;
(v) claims made, or claims likely to be made, against: (a) the County, (b) the property which is the subject of this Construction Contract, or (c) the Professional. The General Contractor's failure to attach to any invoice the lien waivers or other documentation required by section 15.3
(vi) of this Construction Contract shall constitute *prima facie* evidence of such claims likely to be made;
(vii) loss caused by the General Contractor or the General Contractor's subcontractors, or suppliers; and,
(viii) the General Contractor's failure or refusal to perform any of its obligations to the County.

15.6 Correction of Past Payments: All prior payments, whether based on estimates or otherwise, may be corrected and adjusted in any subsequent payment and shall be corrected and adjusted in the final payment. In the event that any invoice contains a defect or impropriety which would prevent payment by the Payment Date, the County shall notify the General Contractor in writing of such defect or impropriety. Any disputed amounts determined by the County to be payable to the General Contractor shall be due thirty (30) calendar days from the date the dispute is resolved.

15.7 Interest on Outstanding Amounts Due: No interest shall accrue when payment is delayed due to a dispute between the County and the Contractor, or a dispute as to the accuracy or completeness of any request for payment received. This exception to the accrual of interest shall apply only to that portion of a delayed payment which is actually the subject of the dispute and shall apply only for the duration of such disagreement. No interest shall accrue on any retainage which is withheld by the County to assure performance of this Contract.

15.8 Invoice Warranties and Guarantees: The General Contractor expressly warrants and guarantees to the County that:
(i) title to all goods, products, materials, equipment and systems covered by an invoice will pass to the County in accordance with Virginia law, either by incorporation into the Work, or upon receipt of payment by the General Contractor, whichever occurs first;
(ii) all goods, products, materials, equipment and systems covered by an invoice are free and clear of liens, claims, security interests or encumbrances; and,

(iii) no goods, products, materials, equipment or systems covered by an invoice have been acquired by the General Contractor, or its subcontractors or suppliers, subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the General Contractor, or its subcontractors or suppliers.

15.9 General Contractor's Signature: The signature of the General Contractor on any invoice constitutes the General Contractor's certification to the County that:

(i) the General Contractor's services listed in the invoice have progressed to the level indicated and have been performed as required by the Contract;

(ii) the General Contractor has paid its subcontractors and suppliers, if any, their proportional share of all previous payments received from the County; and,

(iii) the amount requested is currently due and owing.

15.10 Taxes: The General Contractor shall incorporate into the Contract Price, and shall pay, all sales, consumer, use and similar taxes for goods, products, materials, equipment and systems incorporated into its scope of the Work which were legally required at the time of execution of this Contract for Construction, whether or not yet effective or merely scheduled to go into effect. The General Contractor shall secure, defend, protect, hold harmless, and indemnify the County and Related Parties from and against any and all liability, loss, claims, demands, suits, costs, fees and expenses (including actual fees and expenses of attorneys, expert witnesses, and other consultants) relating to any taxes assessed or imposed upon, incurred by or asserted against the County and Related Parties by any taxing authority with respect to such taxes. The General Contractor shall cooperate with and assist the County in securing qualified refunds of any sales or use tax paid by the County or General Contractor on goods, products, materials, equipment or systems. Any refund secured shall be paid to the County.

15.11 Compensation of General Contractor's Subcontractors and Suppliers. Within seven days after receipt of amounts paid to the General Contractor by the County, for work performed by a subcontractor, the General Contractor shall take one of the following two actions:

(i) pay the subcontractor for the proportionate share of the total payment received from the agency attributable to the work performed by the subcontractor; or

(ii) notify the County and the subcontractor, in writing, of the contractor's intention to withhold all or a part of the subcontractor's payment, specifying the factual basis and reason for the nonpayment. The General Contractor shall include in each of its subcontracts a provision requiring each subcontractor to include or otherwise be subject to the same payment requirements with respect to each lower-tier subcontractor.

15.11.1 The County shall have no obligation to pay, and shall not be responsible for payments to the General Contractor's subcontractors or suppliers. However, the County reserves the right, but shall have no duty, to make payment jointly to the General Contractor and to any of its subcontractors or suppliers in the event that the County becomes aware that the General Contractor fails to pay or unreasonably withholds payment from one or more of those entities. Such joint check procedure, if utilized by the County, shall create no rights in favor of any person or entity beyond the right of the named payees to payment of the check and shall not be deemed to commit the County to repeat the procedure in the future.

15.12 Final Payment: Prior to becoming entitled to receive final payment, and as a condition precedent thereto, the General Contractor must achieve Final Completion. The

County shall, subject to its rights set forth in this Contract for Construction, make final payment of all sums due the General Contractor within fourteen (14) calendar days of the Representative's execution of a final approval for payment.

ARTICLE 16
SCHEDULE REQUIREMENTS

16.1 Construction Schedule: The General Contractor shall submit to the County and to the Representative a Construction Schedule, which shall include all pertinent dates and periods for timely completion of the Work.

16.1.1 Unless otherwise directed and approved by the County, the General Contractor shall prepare the Construction Schedule as a critical path schedule with separate divisions for each major portion of the Work or operations. The Construction Schedule shall include and properly coordinate dates for performance of all divisions of the Work, including completion of off-Site requirements and tasks, so that the Work can be completed in a timely and orderly fashion consistent with the required dates of Substantial Completion and Final Completion.

16.1.2 The Construction Schedule shall include

(i) the required Commencement Date, and the required dates of Substantial Completion and Final Completion;

(ii) any guideline and milestone dates required by the County;

(iii) any applicable subcontractor and supplier sub-schedules;

(iv) a submittal schedule which allows sufficient time for review of documents and submittals;

(v) the complete sequence of construction by activity, with dates for beginning and completion of each element of construction; and,

(vi) required decision dates;

16.1.3 By reviewing the Construction Schedule, the County and the Representative do not assume any of the General Contractor's responsibility that the Construction Schedule be coordinated or complete, or for timely and orderly completion by the required dates of Substantial Completion and Final Completion, and any milestone dates required by the County, and review and acceptance of the Construction Schedule by the County and a Representative shall not relieve the General Contractor of any of its responsibilities established under this Contract.

16.1.4 The General Contractor shall review and compare, on a weekly basis, the actual status of the Work against the Construction Schedule. The General Contractor shall discuss, on a weekly basis, the status of the Work with the Representative.

16.1.5 The General Contractor shall periodically, but no less frequently than once per month prepare a revised Construction Schedule, showing actual progress of the Work through the revision date, projected completion of each remaining activity, activities modified since previous submittal, major changes in scope, and other identifiable changes. In addition, a revised Construction Schedule shall be prepared by the General Contractor whenever the General Contractor anticipates that performance of the Work will be delayed or in fact has been delayed.

16.1.6 The General Contractor, in submitting its bid, acknowledges that it has taken into consideration normal weather conditions. To be counted as an adverse weather delay day, adverse weather must prevent work on critical activities for fifty percent (50%) or more of

a scheduled work day. The General Contractor shall submit to the Representative a written adverse weather report for each calendar month, to be submitted to the Representative within five (5) calendar days following the last day of the reporting month being reported. Failure to submit the required written report within the time specified shall constitute a waiver by the General Contractor of any and all claims for delay due to adverse weather conditions occurring during the month for which the report was required to be submitted.

16.1.7 The time established by the Contract Documents for Substantial Completion must be used in all schedules as the date on which Substantial Completion will be achieved. Extensions of time, damages for delay, and all other matters between the County and the Contractor will be determined using the contractually required Substantial Completion date.

16.2 Delay In Performance: If at any time the General Contractor anticipates that performance of the Work will be delayed or in fact has been delayed, the General Contractor shall:

(i) immediately notify the designated Representative of the probable cause of and effect from the delay, and possible alternatives to minimize the delay; and

ii) take all corrective actions reasonably necessary to deliver the Work by the required dates of Substantial Completion and Final Completion, and other milestone dates established by this Contract.

16.3 Modifications to Time For Performance: The General Contractor shall determine and promptly notify the County in writing when it believes adjustments to the required dates of Substantial Completion or Final Completion, or other milestone dates established by this Contract, are necessary. No such adjustments shall be effective unless approved in writing by the County.

(i) If the General Contractor wishes to make a claim for an increase in the time for performance, written notice shall be given to the County. The General Contractor's claim shall include an estimate of cost and of probable effect of delay on progress of the Work.

(ii) If adverse weather conditions are the basis for a claim for additional time, such claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, and that the weather conditions could not have been reasonably anticipated and had an adverse effect on the scheduled construction (e.g., that adverse weather conditions persisted for a time period exceeding the Contract Allowance for adverse weather days, etc.). All of the evidence and data supporting the request (including both historical data and the recordings at the Site during the time of the delay) must be furnished to the County before any consideration will be given to the request. Any requested extension must be supported by a delay in completion of the entire Project shown on the critical path of the accepted Schedule required by the Project. A request for extension of time based on abnormal weather, including all required supporting data, must be submitted to the County in writing **within five (5) calendar days** of the completion of the calendar month during which abnormal weather is claimed at the Site.

16.4 Early Completion: General Contractor may attempt to achieve Substantial Completion on or before the required date of Substantial Completion. However, such planned early completion shall be for the General Contractor's sole convenience and shall not create any additional General Contractor rights or County obligations under this Contract For Construction, nor shall such early completion unilaterally change the required dates of Substantial Completion or Final Completion. The County shall not pay the General Contractor

any additional compensation for achieving Substantial Completion or Final Completion prior to the required dates nor will the County owe the General Contractor any compensation, should the County cause the General Contractor not to achieve, or should the County decline to accept, Substantial Completion or Final Completion earlier than the dates established by this Contract.

16.5 Modification Dates of Substantial Completion or Final Completion: The General Contractor may propose modifications to the required dates of Substantial Completion or Final Completion. The County may (in its sole discretion), but is not required to accept General Contractor's proposal. Modification(s) of the required dates of Substantial Completion or Final Completion shall be accomplished only by duly authorized and accepted written change order(s) stating the new date(s) and reciting that all references in this Contract For Construction to the required dates of Substantial Completion or Final Completion shall thereafter refer to the date(s) as modified, and all rights and obligations, including the General Contractor's liability for actual damages, delay damages and liquidated damages, shall be determined in relation to the dates, as modified.

16.6 Document Review: The General Contractor shall provide documents to the County for review in accordance with schedule requirements and with sufficient lead time to allow the County reasonable time for review.

ARTICLE 17
LIQUIDATED DAMAGES

17.1 Time Is of The Essence: The parties hereto mutually understand and agree that time is of the essence in the performance of this Contract For Construction and that the County will incur damages if the General Contractor's scope of the Work is not completed in accordance with the required dates of Substantial Completion and Final Completion. The General Contractor shall at all times carry out its duties and responsibilities as expeditiously as possible and shall begin, perform and complete its services so that:

(i) the Work progresses in accordance with the Construction Schedule;

(ii) the Work is substantially completed by the required date of Substantial Completion; and

(iii) the Work is finally complete by the date of Final Completion.

17.2 Failure to Timely Achieve Completion: The parties hereto mutually understand and agree that the County will sustain substantial monetary and other damages in the event of a failure or delay by the General Contractor in the completion of its scope of the Work. If the General Contractor inexcusably fails to achieve Substantial Completion by the date established by this Contract, then the General Contractor shall pay to the County, as liquidated damages for delay and not as a penalty, the daily amount of $1000.00 for each and every day after the required date of Substantial Completion until actual Substantial Completion. This liquidated damages provision shall apply and remain in full force and effect in the event that General Contractor is terminated by County for default and shall apply until Substantial Completion has been achieved by any other contractor(s) hired to complete the Work. If the General Contractor fails to achieve Final Completion by the required date of Final Completion established in this Contract, the General Contractor shall pay to the County, as liquidated damages for delay and not as a penalty, the daily amount specified in this Contract for Construction, for each and every day after the required date of Final Completion until actual Final Completion.

17.3 Compensable or Excusable Delays:
(i) If the General Contractor is delayed at any time in the progress or performance of its scope of the Work by:
(a) acts or omissions of the County;
(b) major changes ordered by the County in the Scope of Work; or
(c) any other cause which the County determines may justify the compensation of the General Contractor for the delay (individually and together referred to as "Compensable Delays"), then the General Contractor's compensation shall be equitably adjusted to cover the General Contractor's actual and direct increased costs attributable to such Compensable Delay.
(ii) If the General Contractor is delayed at any time in the progress or performance of its scope of the Work by:
(a) acts or omissions of the County;
(b) major changes ordered by the County in the Scope of Work;
(c) fire;
(d) unusual delays in transportation;
(e) adverse unusual weather conditions not reasonably anticipated by the General Contractor;
(f) unavoidable casualties;
(g) causes beyond the General Contractor's control which the County agrees in writing are justifiable; or
(h) any other cause which the County determines may justify the delay (individually and together referred to as "Excusable Delay"), then the Construction Schedule shall be extended for a period equal to the length of such Excusable Delay, but only if:
(1) immediately, but not later than seven (7) calendar days after the beginning of any such Excusable Delay, the General Contractor gives notice of its delay claim to the County;
(2) the delay is not in any way caused by default or collusion on the part of the General Contractor, or by any cause which the General Contractor could reasonably control or circumvent; and
(3) the General Contractor would have otherwise been able to timely perform all of its obligation under this Contract, but for such delay.
(iii) Any delay which does not qualify as a Compensable Delay or Excusable Delay under this Contract shall be deemed and designated an "Unexcused Delay."
(iii) Delay caused by labor disputes, picketing, employee boycotts, or the like, which directly or indirectly involves employees of the General Contractor, or its subcontractors and suppliers, is not the responsibility of the County and will result in time extensions only if agreed to in writing by the County, at its sole discretion, at the time such events arise. The General Contractor shall notify the County in writing of any delay it attributes to labor disputes, picketing, employee boycotts, or the like, which directly or indirectly involves employees of the General Contractor, or its subcontractors and suppliers, immediately upon becoming aware thereof.
17.4 County's Right to Withhold Payment: When it reasonably believes:
(i) that Substantial Completion will be inexcusably delayed; or
(ii) that the General Contractor will inexcusably fail to achieve Final Completion by the date of Final Completion, the County shall be entitled, but not required, to withhold from any

amounts otherwise due the General Contractor the daily amount specified as and for liquidated damages for each calendar day of the unexcused delay. If and when the General Contractor overcomes the delay in timely achieving Substantial Completion or Final Completion, or any part thereof, for which the County has withheld payment, the County shall promptly release to the General Contractor those funds withheld, but no longer applicable, as liquidated damages;

ARTICLE 18
CONCEALED AND UNFORESEEN CONDITIONS
18.1 Notification Regarding Unusual Conditions: If
(i) the General Contractor encounters concealed and unforeseen conditions, of an unusual nature, which affect the performance of the Scope of Work; or
(ii) the site conditions vary from those indicated by the Construction Documents; and,
(iii) such conditions are not ordinarily found to exist or differ materially from those generally recognized as inherent in work of the character provided by the General Contractor, the General Contractor shall promptly, but in no event later than three (3) calendar days after first observance of such conditions, notify the Representative and the County before conditions are disturbed, to give the County an opportunity to observe the condition in its undisturbed state.
18.1.1 The conditions will be promptly investigated and, if they differ substantially and cause a material increase or decrease in the General Contractor's cost of, or time required for, performance of its scope of the Work, the General Contractor's compensation or time for performance or both will be equitably adjusted.
18.1.2 All adjustments in compensation or extensions of time attributable to unforeseen site conditions shall be by change order. Change order requests must made within fourteen (14) calendar days from the date of observation of the changed conditions.
18.1.3 The General Contractor's failure to notify the County as required by this Article shall constitute a waiver of any claims, of any nature whatsoever, arising out of or relating to such concealed or unknown condition.

ARTICLE 19
GENERAL CONTRACTOR'S RECORDS
19.1 Preparation of Records: The General Contractor shall, concurrently with performance of its services, prepare written records substantiating and documenting all services rendered, construction performed and all goods furnished.
19.2 Retention of Records: Except as otherwise specifically provided in this Construction Contract, the General Contractor shall keep and retain records performing to this Project, including, without limitation, copies of all specifications, submittals, correspondence, minutes, memoranda, tape recordings, videos, accounting records, documents reflecting the unit price of construction and other writings, electronic messages, transmissions or recordings, and other items which document the Project, its design, and its construction. The General Contractor shall maintain all such records for a period of three (3) years after the date of Final Completion, or for any longer period of time as may be required by law or good construction practice. If the General Contractor receives notification of a dispute or the commencement of litigation regarding the Project within this five (5) year period, the

General Contractor shall continue to maintain all Project records until final resolution of the dispute or litigation.

19.3 Access to Records: Upon the request of the County, the General Contractor shall make its records available to the County (including, without limitation, the County's authorized or designated representatives), and to the representatives or agents of any state, federal or other regulatory authority requesting such records, during normal business hours. The County, as well as any state, federal or other regulatory authority, shall have the right to inspect, examine, review and copy the General Contractor's records at the copying party's reasonable expense. Failure by the General Contractor to keep or provide access to records required by this Contract shall be reason to exclude the related costs from amounts which might otherwise be payable by the County to the General Contractor under this Contract.

ARTICLE 20
PROPRIETARY DOCUMENTS AND CONFIDENTIALITY

20.1 Nature and Use of Information: All information, documents, and electronic media furnished by the County to the General Contractor
(i) belong to the County;
(ii) are proprietary records of the County;
(iii) are furnished solely for use on the Project;
(iv) shall be kept confidential by the General Contractor; and
(v) shall not be used by the General Contractor on any other project or in connection with any other person or entity, unless disclosure or use thereof in connection with any matter other than services rendered to the County hereunder is specifically authorized in writing by the County in advance.

20.1.1 The County hereby grants to the General Contractor a limited license to use and reproduce applicable portions of the Construction Documents necessary for execution of the Scope of Work. All copies made under this license shall bear the statutory copyright notice, if any, shown on the documents.

20.2 County Ownership of Information: All information, documents, and electronic media prepared by or on behalf of the General Contractor for the Project shall be and remain the sole property of the County free of any retention rights of the General Contractor. The General Contractor hereby grants to the County an unconditional right to use, for any purpose whatsoever, any information, documents or electronic media prepared by or on behalf of the General Contractor for the Project, free of any copyright claims, trade secret rights or other proprietary rights with respect to such documents.

20.3 Disclosure of Information: The General Contractor shall not disclose any information it receives from the County to any other person or entity except to the extent necessary to allow it to perform its duties under this Contract For Construction.

20.4 Instructions to Employees: Because it is difficult to separate proprietary and confidential information from that which is not, the General Contractor shall instruct its employees and agents to regard all information which is not in the public domain as proprietary and confidential.

20.5 Non-Publication: Submission or distribution of documents to meet official regulatory requirements or for other required purposes in connection with the Project is not to be

construed as publication in derogation of the County's common law copyrights or other reserved rights.

ARTICLE 21
GENERAL INSURANCE REQUIREMENTS

21.1 General Insurance Requirements: Unless otherwise required, each required Insurance policy:
(i) shall be issued by an insurance carrier authorized to do business within the Commonwealth of Virginia, and otherwise acceptable to the County;
(ii) shall be kept in force throughout performance of the General Contractor's services and for three (3) years after the end of such performance;
(iii) shall be an occurrence policy;
(iv) shall be evidenced by a certificate of insurance acceptable to the County which provides that the coverage evidenced thereby shall not be substantially modified or canceled without prior written notice to the County; and
(v) shall be endorsed to name the County and its officials, officers, and employees and agents as "additional insured."

21.2 Certificates Of Insurance: Prior to performance of any services on the Project, the General Contractor shall:
(i) have all required insurance coverage in effect; and
(ii) deliver to the County certificates of insurance, or other documentation satisfactory to the County in its sole discretion, evidencing the required insurance coverage. Upon the request of the County, the General Contractor shall promptly deliver to the County certificates of insurance and/or copies of policies and endorsements for all Required Insurance coverage. The General Contractor shall require each of its subcontractors and suppliers to have similar coverage in effect, prior to the performance of any services by such subcontractors and suppliers.

21.2.1 Further, the General Contractor shall ensure that all required Insurance coverages of its subcontractors and suppliers is and remains in effect during performance of their services on the Project. The County shall have no responsibility to verify compliance by the General Contractor or its subcontractors and suppliers.

21.3 Effect of Insurance: Compliance with insurance requirements shall not relieve the General Contractor of any responsibility to indemnify the County for any liability to the County, as specified in any other provision of this Contract For Construction, and the County shall be entitled to pursue any remedy in law or equity if the General Contractor fails to comply with the contractual provisions of this Contract For Construction. Indemnity obligations specified elsewhere in this Contract shall not be negated or reduced by virtue of any insurance carrier's denial of insurance coverage for the occurrence or event which is the subject matter of the claim, or by any insurance carrier's refusal to defend any named insured.

21.4 Waiver of Subrogation: The General Contractor hereby releases and discharges the County of and from all liability to the General Contractor, and to anyone claiming by, through or under the General Contractor, by subrogation or otherwise, on account of any loss or damage to tools, machinery, equipment or other property, however caused.

ARTICLE 22
GENERAL BOND REQUIREMENTS

22.1 General Bond Requirements: The General Contractor shall be required to provide performance and payment bonds, and the penal sum of each bond shall be in an amount not less than the Contract Price, as adjusted by any change order(s). Each bond shall:
(i) be in a form approved by the County Attorney, be made payable to the County, and be filed with the County;
(ii) incorporate by reference the terms of this Contract For Construction;
(iii) be executed by a company certified by the Secretary of the United States Department of Treasury pursuant to the Act of July 30, 1947 (61 Stat. 646, as amended; 6 U.S.C. 6-13);
(iv) be executed by a company licensed and authorized to do business in the Commonwealth of Virginia;
(v) be accompanied by a power of attorney certifying that the person(s) executing the bond have the authority to do so;
(vi) be, in the case of a performance bond, conditioned upon the faithful performance of the contract in strict conformity with the plans, specifications and conditions of the contract;
(vii) be, in the case of a payment bond, for the protection of claimants who have and fulfill contracts to supply labor or materials to the General Contractor, or to any subcontractors, in the prosecution of the Work which is the subject of this Contract for Construction;
(viii) be, in the case of a payment bond, conditioned upon the prompt payment for all labor or;
(ix) materials supplied to the General Contractor, or to any subcontractors, in the prosecution of the Work which is the subject of this Contract for Construction.

22.2 Delivery of Bonds: The General Contractor shall deliver any required bond(s) and power(s) of attorney to the County prior to commencement of the Work.

22.3 Subcontractor Bonds. Nothing in this Article shall preclude the General Contractor from requiring each subcontractor to furnish a payment bond with surety thereon in the sum of the full amount of the subcontract conditioned upon the payment to all persons who have and fulfill contracts which are directly with the subcontractor for performing labor or furnishing materials as required by the subcontract.

ARTICLE 23
COUNTY'S RIGHT TO STOP WORK

23.1 Cease and Desist Order: If the General Contractor fails to perform, refuses to perform, or fails to correct defective Work as required, or if the General Contractor persistently fails to carry out the Work in accordance with the Contract, the County may, by written notice, order the General Contractor to cease and desist performing the Work until the cause for the order has been eliminated to the satisfaction of the County. Upon receipt of such instruction, the General Contractor shall immediately cease and desist as instructed by the County and shall not proceed further until the cause for the County's order has been corrected, until the cause no longer exists, or until the County instructs the General Contractor in writing to resume performance of the Work.

23.1.1 The General Contractor shall not be entitled to an adjustment in the time for performance, or the Contract Price, as a result of any order to cease and desist, because any such stoppage is considered to be the fault of the General Contractor.

23.1.2 The right of the County to stop the Work shall not give rise to a duty on the part of the County to exercise this right for the benefit of the General Contractor or any other individual or entity.
23.1.3 In the event the County issues instructions to cease and desist, and in the further event that the General Contractor fails and refuses within seven (7) calendar days to provide adequate assurance to the County that the cause of such instructions will be eliminated or corrected, then the County shall have the right, but not the obligation, to carry out the Work or any portion of the Work with its own forces, or with the forces of another contractor, and the General Contractor shall be responsible for the cost incurred by the County to carry out the Work.
23.1.4 The rights set forth herein are in addition to, and without prejudice to, any other rights or remedies the County may have against the General Contractor.

ARTICLE 24
TERMINATION OR SUSPENSION OF CONTRACT FOR CONSTRUCTION
24.1 Termination for Cause By County: The County may terminate this Contract For Construction for cause if the General Contractor breaches this Contract For Construction, through any act or omission, by:
(i) refusing, failing, or being unable to properly manage or perform the Work required for the Project;
(ii) refusing, failing or being unable to maintain applicable schedules, or to supply the Project with sufficient numbers of workers, properly skilled workers, or proper materials;
(iii) refusing, failing or being unable to make prompt payment to subcontractors or suppliers;
(iv) disregarding laws, ordinances, rules, regulations or orders of any public authority or quasi-public authority having jurisdiction over the Site, the Work or the Project;
(v) refusing, failing or being unable to substantially perform in accordance with the terms of this Contract For Construction (including, without limitation, failure to comply with any required insurance provisions), or as otherwise defined elsewhere herein.
(vi) Each of the foregoing items shall be deemed a material breach and default of this Contract.
24.1.1 Upon the occurrence of any of the events described in Paragraph 24.1.1, the County may give notice to the General Contractor setting forth the nature of the default, requesting cure within seven (7) calendar days from the date of notice, and notifying the General Contractor that failure to cure within the 7 day period shall entitle the County to immediately terminate the Contract. At any time thereafter, if the General Contractor fails to initiate the cure and continue to cure the default, the County, without prejudice to any other rights or remedies, may take any or all of the following actions:
(i) complete all or any part of the General Contractor's scope of the Work, including supplying workers, material and equipment which the County deems expedient to complete the General Contractor's scope of the Work;
(ii) contract with other builder(s) to complete all or any part of the General Contractor's scope of the Work, including supplying workers, material and equipment which the County deems expedient to complete the General Contractor's work;
(iii) take such other action as is necessary to correct such failure; and,

(iv) give notice to the General Contractor of immediate termination.
24.1.2 If the County terminates this Contract for cause, the County may also, without prejudice to any other rights and remedies:
(i) take possession of all materials, tools, construction equipment and machinery on the Site owned or leased by the General Contractor;
(ii) directly pay the General Contractor's subcontractors and suppliers any compensation due to them from the General Contractor;
(iii) finish the General Contractor's Work by whatever means the County may deem expedient; and,
(iv) require the General Contractor to assign the General Contractor's right, title and interest in General Contractor's subcontracts or orders to the County.
24.1.3 If the County terminates this Contract for cause and takes possession of materials, tools, construction equipment and machinery on the Site owned or leased by the General Contractor, then the General Contractor's compensation shall be increased by fair payment, either by purchase or rental at the election of the County, for any materials, tools, construction equipment and machinery items retained, subject to the County's right to recover from the General Contractor its damages resulting from the termination of the Contract.
24.1.4 If the County terminates this Contract for cause and a court of competent jurisdiction subsequently determines the termination was without cause, then said termination shall be deemed a termination for convenience as set forth in Paragraph 24.3.
24.2 Termination for Cause By General Contractor:
24.2.1 The General Contractor may terminate this Contract For Construction for cause if the County materially breaches this Contract For Construction by:
(i) refusing, failing or being unable to make payment to the General Contractor in accordance with the requirements of this Construction Contract, without just cause;
(ii) disregarding laws, ordinances, rules, regulations or orders of any Public authority or quasi-public authority having jurisdiction over any Project;
(iii) refusing, failing or being unable to substantially perform in accordance with the terms of this Contract For Construction.
24.2.2 Upon the occurrence of any of the events described in Paragraph 24.2.1, the General Contractor may give notice to the County setting forth the nature of the default and requesting cure within seven (7) calendar days from the date of notice. If the County fails to cure the default the default within seven (7) calendar days, the General Contractor, without prejudice to any rights or remedies, may give notice to the County of immediate termination.
24.3 Termination for Convenience: The County may terminate this Contract for Construction, at any time, for its convenience, upon thirty days' advance written notice to the General Contractor. In the event of such termination the Contractor shall be compensated for services and work performed prior to the effective date of termination.
24.3.1 Upon receipt of written notice from the County of a termination for the County's convenience, the General Contractor shall cease operations as directed by the County in the notice; take any actions necessary, or any actions that the County may direct, for the protection and preservation of the Work; and, except for Work directed to be performed prior to the effective date of termination, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders. In case of a termination

for the County's convenience, the General Contractor shall be entitled to receive payment for Work executed in accordance with the Contract Documents prior to the effective termination date, in accordance with the approved Schedule of Values and Certificate(s) of Payment, and the General Contractor shall also be entitled to receive reasonable compensation for the actual cost of demobilization incurred by the Contractor as a direct result of such termination. The General Contractor shall not be entitled to compensation or damages for lost profits, or for any other type of contractual compensation or damages other than those provided by the preceding sentence. Upon payment of the amounts specified in this paragraph, the County shall have no further obligations to the General Contractor, of any nature whatsoever. In no event shall a termination for the convenience of the County terminate the obligations of the Contractor's surety on its payment or performance bond(s).

24.4 General Contractor's Compensation When General Contractor Terminates For Cause: If this Contract For Construction is (i) terminated by the General Contractor pursuant to Paragraph 24.2 then the County shall pay the General Contractor specified amounts due for Work actually performed prior to the effective termination date. In addition, unless otherwise expressly agreed by the County and the General Contractor in writing, then the County shall pay the following additional amounts to the General Contractor:

(i) reasonable direct costs incurred by the General Contractor in preparation for performance of the terminated portion of its scope of Work, plus a fair and reasonable allowance for costs incurred by the General Contractor in the process of effectuating the termination, and a fair and reasonable allowance for costs of overhead incurred by the General Contractor specifically in contemplation of its performance of the terminated portion of its scope of Work.

(ii) reasonable costs of settling and paying claims arising out of the termination of subcontracts or supplier orders. These costs shall not include amounts paid in accordance with other provisions hereof.

24.5 General Contractor's Compensation When County Terminates For Cause: If this Contract For Construction is terminated by the County for cause, no further payment shall be made to the General Contractor until Final Completion of the Project. Upon Final Completion the General Contractor shall be paid the remainder of the Contract Price less all costs and damages incurred by the County as a result of the default of the General Contractor, including liquidated damages applicable thereto.

24.6 Limitation On Termination Compensation: Regardless of the reason for termination or the party terminating, the total sum paid to the General Contractor shall not exceed the Contract Price, as properly adjusted and reduced by the amount of payments previously made and any penalties or deductions incurred pursuant to any other provision of this Contract, and shall in no event include any duplication of payment(s).

24.7 General Contractor's Responsibility Upon Termination: Regardless of the reason for termination or the party terminating, if this Contract For Construction is terminated, the General Contractor shall, unless notified otherwise by the County,

(i) immediately stop work;

(ii) reduce its staff, services and outstanding Commitments in order to minimize the cost of termination;

(iii) terminate outstanding orders and subcontracts;

(iv) settle the liabilities and claims arising out of the termination of subcontracts and orders; and,
(v)transfer title and deliver to the County such completed or partially completed Work, and, if paid for by the County, materials, equipment, parts, fixtures, information and such contract rights as the General Contractor has.
24.8 Lack of Duty to Terminate: The right to terminate or suspend the Work shall not give rise to a duty on the part of either the County or the General Contractor to exercise that right for the benefit of the County, General Contractor or any other persons or entities.
24.9 Limitation on Termination Claim: If the General Contractor fails to file a claim within sixty (60) days from the effective date of termination, the County shall not be obligated to pay the General Contractor any amount other than that owed to the General Contractor for services actually performed and expenses actually incurred prior to the effective termination date.
24.10 Availability and Appropriation of Funds. Payment and performance obligations of the County, beyond those appropriated in the initial fiscal year of this Contract, are expressly conditioned upon the availability of and appropriation by the County of public funds therefore in each subsequent fiscal year. When public funds are not appropriated or are otherwise unavailable to support continuation of performance by the County in a subsequent fiscal period, this contract and the County's obligations hereunder shall automatically expire, without liability or penalty to the County.

ARTICLE 25
APPLICABLE LAW AND DISPUTE RESOLUTION
25.1 The procedure shall govern all Contractual disputes and claims. All claims whether for money or other relief, shall be submitted in writing no later than sixty (60) days after final payment, however, written notice of the contractor's intention to file a claim must have been given at the time of the occurrence or beginning of the work upon which the claim is based. Nothing herein shall preclude a contract from requiring submission of an invoice for final payment within a certain time after the completion and acceptance of the work or acceptance of the goods. Pendency of claims shall not delay payment of amounts agreed due in the final payment.
(i) Contractual claims shall first be presented to the project officer, or if none, to the purchasing agent.
(ii) Any such claims shall be set forth in writing with the amount and nature of each item separately stated. When no specific liquidated damages fees are allowed by law, the time actually and necessarily devoted to performance under the contract shall be verified by affidavit filed with the claim. The purchasing agent shall render a decision on any such claims within ten (10) business days. Appeals of such decision may be made by the contractor within ten (10) business days to the county administrator by serving a written notice of appeal upon the project officer or purchasing agent, as applicable, and the county administrator.
(iii) The decision of the County Administrator shall be rendered within fifteen (15) business days, and shall be final and conclusive unless the contractor appeals such decision to the Powhatan County Board of Supervisors within thirty (30) days of the date of the decision of

the County Administrator in accordance with the requirements of Sections 15.2-1245 through 15.2-1248 of the Virginia Code.

25.2 Remedies: The remedies available to a vendor on appeal to the County Administrator shall be as provided in Chapter 43 of the Title 2.2 of the Virginia Code (Virginia Public Procurement Act).

25.3 Mutual Discussion: In case of any dispute, claim, question or disagreement arising from or relating to the Project or arising out of this Contract For Construction or the breach thereof, the parties shall first attempt resolution through mutual discussion.

25.4 Arbitration Preclusion: In case of a dispute relating to the Project, or arising out of this Contract For Construction, no party to this Contract For Construction shall be required to participate in or be bound by any arbitration proceedings.

25.5 Legal Actions -- If a vendor seeks judicial review of a final decision of the Appeal or initiates a legal action such appeal or legal action shall be governed by Article 5, Chapter 43of Title 2.2, Section 2.2-4364 of the Virginia Code (Virginia Public Procurement Act).

ARTICLE 26
DAMAGES AND REMEDIES

26.1 General Contractor's Repair: The General Contractor shall, at its expense, promptly correct, repair, or replace all goods, products, materials, systems, labor and services which do not comply with the warranties and guarantees set forth in this Contract For Construction, or any other applicable warranty or guarantee.

26.2 General Contractor's Reimbursement: The General Contractor shall promptly reimburse the County for any expenses or damages incurred by the County as a result of:

(i) the General Contractor's failure to substantially perform in accordance with the terms of this Contract For Construction;

(ii) deficiencies or conflicts in the Construction Documents attributable to the General Contractor or of which the General Contractor was or should have been aware;

(iii) breach of the warranties and guarantees Set forth in this Contract For Construction or any other applicable warranty or guarantee; or

(iv) other acts or omissions of the General Contractor.

26.3 General Indemnity: To the fullest extent permitted by law the General Contractor shall secure, defend, protect, hold harmless, and indemnify the County from and against any and all liability, loss, claims, demands, suits, costs, fees and expenses (including actual fees and expenses of attorneys, expert witnesses, and other consultants), by whomsoever brought or alleged, and regardless of the legal theories upon which premised, including, but not limited to, those actually or allegedly arising out of bodily injury to, or sickness or death of, any person, or property damage or destruction (including loss of use), which may be imposed upon, incurred by or asserted against the County allegedly or actually arising out of or resulting from the General Contractor's services, including without limitation, any breach of contract or negligent act or omission

(i) of the General Contractor; or

(ii) of the General Contractor's subcontractors or suppliers, or

(iii) of the agents, employees or servants of the General Contractor or its subcontractors or suppliers.

26.3.1 To the fullest extent permitted by the law of the Commonwealth of Virginia, the General Contractor, for itself and for its subcontractors and suppliers, and the respective agents, employees and servants of each, expressly waives any and all immunity or damage limitation provisions available to any agent, employee or servant under any workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts, to the extent such statutory or case law would otherwise limit the amount recoverable by the County or the County's Related Parties pursuant to the indemnification provision contained in the paragraph above.

26.4 Royalties, Patents and Copyrights: The General Contractor shall pay all royalties and license fees. To the fullest extent permitted by law, the General Contractor shall defend, protect, hold harmless, and indemnify the County from and against any and all liability, loss, claims, demands, suits, costs, fees and expenses (including actual fees and expenses of attorneys, expert witnesses, and other consultants), by whomsoever brought or alleged, for infringement of patent rights, copyrights, or other intellectual property rights. The General Contractor shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer is expressly required by the Contract Documents or where the copyright or patent violation(s) are contained in drawings, specifications or other documents prepared by the owner or Professional. However, if the General Contractor has reason to believe that a required design, process or product is an infringement of a copyright or patent, the General Contractor shall be responsible for such loss unless such information is promptly given to the County. **26.5 Non-Exclusivity Of County's Remedies:** The County's selection of any one or more remedies allowed by this Contract for breach hereof shall not limit the County's right to invoke any other remedy available to the County at law or by virtue of any other provision of this Contract.

26.6 Waiver Of Damages: The General Contractor shall not be entitled to, and hereby waives, any monetary claims and damages of any nature whatsoever arising from, or related to, any of the following: lost income, lost profits, lost financing, loss of reputation, lost business opportunities, loss of management or employee productivity or of the services of such persons; unabsorbed overhead, and principal office expenses (including, without limitation, the compensation of personnel stationed there, for losses of financing, business and reputation and for loss of profit). Nothing contained in this paragraph shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

26.7 Interest: The County is entitled to interest on all amounts due from the General Contractor that remain unpaid thirty (30) days after the amount is deemed due, whether as a result of a resolution of a dispute or otherwise. Such interest shall be calculated and shall accrue at a rate of one percent (1%) per month.

SECTION IV CONTRACT AGREEMENT

COUNTY OF POWHATAN, VIRGINIA
CONTRACT FOR CONSTRUCTION AND RELATED SERVICES
GENERAL CONTRACTOR'S FIXED PRICE FORM

This Contract for Construction ("Contract") is entered into by and between:

OWNER: The County of Powhatan, Virginia, 3834 Old Buckingham Road, Powhatan, Virginia, 23139,

and

GENERAL CONTRACTOR: _____.

This Construction Contract is executed under seal and shall be effective as of the ___ day of ____, 2017.

PROJECT IDENTIFICATION INFORMATION:
Project Title: IFB# 2017-U1
Project Description: 500,000 Gallon Elevated Water Storage Tank-Powhatan County

ADDRESSES and AUTHORIZED REPRESENTATIVES: The addresses and authorized representatives of the Owner, the General Contractor and any Professional (e.g., Architect or Engineer) working with the Owner in connection with this Contract are as follows:

OWNER:
Representative: Pat Weiler
Mailing Address: 3834 Old Buckingham Road, Powhatan, Virginia, 23139
Telephone: 804-598- 5612
E-mail: pweiler@powhatanva.gov

Representative: Ramona Carter
Mailing Address: 3834 Old Buckingham Road, Powhatan, Virginia 23139
Telephone: 804- 598-5764
E-mail: rcarter@powhatanva.gov

Representative: Mark Piper
Mailing Address: 3834 Old Buckingham Road, Powhatan, Virginia, 23139
Telephone: 804-598-5697
E-mail: mpiper@powhatanva.gov

GENERAL CONTRACTOR:
Representative:
Mailing Address:
Telephone:
Facsimile:
E-mail:

General Contractor's License No:

SCC #:

RECITALS

WHEREAS, the Owner intends to construct the Project and is engaging the General Contractor to perform certain labor, supervision and services and to provide certain equipment, goods and materials for the Project; and
WHEREAS, the Owner and General Contractor each acknowledges that it will act in good faith in carrying out its duties and obligations; and
WHEREAS, the Owner's engagement of the General Contractor is based upon the General Contractor's representations to the Owner that it: (i) is experienced in the type of labor and services the Owner is engaging the General Contractor to perform; (ii) is authorized and licensed to perform the type of labor and services for which it is being engaged within the County to perform; (iii) is qualified, willing and able to perform labor and services for the Project; and (iv) has the expertise and ability to provide labor and services which will meet the Owner's objectives and requirements, and which will comply with the requirements of all governmental, public and quasi-public authorities and agencies having or asserting jurisdiction over the Project; and
WHEREAS, the Owner and General Contractor each acknowledges that it has reviewed and familiarized itself with this Contract, including the documents enumerated in Section 1, and agrees to be bound by the terms and conditions contained therein.
NOW, THEREFORE, for good and valuable consideration, the parties agree as follows:

SECTION ONE: GENERAL CONTRACTOR'S SCOPE OF WORK

A. The General Contractor shall furnish or cause to be furnished, and shall pay for out of the Contract Price: all management, supervision, financing, goods, products, materials, equipment, systems, labor, services, permits, licenses, construction machinery, transportation and other facilities necessary for proper execution and completion of the Work, in accordance with all of the terms and conditions of this Contract.
B. The general nature of the Work the General Contractor is to complete may briefly be described as follows: furnish all labor, materials, tools, equipment and services for the complete the roads and ditches of Monastery Subdivisions.

SECTION TWO: THE CONTRACT DOCUMENTS

A. This Contract between the parties is comprised of the following documents:
1. The original Invitation for Bid #2017-U1, dated March 2017 and all addenda thereto;
2. This Contract and all attached documents and appendices;
3. The General Terms and Conditions for Construction Contracts for the County of Powhatan, Virginia, incorporated herein by reference;
4. Drawings dated December, 2016 and post-contract modifications thereto, if any, included within the Owner's Invitation for Bids;
5. The bid and all required documents in response to the Invitation to Bid submitted by the General Contractor and the lawful and valid modifications thereto, if any; and
6. Any amendments or modifications executed by the Owner and General Contractor hereafter.
B. Documents not included or expressly contemplated or incorporated by reference in this Section Two do not, and shall not, form any part of this Contract.

SECTION THREE: TIME FOR PERFORMANCE

A. Commencement of Construction. The General Contractor shall commence work upon receipt of Notice to Proceed and substantially complete the project within 30 days.
B. The General Contractor shall, not less than ten (10) business days after execution of this Contract, prepare and submit a Construction Schedule, to the Owner, in accordance with the requirements of the General Terms and Conditions (and any applicable Special Conditions) for this Contract.

SECTION FOUR: PERSONNEL AND CONSULTANTS

A. The General Contractor shall prepare and attach to this Contract a Personnel Chart which lists by name, job category and responsibility the General Contractor's primary employees who will work on the Project. The General Contractor shall promptly inform the Owner in writing of any proposed replacements, the reasons therefore, and the name(s) and qualification(s) of proposed replacement(s). The Owner shall have the right to reject any proposed replacement. Under no circumstances shall the Owner be required to consent to a proposed replacement under circumstances where such replacement would result in an increase in the Contract Price.
B. The General Contractor shall prepare and attach to this Contract a list of the General Contractor's Subcontractors and Suppliers, listing by name and general Project responsibility each subcontractor and supplier who will be utilized by the General Contractor to provide goods or services with respect to the Project. The General Contractor shall not enter into any agreement(s) with any Subcontractor(s) or Supplier(s) to which the Owner raises a reasonable, timely objection. The General Contractor shall promptly inform the Owner in writing of any proposed replacements, the reasons therefore, and the name(s) and qualification(s) of proposed replacement(s). The Owner shall have the right to reject any proposed replacement. Under no circumstances shall the Owner be required to consent to a

proposed replacement under circumstances where such replacement would result in an increase in the Contract Price.
C. The Owner shall prepare and attach to this Contract a list, by name and general Project duties, of each consultant retained by the Owner to provide services with respect to the Project. The Owner reserves the right to engage any other consultants which it may deem necessary or desirable.

SECTION FIVE: RELATION TO OWNER

The General Contractor will be legally considered as an independent contractor and neither the General Contractor nor its employees will, under any circumstances, be considered servants or agents of the Owner. The Owner will not be legally responsible for any negligence or other wrongdoing by the General Contractor, its servants or agents. The Owner will not withhold payments to the General Contractor for any federal or state unemployment taxes, federal or state income taxes, Social Security tax, or any other amounts for benefits to the General Contractor. Further, the Owner will not provide to the General Contractor any insurance coverage or other benefits, including workers' compensation, normally provided by the Owner for its employees.

SECTION SIX: COMPENSATION OF GENERAL CONTRACTOR

A. The Owner shall pay and the General Contractor shall accept, as full and complete payment for the General Contractor's timely and complete performance of its obligations under this Contract the Contact Price of _____ and __ cents ($_____) Dollars subject to additions and deductions as approved by the owner, provided in the specifications or bids. This Contract Price includes the aggregate amount of all allowances and any unit price items to be furnished or installed.
B. Within ten (10) business days after execution of this Contract, the General Contractor shall prepare and present to the Owner the General Contractor's Compensation Schedule, to include a Schedule of Values for payment of the Contract Price.
C. Upon receipt by the Owner of the General Contractor's invoice, properly prepared in accordance with the General Terms and Conditions for this Contract, the Owner shall pay to the General Contractor ninety-five percent (95%) of the total amount approved by the Representative, withholding the balance as retainage, unless there is a dispute about the amount of compensation due the General Contractor.
D. If the General Contractor disputes a change order decision, then the General Contractor must give the Owner its written notice of dispute, including the reasons therefore, following the procedures set forth within the General Terms and Conditions for this Contract.

SECTION SEVEN: SPECIFIC INSURANCE REQUIREMENTS

A. The General Contractor shall purchase and maintain, at its expense, and from a company or companies authorized to do business within the Commonwealth of Virginia, insurance policies containing the following selected types of coverages and minimum limits of liability, protecting from claims which may arise out of or result from the General Contractor's

performance or non-performance of services under this Contract, or the performance or non-performance of services under this Contract by anyone directly or indirectly employed by the General Contractor or for whose acts it may be liable:

i. Comprehensive General Liability, including Premises and Operations; Contractor's Protective Liability; Products Liability including Completed Operations Coverage; and Contractual Liability for this contract:

a. Limits: $1,000,000 per incident / $3,000,000 Total Bodily Injury (including death) $1,000,000 per incident / $3,000,000 Total Property Damage

ii. Comprehensive Automobile Liability, including all Owned Automobiles, Non-Owned Automobiles and Hired Car Coverage:

a. Limits: $1,000,000 per incident / $3,000,000 Total Bodily Injury (including death) $1,000,000 per incident / $3,000,000 Total Property Damage

iii. Employer's Liability for Participants not covered by Workers Compensation Insurance in an amount not less than $100,000.

iv. Builder’s Risk Insurance which includes, without duplication, but is not limited to: fire (with extended coverage), theft, vandalism, malicious mischief, collapse, windstorm, false work, testing and startup, temporary buildings and debris removal, and which provides coverage for one hundred percent (100%) of the General Contractor’s the Work.

vi. General Contractor shall not perform any Work on this Project unless General Contractor has obtained, and continues to maintain for the duration of Work, such Workers’ Compensation coverage as may be required pursuant to the provisions of Chapter 8 (Code Section 65.2-800 et seq.) of Title 65.2 of the Code of Virginia, 1950, as amended. General Contractor shall not allow any subcontractor to perform any work on Project unless the subcontractor has obtained, and continues to maintain for the duration of such work, such Worker’s Compensation coverage as may be required pursuant to the provisions of Chapter 8 (Code Section 65.2-800 et seq.) of Title 65.2 of the Code of Virginia, 1950, as amended. General Contractor shall include the provisions of this subsection within each of its subcontracts, so as to bind each subcontractor.

A Certificate of Insurance shall be submitted within ten (10) business days after Notice of Intent to Award and included as a part of this Contract.

The General Contractor shall furnish to the Owner a binder adding the Owner as an additional insured on all policies except those pertaining to Workers Compensation and including the following language: “The above described policies shall not be canceled, modified, or amended or coverage reduced without the issuing company providing thirty (30) business days advance written notice to the County of Powhatan.”

Should insurance coverage be changed or cancelled, regardless of the reason, the General Contractor shall furnish evidence of new coverage and submit a new and valid binder evidencing the required insurance. Failure to deliver a new and valid binder will result in suspension of all payments until the new binder is furnished.

All insurance required by this Contract shall be and remain in full force and effect for the life of the Contract.

This Contract shall be binding upon the Owner until the all insurance requirements and policies, required herein have been filed with the Owner (if requested) and all have been approved as to form and sufficiency by the County Attorney.

SECTION EIGHT: SPECIFIC BOND REQUIREMENTS

The General Contractor shall be required to provide payment and performance bonds. The amount of the premiums shall be included in the Contract Price.

SECTION NINE: MISCELLANEOUS

A. NO DISCRIMINATION BY GENERAL CONTRACTOR
During the performance of this Contract, the General Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, disability or any other basis prohibited by law relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of the contractor. The General Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause. Also, the General Contractor, in all solicitations or advertisements for employees placed by or on behalf of the contractor, will state that it is an equal opportunity employer.
B. MODIFICATION OF CONTRACT
1. This Contract may be supplemented, modified, or amended by the mutual agreement of the parties hereto, set forth in writing. No supplement, modification or amendment shall be enforceable unless set forth within a writing signed by both the Owner and the General Contractor.
2. Notwithstanding the foregoing, this Contract may not be increased by more than twenty-five percent (25%) of the amount of the contract or $50,000, whichever is greater, without the advance approval of the County Board of Supervisors. In no event may the amount of any County contract, without adequate consideration, be increased for any purpose, including, but not limited to, relief of a bidder from the consequences of an error in its bid.
C. DRUG-FREE WORKPLACE
During the performance of this Contract the General Contractor agrees as follows: (i) to provide a drug-free workplace for its employees; (ii) to post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the General Contractor's workplace and specifying

the actions that will be taken against employees for violations of such prohibition; and (iii) state in all solicitations or advertisements for employees placed by or on behalf of the contractor that the contractor maintains a drug-free workplace; and (iv) include the provisions of the subsection in every subcontract or purchase order of over $10,000, so that the provisions will be binding upon each subcontractor or vendor. For the purposes of this subsection, "drug-free workplace" means a site for the performance of work done in connection with a specific contract awarded to a contractor, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the contract.

D. PAYMENT OF SUBCONTRACTORS

The General Contractor is obligated to take one (1) of the two (2) following actions within seven (7) business days after receipt of amounts paid to the General Contractor by the Owner for work performed by any subcontractor under this Contract:

(1) Pay the subcontractor for the proportionate share of the total payment received from the Owner attributable to the work performed by the subcontractor under the Contract; or

(2) Notify the Owner and the subcontractor, in writing, of the General Contractor's intention to withhold all or a part of the subcontractor's payment with the reason for nonpayment.

The General Contractor is obligated to provide (i) its social security number if it is an individual or (ii) its federal identification number if it is a proprietorship, partnership, or corporation, in accordance with Section 2.2-4354 of the Code of Virginia. The General Contractor is obligated to pay interest to the subcontractor on all amounts owed by the General Contractor that remain unpaid after seven (7) business days following receipt by the General Contractor of payment from the Owner for work performed by the subcontractor under the Contract, except for amounts withheld as allowed in Subsection (2) above. Unless otherwise provided under the terms of this Contract, interest shall accrue at the rate of one percent (1%) per month. The General Contractor shall include in each of its subcontracts a provision requiring each subcontractor to include or otherwise be subject to the same payment and interest requirements with respect to each lower-tier subcontractor. The General Contractor's obligation to pay an interest charge to a subcontractor pursuant to the above provisions may not be construed to be an obligation of the Owner. A Contract modification shall not be made for the purpose of providing reimbursement for such interest charge. A cost reimbursement claim shall not include any amount for reimbursement for such interest charge.

E. GOVERNING LAW

This Contract and the Work performed hereunder shall be governed in all respects by the laws of the Commonwealth of Virginia and the venue for any litigation with respect thereto shall be in the Circuit Court for Powhatan County, Virginia. The provisions of this subsection shall control over any contrary provisions in the Contract Documents. The General Contractor shall comply with applicable federal, state and local laws and regulations.

F. FORCE MAJEURE

Neither party shall hold the other responsible for damages or delay in performance caused by acts of God, strikes, lockouts, or similar events beyond the control of the other.

G. NO WAIVER OF RIGHTS

No failure on the part of the Owner to enforce any of the terms or conditions set forth in this Contract shall be construed as or deemed to be a waiver of the right to enforce such terms or conditions. No waiver by the Owner of any default or failure to perform by the General Contractor shall be construed as or deemed to be a waiver of any other and/or subsequent default or failure to perform. The acceptance or payment of any rentals, fees and/or charges by the Owner, and/or the performance of all or any part of this Contract by the Owner, for or during any period(s) following a default or failure to perform by the General Contractor, shall not be construed as or deemed to be a waiver by the Owner of any rights hereunder.

H. SEVERABILITY

In the event that any term, provision or condition of this Contract, or the application thereof to any person or circumstances, shall be held by a court of competent jurisdiction to be invalid or unenforceable, the remainder of this Contract, and the application of any term, provision or condition contained herein to any person or circumstances other than those to which it has been held invalid or unenforceable, shall not be affected thereby.

I. NO PERSONAL LIABILITY

Nothing herein shall be construed to create any personal liability on the part of any elected or appointed official, officer, agent or employee of the Owner.

J. ETHICS IN PUBLIC CONTRACTING

This Contract incorporates by reference any state or federal law related to ethics, conflict of interests, or bribery, including by way of illustration and not limitation, the Virginia Conflict of Interests Act, the Virginia Governmental Frauds Act, and Articles 2 and 3 of Chapter 10 of Title 18.2 of the Code of Virginia, as amended. The General Contractor certifies that its offer is made without collusion or fraud and that it has not offered or received any kickbacks or inducements from any other offeror, supplier, manufacturer, or subcontractor in connection with this solicitation, and that it has not conferred on any public employee having official responsibility for this solicitation any payment, loan, subscription, advance, deposit of money, services, or anything of more than nominal value, present or promised unless consideration of substantially equal or greater value was exchanged.

K. IMMIGRATION REFORM AND CONTROL ACT OF 1986

The General Contractor certifies that it does not and will not during the performance of the Contract employ illegal alien workers or otherwise violate the provisions of the federal Immigration Reform and Control Act of 1986.

L. AUTHORIZATION TO TRANSACT BUSINESS IN THE COMMONWEALTH

General Contractor shall be authorized to transact business in the Commonwealth as a domestic or foreign business entity if so required by Title 13.1 or Title 50 or as otherwise required by law. General Contractor shall not allow its existence to lapse or its certificate of authority or registration to transact business in the Commonwealth, if so required under Title 13.1 or Title 50, to be revoked or cancelled at any time during the term of this Contract. The Owner may void this Contract if General Contractor fails to remain in compliance with the provisions of this section.

M. HEADINGS

Section, article, and paragraph headings contained within this Contract have been inserted only as a matter of convenience and for reference, and they in no way define, limit, or describe the scope or intent of any term, condition or provision of this Contract.

N. BINDING EFFECT
The terms, provisions and conditions of this Contract shall bind and inure to the benefit of the respective
parties hereto and to their representatives, successors, and (where permitted by this Contract) their assigns.
O. ENTIRE AGREEMENT
This Contract represents the entire agreement between the parties, and there are no other agreements or understandings between the parties, either verbal or written, which have not been incorporated herein.

IN WITNESS WHEREOF, the parties do hereby set forth their signatures, representing that the individuals who affix their signatures hereto have been duly authorized to bind each party to the terms and conditions of the foregoing Contract:

OWNER:	**GENERAL CONTRACTOR:**
By: _____	By: _____
Print Name: Patricia A. Weiler	Print Name: _____
Title: County Administrator	Title: _____
Date: _____	Date: _____

POWHATAN ELEVATED TANK 500,000 GALLON

TECHNICAL SPECIFICATIONS

TIMMONS GROUP

YOUR VISION ACHIEVED THROUGH OURS.

Site Development | Residential | Infrastructure | Technology

March 4, 2017
Project Number 37385

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SECTION 09 9724 – STEEL WATER STORAGE TANK PAINTING

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Furnish all necessary equipment, labor, materials, and tools to paint the interior and exterior of the water storage tank, including all exposed piping within the tank structure in accordance with the Project Drawings and as specified herein.

1.2 REFERENCES

A. The latest revisions of the following standard specifications shall govern the work with regards to materials, design, construction, inspection, and testing to the extent specified or as indicated in this specification.

1. NSF International

a) ANSI/NSF 61 Drinking Water System Components - Health Effects (current edition)

2. American Water Works Association

a) ANSI/AWWA D102 Standard for Coating Steel Water Storage Tanks, 2014 Edition

3. The Society for Protective Coatings

a) SSPC PA-1 Shop, Field, and Maintenance Painting of Steel, April 1, 2000 Edition (Editorial November 1, 2004)

b) SSPC PA-2 Measurement of Dry Coating Thickness with Magnetic Gages, May 1, 2004 Edition (Editorial September 1, 2009)

c) SSPC SP-6 Commercial Blast Cleaning, January 1, 2007 Edition

d) SSPC SP-7 Brush-Off Blast Cleaning, January 1, 2007 Edition

e) SSPC SP-10 Near-White Blast Cleaning, January 1, 2007 Edition

4. Manufacturer's product data sheets

1.3 SUBMITTALS

A. Paint manufacturer Product Data Sheet and MSDS for each paint product

B. Cleaning and Painting Instruction document with outline of surface preparation, paint system (including dry film thickness) and sterilization procedure.

1.4 QUALITY

A. Meet the requirements of AWWA D102.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the project site in manufacturer's original, unopened containers.

B. Paint Materials shall be stored in an enclosed well-ventilated area in accordance with manufacturer's instructions.

1.6 PROJECT SITE CONDITIONS

A. Containment of the structure is at the discretion of the Contractor. Contractor is responsible for any damage to surrounding structures or property due to airborne paint particles or spent abrasive.

1.7 WARRANTY

A. All work shall be guaranteed by the Contractor for a period of one (1) year from the date of substantial completion against faulty design, defective materials, and faulty workmanship. Substantial completion shall be the date the elevated tank is placed, or available to be placed, in service.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All paint materials are to be from a single manufacturer. Thinners are to be as recommended by the paint manufacturer unless otherwise approved.

B. The paint and paint products specified are manufactured by Tnemec Company or approved equal. Substitutions can be made with written approval by the Engineer if an alternative paint system is presented and specified.

C. All painting and thinning materials shall be in manufacturer's original containers with labels intact. The labels shall show the manufacturer's name, type and color of paint, and the manufacturer's stock and batch number. Only newly purchased paint bought specifically for this project shall be used.

D. All materials shall be stored in an environment and in such a manner as to comply with all of the provisions of manufacturer's product data sheets.

E. Coatings used on potable water bearing surfaces shall be certified to ANSI/NSF 61.

2.2 INTERIOR WET SURFACE PAINT SYSTEM (EXCLUDING DRAFT TUBE INTERIOR SURFACE)

A. Shop Painting

1. Surface Preparation. Remove all oil and grease from the surface before blast cleaning. All surfaces shall be abrasive blast cleaned to a NEAR-WHITE finish in accordance with SSPC SP-10.

2. Shop Primer. Immediately after abrasive blasting and before any rusting occurs, apply one-coat of polyamidoamine epoxy Tnemec Pota-Pox Plus V140-1255 (Beige) or Pota-Pox Plus Fast Cure V140F-1255 (Beige) to a DFT range of 4.0-6.0 mils.

B. Field Painting

1. Surface Preparation. After erection and prior to field touch-up priming, all surfaces shall be cleaned to remove all surface contamination including oil, grease, dust, dirt and foreign matter. Weld slag, weld spatter, and other sharp or rough projections shall be removed. All rusted, abraded and unpainted areas shall be abrasive blast cleaned to a NEAR-WHITE finish in accordance with SSPC SP-10.

2. Field Touch-Up. Spot prime with polyamide epoxy Tnemec Pota-Pox 20-1255 (Beige) or Pota-Pox Fast Cure FC20-1255 (Beige) to a DFT range of 4.0 - 6.0 mils.

3. Field Finish Coat. Apply one-coat of polyamide epoxy Tnemec Pota-Pox 20-15BL (Tank White) or Pota Pox Fast Cure FC20-15BL (Tank White) to a DFT range of 4.0-6.0 mils.

a) The total DFT range of the three-coat paint system is 8.0-12.0 mils.

2.3 DRAFT TUBE INTERIOR SURFACE

A. Shop Painting

1. Surface Preparation. Remove all oil and grease from the surface prior to blast cleaning. All surfaces shall be abrasive blast cleaned to a NEAR-WHITE finish in accordance with SSPC SP-10.

2. Shop Primer. Immediately after abrasive blasting and before any rusting occurs, apply one-coat of polyamidoamine epoxy Tnemec Pota-Pox Plus N140-1255 (Beige) or Pota-Pox Plus Fast Cure N140F-1255 (Beige) to a DFT of 4.0-6.0 mils.

3. Shop Finish Coat. Apply one-coat of polyamidoamine epoxy Tnemec Pota-Pox Plus N140-15BL (Tank White) or Pota-Pox Plus Fast Cure N140F-15BL (Tank White) to a DFT range of 4.0-6.0 mils.

4. The total DFT range of the two-coat system is 8.0-12.0 mils.

2.4 INTERIOR DRY SURFACE PAINT SYSTEM

A. Shop Painting

1. Surface Preparation. Remove all oil and grease from the surface prior to blast cleaning. All surfaces shall be abrasive blast cleaned to a COMMERCIAL finish in accordance with SSPC SP-6.

2. Shop Primer. Immediately after abrasive blasting and before any rusting occurs, apply one-coat of polyamidoamine epoxy Tnemec Pota- Pox Plus V140-1255 (Beige) or Pota-Pox Plus Fast Cure V140F-1255 (Beige)to a DFT of 3.0-5.0 mils.

B. Field Painting

1. Surface Preparation. After erection and prior to field touch-up priming, all surfaces shall be cleaned to remove all surface contamination including oil, grease, dust, dirt and foreign matter. Weld slag, weld spatter, and other sharp or rough projections shall be removed. All rusted, abraded and unpainted areas shall be abrasive blast cleaned to a COMMERCIAL finish in accordance with SSPC SP-6.

2. Field Touch-Up. Spot prime with polyamide epoxy Tnemec Pota-Pox 20-1255 (Beige) Pota-Pox Fast Cure FC20-1255 (Beige) to a DFT range of 3.0-5.0 mils.

3. Field Finish Coat. Apply one-coat of polyamine epoxy Tnemec Pota-Pox 20-15BL (Tank White) or Pota-Pox Fast Cure FC20-15BL (Tank White) to a DFT range of 3.0-5.0 mils.

4. The total DFT range of the two-coat paint system is 6.0-10.0

2.5 EXTERIOR PAINT SYSTEM

A. Shop Painting

1. Surface Preparation. Remove all oil and grease from the surface prior to blast cleaning. All surfaces shall be abrasive blast cleaned to a COMMERCIAL finish in accordance with SSPC SP-6.

2. Shop Primer. Immediately after abrasive blasting and before any rusting occurs, apply one-coat of zinc-rich urethane Tnemec Hydro-Zinc 94-H20 (Greenish-Gray) to a DFT of 2.5-3.5 mils.

B. Field Painting

1. Surface Preparation. After erection and prior to field touch-up priming, all surfaces shall be cleaned to remove all surface contamination including oil, grease, dust, dirt and foreign matter. Weld slag, weld spatter, and other sharp or rough projections shall be removed. All rusted, abraded and unpainted areas shall be abrasive blast cleaned to a COMMERCIAL finish in accordance with SSPC SP-6.

2. Field Touch-Up. Spot prime with zinc-rich urethane Tnemec Hydro-Zinc 94-H20 (Greenish-Gray) or Hydro-Zinc 91-H20 (Greenish-Gray) to a DFT range of 2.5-3.5 mils.

3. Field Intermediate Coat. Apply one complete coat of polyamidoamine epoxy Tnemec HB Epoxoline II Series N69 or Series HB Epoxoline II Fast Cure Series N69F to a DFT range of 2.0-3.0 mils. The color shall be of slight contrast with the finish coat color.

4. Field Finish Coat. Apply one complete coat of alphatic acrylic polyurethane Tnemec Endura-Shield Series 73 to a DFT range of 2.0-3.0 mils. The Owner shall select finish color.

5. The total DFT range of the three-coat paint system is 6.5-9.5 mils.

2.6 SEALANT

A. Sika-Flex 1a elastomeric sealant shall be applied after the finish coat to the exterior shell to cone junction.

PART 3 - EXECUTION

3.1 APPLICATION CONDITIONS

A. Adhere to all ambient temperature and surface temperature restrictions described in the paint manufacturer's product data sheets.

B. No paint shall be applied when the temperature of the surface to be painted is below the minimum specified by the paint manufacturer.

C. No paint shall be applied to wet, damp or frost coated surfaces or when the relative humidity exceeds 85%.

3.2 MIXING AND THINNING

A. Paint shall be thoroughly mixed in the proportions stated in the manufacturer's product data sheets. The pot life of the mixed materials shall not exceed the manufacturer's recommendations.

B. Paint shall be factory mixed to proper consistency and viscosity for application without thinning. In no case shall the wet film thickness of applied paint be reduced, by the addition of thinner or otherwise, below the thickness recommended by the paint manufacturer.

3.3 SURFACE PREPARATION

A. All surfaces must be dry and free from dirt, dust, sand, mud, oil, grease, rust, and mill scale before applying paint to the surface.

B. All steel surfaces shall be prepared for painting by abrasive blast cleaning as defined in the PRODUCTS section of this specification.

C. All steel surfaces cleaned on a particular day shall be painted within the same day and before evidence of rusting or discoloration. Any abrasive blast cleaned surfaces that develop rusting due to climatic conditions or prolong exposure shall be re-blasted prior to painting.

D. All interior wet surfaces that have been prime coated in the shop shall be brush-off blast cleaned in accordance with SSPC SP-7 prior to receiving any field applied paint.

3.4 PAINT APPLICATION

A. Paint shall be applied in a neat manner with finish surfaces free of runs, sags, ridges, heavy laps, and brush marks.

B. Prior to applying the first field spray coat to the interior wet area, all weld seams, rough areas, bolt heads, bold threads, nuts, corners, and difficult to coat areas, shall be stripe coated. Striping shall be by either brush or roller using a 5% thinned primer material.

3.5 CURING AND VENTILATION

A. Adhere to all curing provisions of the paint manufacturer's product data sheets. No paint shall be applied over paint that has not had sufficient time to properly cure.

B. The interior of the tank shall be ventilated during painting and drying periods using fans or air compressors of sufficient number and size in relation to the tank size. During drying periods, the hatches at the top and bottom of the tank shall remain open.

3.6 INSPECTION TESTING AND RECORDS

A. In the event the owner elects to conduct inspections of the tank painting, the paint subcontractor shall provide the owner or his representative reasonable access to the various areas for inspection. The owner is to be notified 24 hours prior to blasting or painting.

B. The painting subcontractor shall take and record dry film thickness readings on each coat of paint. Dry film thickness (DFT) shall be measured in accordance with SSPC PA-2.

C. The painting subcontractor shall prepare a daily record of ambient air temperatures, surface temperatures on surfaces to be worked on, and relative humidity readings. The record shall also indicate any general weather conditions for the day. All data is to be recorded at the following times:

1. The beginning of the workday.
2. The time blasting or painting is started, and a minimum of every four hours thereafter.
3. The completion of work each day.

D. The paint manufacturer shall visit the site to confirm that the paint is being properly prepared and applied to the tank surface.

E. A one-year anniversary inspection in accordance with AWWA D102 is required for this project.

END OF SECTION 09 9724

SECTION 22 0700 – MECHANICAL INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Piping insulation, jackets and accessories.

B. Equipment insulation, and covering.

1.2 SUBMITTALS

A. Product Data: Provide product description, list of materials and thickness for each service or equipment scheduled, locations, and manufacturer's installation instructions.

1.3 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

1.4 QUALITY ASSURANCE

A. Insulation Materials: Insulation materials must be manufactured at facilities certified and registered with an approved registrar to conform to ISO 9000 Quality Standard.

1.5 DELIVERY AND STORAGE OF MATERIALS

A. Deliver all materials to the job site and protect the insulation against dirt, water, chemical and mechanical damage before, during and after installation. Do not install damaged insulation and remove it from the job site.

B. Deliver insulation, coverings, cements, adhesives coatings etc. to the site in factory-fabricated containers with the manufacturer's stamp or label affixed showing fire hazard ratings of the products, name of manufacturer and brand.

C. Installed insulation which has not been weatherproofed shall be protected from inclement weather by an approved waterproof sheeting installed by the Contractor. Any water-damaged insulation shall be removed and replaced by the Contractor at no additional cost.

PART 2 - PRODUCTS

2.1 PIPE INSULATIONS

A. Manufacturers: Johns Manville or approved equal.

B. Glass Fiber: Micro-Lok meeting ASTM C 547, Type I; rigid molded, noncombustible.

1. 'K' ('ksi') Value: 0.23 at 75°F Mean Temperature (0.033 at 24°C).

2. Maximum Service Temperature: 0°F to 850°F (-18°C to 454°C).

3. Vapor Retarder Jacket: AP-T PLUS White kraft paper reinforced with glass fiber yarn and bonded to aluminum foil, secure with self sealing longitudinal laps and butt strips or AP Jacket with outward clinch expanding staples coated with vapor barrier mastic as needed.

C. Field Applied Jackets

1. PVC Plastic: Zeston 2000. One piece molded type fitting covers and jacketing material, gloss white.

a) Connections: Tacks; Pressure sensitive color matching vinyl tape.

2. Canvas Jacket: UL listed fabric, 6 oz/sq yd (220 g/sq m), plain weave cotton treated with dilute fire retardant lagging adhesive.
3. Aluminum Jacket: 0.016 inch (0.045 mm) thick sheet, (smooth / embossed) finish, with longitudinal slip joints and 2 inch (50 mm) laps, die shaped fitting covers with factory applied moisture barrier.
4. Stainless Steel Jacket: Type 304 stainless steel, 0.010 inch (0.25mm), and (smooth/corrugated) finish.

2.2 EQUIPMENT INSULATION

A. Manufacturers: Johns Manville or approved equal.

B. Flexible Fiber Glass Blanket: 812 Spin-Glas meeting ASTM C 553, Type III; flexible.

1. 'K' ('ksi') Value: 0.24 at 75°F Mean Temperature (0.035 at 24°C).
2. Maximum Service Temperature: 450OF (232°C).
3. Density: 1.5 lb/cu ft (24 kg/cu m) density.
4. Vapor Retarder Jacket: Aluminum foil reinforced with fiber glass yarn and laminated to fire-resistant kraft shall be secured with UL listed pressure sensitive tape and/or outward clinch expanding staples and vapor barrier mastic as needed.

C. Rigid Fiber Glass Board: 814 Spin-Glas meeting ASTM C 612, Type IA & IB; rigid.

1. 'K' ('ksi') Value : 0.23 at 75°F Mean Temperature (0.033 at 24°C).
2. Maximum Service Temperature: 450°F (232°C)
3. Density: 3.0 lb/cu ft (48 kg/cu m) density.
4. Vapor Retarder Jacket: Aluminum foil reinforced with fiber glass yarn and laminated to fire-resistant kraft shall be secured with UL listed pressure sensitive tape and/or outward clinch expanding staples and vapor barrier mastic as needed.
5. Facing: 1 inch (25 mm) galvanized hexagonal wire mesh stitched on one face of insulation.

2.3 HEAT TRACING

A. Heat tracing shall be as specified on the drawings.

B. Thermostat shall be a Chromalox model RTAS or approved equal. Unit shall be rated for 22 amps and mounted in a NEMA 4X box.

C. A Chromalox splice and tee kit with signal light model RTST-SL or approved equal shall be installed on the end of the heat trace wire to indicate operation.

D. All components shall be from one manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Verify that all surfaces are clean, dry and free of foreign material.

3.2 INSTALLATION

A. Install materials in accordance with manufacturer's recommendations, building codes and industry standards.

B. Continue insulation vapor barrier through penetrations except where prohibited by code.

C. Piping Insulation

1. Locate insulation and cover seams in least visible locations.

2. Neatly finish insulation at supports, protrusions, and interruptions.
3. Provide insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature with vapor retardant jackets with self sealing laps. Insulate complete system.
4. For pipe exposed in mechanical equipment rooms or in finished spaces below 10 feet (3 meters) above finished floor, finish with Zeston 2000 PVC jacket and fitting covers or aluminum jacket.
5. For exterior applications, provide weather protection jacket or coating such as Insulkote or Foster 35-00 or equal. Insulated pipe, fittings, joints, and valves may be covered with aluminum jacket. Jacket seams shall be located on the bottom side of horizontal piping.

D. Equipment Insulation:

1. Apply insulation as close as possible to equipment by grooving, scoring, and bevelling insulation, if necessary. As required, secure insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
2. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retardant cement.
3. Provide insulated dual temperature equipment or cold equipment containing fluids below ambient temperature with vapor retardant jackets.
4. Cover insulation with aluminum jacket, or with metal mesh and finish with heavy coat of insulating cement or mastic (such as Foster 35-00).
5. For equipment in mechanical equipment rooms or in finished spaces, finish with Zeston 2000 jacketing and fitting covers or aluminum jacketing.
6. Do not insulate over nameplate or ASME stamps. Bevel and seal insulation around such.
7. When equipment with insulation requires periodic opening for maintenance, repair, or cleaning, install insulation in such a manner that it can be easily removed and replaced without damage.

3.3 HEAT TRACING

A. Install as per manufacturer's instructions.

END OF SECTION 22 0700

SECTION 22 1113 – PIPE VALVES AND FITTINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section includes the requirements for furnishing all labor, materials, equipment and appurtenances necessary for the complete and satisfactory installation of all piping systems within and under the pumping station structure, as shown on the Drawings and as required for a complete installation as specified.

1.2 SHOP DRAWINGS

A. Shop drawings shall be submitted for items specified herein:

B. Dimensioned layout and descriptive literature of all piping systems shall be submitted. All piping layout drawings shall be two line drawings accompanied by a bill of materials. Single line piping drawings are not acceptable.

C. Submit list of materials to be furnished, including all manufacturer's data, drawings, weight of each item, list of recommended spare parts, descriptive literature for each item, the names of the suppliers, and the date of delivery of materials on the job site.

D. Shop drawings and descriptive literature for pipe hangers and supports, mechanical couplings, pipe wall sleeves, wall pipes, and pipe plates.

E. Manufacturer's drawings and catalog cuts for the valve, which indicate dimensions, performance, materials of construction and all other items of information specified herein.

F. Manufacturer's drawings showing a complete cut-away view of the valve and operator, clearly identifying all component parts. Show intended orientation of the valve and its operator and clearly identify the location at which the valve is to be installed.

G. Minimum and maximum input torque over the operating range of the valve.

H. Wiring diagrams for all electrical items.

I. Submit Operation and Maintenance Manuals for all specified items.

1.3 GENERAL NOTES

A. Refer to Chesterfield County Department of Public Utilities Water and Sewer Specifications for appurtenances not specified herein.

B. Miscellaneous piping systems which may not be described specifically by any section of these Specifications shall be of the type of pipe and fittings as directed by the Engineer or as shown on the Drawings.

C. The Contractor shall verify all dimensions of special castings and fittings, pipe equipment, etc., so that all of the pipe work performed will fit together properly and will conform to the arrangement as shown on the Drawings. In selecting laying lengths of fittings, the Contractor shall be guided by the dimensions of equipment to which connections are made and by the indicated dimensions on the Drawings. All pipe and specials shall be accurate to the dimensions shown. Hubs, spigots, and flanges shall be at right angles to the axis of the opening, and openings shall be at the exact angle specified.

D. It is to be noted that in the relatively small piping systems, the Drawings do not necessarily show all fittings, offsets, unions, hangers, supports, etc. All such items shall be furnished and installed, however, as required for complete and satisfactory installation of the equipment shown.

E. All exposed interior ductile iron or steel pipe, fittings and exposed cast iron specials, shall be painted. The Contractor may furnish pipe and fittings with the cast iron pipe industry's standard exterior bituminous coating, or uncoated pipe and fittings, or pipe and fittings with a shop prime coat of paint. In any case, it shall be the Contractor's responsibility to provide a satisfactory final field finish painting job. Sealer coats (on bituminous

coated surfaces), thorough field cleaning (of uncoated surfaces), or shop primer which is compatible with field coats, shall be provided as required.

F. Where eccentric reducers are indicated to be used, the reducer shall be installed with its straight side at the top of the piping system, unless otherwise noted on the Drawings.

1.4 GENERAL NOTES - FITTINGS

A. All fittings shall be of the type indicated on the Drawings unless otherwise specified. Ferrous piping shall be provided with ferrous fittings; copper tubing shall be provided with bronze, wrought copper or brass fittings. In general, all fittings shall be as specified hereinafter in paragraph entitled "Pipe and Fittings Schedule".

B. Nipples shall be extra heavy and of same material as piping system in which they are installed. Close nipples are not acceptable.

C. Malleable iron ground joint unions, brass to iron seat, of approved make, shall be used on all connections, up to and including 3-inch in diameter, to risers, appliances and equipment. Flanged connections shall be used for piping larger than 3-inches. Wherever the sizes of pipe are reduced, the fittings shall be made to suit these changes without the use of bushings.

D. All flanges shall come fairly face to face, the pipe in perfect line, the pipes shall not be sprung to make a joint. Gaskets for flanged joints shall be as specified under "Joints". All joints shall be neatly made and with great care.

E. Screwed type systems shall contain ample unions in piping at equipment to allow easy removal of the equipment.

1.5 GENERAL NOTES - PIPING HANGERS AND SUPPORTS

A. All hangers, supports, and guides shall be types as approved by the Engineer, arranged to maintain the required grading and pitching of lines, to prevent vibration and sagging, to provide for expansion and contraction, and to provide for adequate support of the pipes.

B. Hangers and supports shall be designed and manufactured in conformance with MSS SP-58, "Manufacturers Standardization Society: Pipe Hangers and Supports - Materials, Design, and Manufacture."

C. All hangers and supports shall be galvanized steel, associated hardware shall be stainless steel type 316.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS SCHEDULE

A. Pipe and fittings shall be as indicated on the Drawings and as listed in the following schedule. The schedule is intended to serve as a general guide and is not necessarily a complete listing of every piping system. Systems which may not be listed shall be comprised of the same kind of pipe and fittings as in similar systems which are listed, or as directed by the Engineer.

SERVICE	PIPE Material	PIPE Spec. Ref.	FITTINGS Material	FITTINGS Spec. Ref.	TYPE JOINTS
First Group a. 3" and larger	Ductile Iron	ANSI A21.15 (AWWA C115)	Ductile Iron	ANSI A21.10 (AWWA C110)	Flanged Pipe (See Note 3 Below)
	Notes for First Group: 1. The exterior of all non-buried piping shall be shop primed and painted. 2. Pipe shall be Class 53. 3. Flanges shall be drilled and faced for ANSI B16.1, Class 125. 4. All nuts and bolts to be stainless steel.				
Second Group a. 2.5" and smaller	Brass Schd. 40	ASTM B687	Brass Schd. 40	ASTM B62	Threaded
	Notes for Second Group: 1. See section 2.4 for joining requirements.				

2.2 DUCTILE IRON PIPE AND FITTINGS

A. Ductile iron pressure pipe shall be made of cast ductile iron of good quality and of such character as shall make the metal castings strong, tough and of even grain and soft enough to satisfactorily permit drilling, tapping and cutting. All piping shall be smooth, free from cold shuts, scale, lumps, blisters, and sand holes and defects of every nature which make it unfit for the use intended. All piping shall be straight and shall be true circles in section with its inner and outer surfaces concentric. No plugging, filling, burning-in or welding will be allowed. All piping shall be subject to inspection and approval by the Engineer upon delivery, and no broken, cracked, misshaped, or otherwise damaged or unsatisfactory piping will be accepted.

B. Each piece of pressure ductile iron pipe shall have the weight and class designation conspicuously painted on it as near as possible to flange or bell end of the pipe and these designations shall be clearly legible.

C. Where required or shown, the Contractor shall provide ductile iron specials. In general, specials shall consist of spool pieces, less than standard lengths of flanged, spigot end, or bell end pipe, or combination of ends, and nonstandard fittings. The specials shall conform in material, thickness and finish to the pipe in which they are installed. Tapped reinforced bosses shall be provided as an integral part of fittings, when shown or specified.

D. Flanges may be cast integrally with the ductile iron pipe, or screwed on type flanges may be used. Pipe compound of the manufacturer's recommendation shall be used at each threaded joint or flanges. "Uni-flanges" will not be acceptable unless specifically called out on the Drawings. Unless otherwise noted, all flanges shall be flat face. Flanges shall be drilled and faced for ANSI B16.1, Class 125.

2.3 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. Those piping systems listed in the preceding schedule and where noted on the Drawings as being "PVC" shall be unplasticized polyvinyl chloride normal impact type, conforming to ASTM Specification D1784 and either D1785 or D2665 for PVC pipe Class 12454-B. Pipe shall be DWV (Drain Waste Vent), Schedule forty (40) or Schedule eighty (80) pressure pipe, as indicated in the pipe and fittings schedule specified herein. Pipe shall be that of the Charlotte Pipe, or equal, and each length shall be clearly labeled with the manufacturer's name, PVC Type, Schedule and Size. Pipe shall be extruded and seamless.

B. Fittings shall be PVC, conforming to: ASTM D2665 for DWV, ASTM D2466 for Schedule 40, ASTM D2467 for Schedule 80, as applicable as manufactured by Charlotte Pipe, or equal. All fittings shall be solid molded. Welded seams shall not be permitted.

C. Generally, all PVC pipe and fittings shall have socket type joints with solvent cement. Joints shall be made in accordance with manufacturer instructions. Where specifically noted on the Drawings, or where required for connections to valves and/or equipment for special reasons, pipe and fittings shall have threaded ends, or flanged joints. Threaded joints shall be made using the pipe manufacturer's recommended thread lubricant joint compound. Flanges may be the socket type, and shall be complete with rubber gaskets and galvanized steel bolts and nuts.

D. The Contractor shall demonstrate to the full satisfaction of the Engineer that their personnel are adequately skilled in making the joints specified above, prior to the installation of any PVC piping. The Engineer reserves the right to direct the Contractor to have tests conducted on PVC pipe and fittings at the Contractor's expense. The Engineer shall select the tests and test methods based on existing ASTM Standards.

2.4 JOINTS, COUPLINGS, CONNECTORS AND ADAPTERS

A. Joints

1. All joints at equipment shall conform to the equipment requirements. No direct welded connections shall be made to other equipment. Right and left couplings, long screws, or caulking of pipe threads or gasket joints will not be permitted. Mitered joints for elbows and matching straight runs of pipe for tees and elbows will not be permitted.

2. Soldered or brazed joints shall be made with solder and a noncorrosive past flux. The solder mixture shall be of 95-5 (tin-antimony) content. The use of acid core solder will not be permitted. The application of excess heat shall be avoided to prevent undue softening or burning of the fittings or tubing when making connections. All soldering operations shall be performed in strict accordance with best accepted practices. Tubing shall be square cut and reamed to remove all burrs. The inside of the fittings and the outside of the tubing at each end shall be well cleaned immediately prior to soldering to remove all traces of oxidation, regardless of how clean the surfaces of the pipe and fittings may appear.

3. Threads shall be standard, clean-cut and tapered. All pipe shall be reamed free from burrs, and kept free from scale and dirt. Unless otherwise specified, threaded joints shall be made up with "Permatex" type 2, black, non-hardening pipe joint compound applied to the male thread only. The use of red lead or white lead will not be permitted. The complete threaded joint shall not have more than two threads exposed when made tight. Threads shall comply with ANSI B2.1.

4. Except where special couplings are indicated, piping requiring screwed connections shall be connected with screwed, malleable iron, ground joint, brass seat, 150 psi unions; for piping requiring flanged connections, flanged malleable iron unions shall be used. The finish of all unions shall match piping in which they are installed. Unions shall be provided at equipment and where required otherwise to facilitate removal of piping or equipment. Ground joint unions shall be as manufactured by Grinnell Company, Inc., or Stockham Valve and Fittings Company, or equal. The finish of all unions shall match piping in which they are installed. All gaskets between flanged connections and fitting shall be full face rubber or ring gaskets, 1/8-inch thick.

5. Flanges shall be of the same material as the piping on which installed, and bolts, nuts and washers shall be of mild steel, with good sound well-fitting threads; the nuts shall be cold punched, hexagonal, trimmed and chamfered. Heads, nuts and threads shall be U.S. Standard sizes. Bolts shall be of such length as to project 1/4-inch beyond the nut when the flanged joint with gasket is assembled. All hardware shall be galvanized.

B. Mechanical Couplings

1. Unless specified or shown otherwise on the Drawings, mechanical couplings shall be the Style 38 of the Dresser Manufacturing Division, or equal. Each shall be so designed and constructed to withstand an internal line test pressure equal to that of the pipeline in which it is to be installed but not less than 250 psi. The various mechanical couplings shall be suitable for the class and size of ductile iron pipe or steel pipe as required at the various locations, and shall be without pipe stops. The Contractor shall provide and install

mechanical couplings in addition to those shown, as required, for flexibility in installing the various piping systems. Locations of additional couplings must be approved by the Engineer.

2. Harnesses shall be provided across all mechanical couplings unless otherwise specifically noted in the Drawings to be omitted.

3. Couplings shall be designed to provide a rigid connection, ease of installation, and shall allow for angular deflection and pipe expansion and contraction.

C. Flange Adapters

1. Unless specified or shown otherwise on the Drawings, flange adapters shall be the Style 128 of the Dresser Manufacturing Division, or equal. Each shall be so designed and constructed to withstand an internal line test pressure equal to that of the pipeline in which it is to be installed but not less than 250 psi. The various flange adapters shall be suitable for the class and size of ductile iron pipe or steel pipe as required at the various locations, and shall be without pipe stops. The Contractor shall provide and install flange adapters in addition to those shown, as required, for flexibility in installing the various piping systems. Locations of additional flange adapters must be approved by the Engineer.

2. Tie rods shall be provided across all flange adapters unless otherwise specifically noted in the Drawings to be omitted.

3. Flange adapters shall be designed to provide a rigid connection, ease of installation, and shall allow for angular deflection and pipe expansion and contraction.

2.5 SLEEVES THRU WALLS AND FLOORS

A. Sleeves shall be provided in walls and floors for the passage of all pipes.

B. The Contractor will not be allowed to box-out the concrete for installation of any sleeves, except with the Engineer's permission for each specific location involved. Castings shall be securely fastened in place so that pouring of concrete will not disturb their position in any manner. The Contractor shall correlate with the other trades (particularly concrete work) to assure that all wall and floor sleeves are properly set.

C. Sleeves shall be of ample size to permit passage of pipe and allow for expansion and modular mechanical type joint, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening. The seal shall be watertight and provide electrical insulation between the pipe and the wall, thus reducing chances of cathodic reaction between these two members. The inside diameter of each wall or floor opening shall be sized as recommended by the manufacturer to fit the pipe and mechanical-seal to assure a watertight joint. Contractor shall familiarize his installation personnel with all manufacturer recommendations and installation bulletins to assure a watertight assembly. Mechanical-seal shall be Link-Seal as manufactured by Thunderline Corporation or equal. Seal shall be placed even with the interior wall to allow access for future adjustment. Annular space along the exterior wall shall be filled with a mastic caulk or other method approved by the Engineer.

2.6 DRAINS AND VENTS

A. All piping systems (which do not include other convenient means of draining) shall include 3/4-inch hose valves at each low point to facilitate draining of the system. All piping systems, which do not include by nature of the systems a means of venting the air (for example, faucets at sinks are a means of venting), shall be provided with either ½ inch manual gate valve or an automatic air vent valve, as directed by the Engineer, and located at each high point.

2.7 PIPE SUPPORTS

A. All supports shall conform to MSS SP-69. The following support models are based on Anvil International Catalog. Similar models from PHD, B-Line, Tolco, or equal are acceptable.

B. Wall Brackets: All brackets shall be galvanized carbon steel construction. Heavy duty wall brackets shall be suitable for maximum 3,000 pounds load and shall be Figure 199.

C. Medium Pipe Clamp: All medium pipe clamps shall be galvanized carbon steel construction. Medium pipe clamps shall be suitable for maximum 3,500 pounds load and shall be Figure 212. For pipe suspension, the medium pipe clamps shall be used with galvanized weldless eye nut, Figure 290, and galvanized continuously treaded rod, Figure 146.

D. Adjustable Pipe Saddle: Saddles for pipe 3 through 12 inches shall be cast iron with steel u-bolt and nuts. Saddles for pipe 14 through 36 inches shall be carbon steel saddle and u-bolt. All saddles shall have galvanized finish, steel locknut nipple, and cast iron reducer. Adjustable pipe saddles shall be Figure 265. Adjustable saddles shall be used with carbon steel stanchion with threaded connection and baseplate Figure 63T.

E. Riser Clamps: Clamps shall be carbon steel construction with galvanized finish. Riser clamps shall be Figure 261. Riser clamps shall be fitted and bolted below welded lugs on steel pipe.

PART 3 – EXECUTION

3.1 INSTALLATION OF PIPING HANGERS AND SUPPORTS

A. Proper and suitable tools and appliances for the safe and convenient handling of pipe and specials shall be used. All pipe and castings shall be carefully examined for defects before laying and no pipe or casting known to be defective shall be laid in the line.

B. During construction, the Contractor shall keep all ends of pipes, including those extending above the roof, and all drains and fixtures, closed with caps, plugs or wooden flange covers, so as to prevent dirt, building material or other foreign matter from getting into pipe and traps.

C. Unless shown otherwise on the Drawings, pipe hangers and supports shall be in accordance with the following:

1. All hangers shall be adjustable clevis type having rods with machine threads. Adjustable clevis hangers shall be figure 260 of Anvil International, Inc. Adjustable clevis hangers for copper tubing shall be Figure CT-65 of Anvil International, Inc., or equal. Rod diameters shall be not less than and rod spacing shall not be greater than that scheduled below:

	Min. Rod Diameter (Inches)		Support Spacing (Feet)	
Pipe Size (Inches)	**Water**	**Air**	**Ferrous & Hard Copper Pipe**	**PVC Pipe**
1/2 to 2	3/8	1/4	8	5
2-1/2 to 3	1/2	1/4	10	7
4 and 5	5/8	3/8	10	7.5
6	3/4	3/8	10	9
8 to 12	7/8	1/2	10	9.5

2. It shall be noted, the maximum design load for any pipe hanger is for a 2000 pound rod load and for a minimum spacing of 3 feet. The cast iron and steel piping up to 16-inch diameter shall have a maximum single rod hanger support spacing of ten feet (as long as the 2000 pound rod loading is not exceeded).

3. Vertical lines shall be supported at their bases, using either a suitable hanger placed in a horizontal line near the rise or a base type fitting set on a concrete supports where shown on the Drawings. Where support at the base is not practical, vertical lines shall be supported using a base type fitting set on a pipe support with ceiling anchorage. All vertical lines extending 6 feet or more shall be supported with riser clamps. Riser

clamps shall be Figure 261 of Anvil International, Inc., or equal. Riser clamps for use with hanger rods shall be Figure 40 of Anvil International, Inc., or equal. Riser clamps for copper tubing shall be Figure CT-121 of Anvil International, Inc., or equal. Wherever possible, locate riser clamps directly below pipe couplings or shear lugs.

4. All horizontal piping 6-inches in diameter and larger on vertical walls and all piping near walls for which ceiling anchorage is not practicable, subject to the Engineer's approval, shall be properly supported by heavy welded steel brackets, Figure 199 of Anvil International, Inc., or equal, securely anchored into the wall construction. Horizontal pipe (or pipe covering) on vertical walls shall be held at a minimum of one inch from the walls to protect them from wall sweating.

5. All hangers shall be secured in expansion bolts wherever practicable. Hangers and/or rod supports inserted in the concrete slab shall be capable of sustaining the hanger rod load. Provide concrete inserts for placement in formwork before concrete is poured. Provide concrete inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams. Where concrete slabs form finished ceilings, provide inserts to be flush with slab surface. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inch.

6. Drilling of holes for anchors, supports, hangers, etc., in portions of the building which may affect the structural soundness of that portion will be done only after the Contractor has secured permission from the Engineer to do so.

7. All pipes, fittings and equipment 6-inches in diameter and larger and located relatively close to the various floors, shall be supported by concrete supports where shown on the Drawings, or where directed by the Engineer. Where concrete supports are not feasible, adjustable pipe saddles support may be used. These shall be complete with locknut, nipple reducer, pipe stand and floor flange and shall be Figure 265 of Anvil International, Inc., or equal. The size of the support shall be suitable for pipe being supported. Saddle and reducer shall be of cast iron construction with hot dipped galvanized finish. Adjustment height shall be approximately 4-1/2 inches. Support pipe shall be the size required and shall be Schedule 40 hot dipped galvanized steel pipe. Floor connection shall be by companion flange with at least four stainless steel expansion bolts sized to fit bolt holes. A minimum of 3/4-inches of grout shall be used for leveling.

8. Isolating mats shall be provided between concrete supports and metallic pipe, valves, fittings, and equipment.

9. All piping connected to pumps shall be supported as near the pump as practicable such that the weight of the pipe is not supported by the pump casing.

3.2 MINIMUM SLOPES

A. Soil, waste and drainage piping shall be sloped not less than 1/16-inch per foot in direction of flow unless otherwise indicated on the Drawings.

3.3 CONNECTION OF DISSIMILAR METALS

A. Wherever pipes of dissimilar metals join, there shall be provided an insulating union, coupling or flange connector for corrosion control. Connectors shall include an approved dielectric separator. Connectors shall be the product of Dresser Corporation, F.H. Maloney Company, Universal Controls Corporation, or equal. Stainless steel nuts, bolts, and washers shall be used at all places at which such dielectric separators are used.

3.4 IDENTIFICATION OF PIPING SYSTEMS

A. All piping systems listed shall be labeled with the name of the service to indicate the use of that particular pipe, and an arrow showing the normal direction of flow using vinyl pipe labels. Labels shall be plain block letters of the size indicated hereinafter. Labeled names shall be located near each branch connection, near each valve and at least every 50 feet on straight runs of pipe. All labeled names shall be so located as to be legible from the floor. Generally, letters on light colored pipes shall be either black or red; on dark colored pipes letters shall be white. Labeled names shall be applied after the piping has been tested, covered (if required) and painted. Any system inadvertently not listed shall be labeled as directed by the Engineer.

B. All material shall be applied in accordance with the manufacturer's recommendation.

C. No bright metal parts such as stainless steel, chrome plate, etc., shall be painted. Nor is it intended to paint stainless steel, copper, brass, or aluminum pipes. Pipes of these metals, however, shall be color coded, banded with colors indicated below with 6 inch wide bands not less than 8 feet on centers. PVC and CPVC piping shall be painted.

D. The various systems shall be identified as follows:

	Piping Covering
Outside Diameter	Label Letter Size
Under 3/4 inch	Do not paint-label
3/4 to 1-1/4 inch	1/2 inch
1-1/2 to 2 inch	3/4 inch
2-1/2 to 6 inch	1-1/4 inch
8-10 inch	2-1/2 inch
Over 10-inch	3-1/2 inch

3.5 FIELD TESTING

A. The Engineer shall be notified a minimum of 24 hours in advance of all tests and all tests shall be conducted to his entire satisfaction. All tests shall be made prior to insulating piping.

B. Repairs to the various systems shall be made with new materials. No caulking of threaded joints, cracks or hoses will be acceptable. Where it becomes necessary to replace pieces of pipe, the replacement shall be the same material and thickness as the defective piece. Tests shall be repeated after defects disclosed thereby have been made good or the work replaced.

C. All piping shall be adequately braced and supported during the tests so that no movement, displacement or damage shall result from the application of the test pressure. Relief devices in the various systems shall be capped or plugged during the tests. Valves shall be open during testing and blind flanges/plugs shall be provided where necessary.

D. All equipment used in testing shall be subject to the approval of the Engineer, and shall be such as to properly develop, maintain and measure test procedures. All gauges used for testing shall be the "Test Grade" type, certified specifically for this job.

E. The outer secondary containment systems shall undergo an air pressure hold test (3 to 5 psi) after installation. The flexible inner primary piping system shall be subject to 60 psi pressure hold test.

F. Prior to field hydrostatic testing of the associated piping, demonstrate operation of all valves, from fully open to fully closed and back again, two times. Verify position indications are functioning properly. Inspect all valves for signs of leakage during hydrostatic testing of the associated piping. Verify operation of all valves by fully opening and closing each valve two times again after successful hydrostatic testing.

3.6 AS BUILT SHOP DRAWINGS

A. The Contractor shall provide As Built Shop Drawings for each interior piping system showing all equipment and valves. Drawings shall show numbers and/or letters for all equipment and for each valve, as specified herein under Paragraph entitled "IDENTIFICATION OF PIPING SYSTEMS".

END OF SECTION 22 1113

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

A. VFC: Variable frequency controller.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Cerro Wire LLC.
2. General Cable; General Cable Corporation.
3. Southwire Company.

B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2.

D. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for metal-clad cable, Type MC with ground wire.

2.2 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. 3M.
2. Hubbell Power Systems, Inc.
3. ILSCO.
4. Tyco Electronics Corp.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN-2-THWN-2, single conductors in raceway.

B. Exposed Feeders: Type THHN-2-THWN-2, single conductors in raceway.

C. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

D. Exposed Branch Circuits: Type THHN-2-THWN-2, single conductors in raceway.

E. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

G. Whips from Junction Box to Lighting Fixtures:
   1. Type MC Cable or FMC, with minimum #12AWG copper THHN/THWN and full size equipment grounding conductor. Maximum whip length 72”.
   2. MC Cable and FMC shall be supported within 24” of fixture connection. Secure whips to steel structure with support clamps.

H. All single-phase circuits shall include a dedicated neutral (grounded) and grounding conductor, unless specifically noted otherwise.
   1. The intent of this is to eliminate multi-wire branch circuits and allow disconnection of one circuit without requiring disconnection of other(s) as would be required to comply with NEC 210.4(B). Per NEC 310.15(B)(b) each of these neutral (grounded) conductor is not considered to be load-bearing so derating is not required.

I. Contract drawings are based upon a maximum of 3 current-carrying conductors in a conduit. Contractor may rework indicated circuitry to install a maximum of (6) L-N circuits (120V) in a single conduit. There shall be no more than 2 each A, B, C phase conductors per homerun. Each shall have dedicated neutral (grounded) conductor.
   1. Do not group L-L circuits in a homerun, unless specifically indicated on the drawings.
   2. Where there are more than 3 current-carrying conductors in a conduit, derate conductor ampacities in accordance with NEC Table 310.15(B)(2)(a).
   3. When running more than 3 ungrounded conductors in a raceway, increase size of conduits beyond those indicated in contract documents, as required to not exceed NEC Chapter 9, Table 1 conduit-fill requirements. As-built drawings shall clearly indicate which circuits are grouped in homeruns.

J. The electrical service is 120/240 volt, 3-phase. Extreme care shall be taken to identify the "HIGH LEG" of the system and not use it with the neutral.

K. Unless otherwise indicated, minimum conductor size shall be 12 AWG.

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.

2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

B. Test and Inspection Reports: Prepare a written report to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes grounding and bonding systems and equipment, plus the following special applications:

1. Underground distribution grounding.
2. Foundation steel electrodes.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:

1. Test wells.
2. Ground rods.
3. Ground rings.

B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Instructions for periodic testing and inspection of grounding features at test wells based on NETA MTS.

1) Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
2) Include recommended testing intervals.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Burndy; Part of Hubbell Electrical Systems.
2. ERICO International Corporation.
3. Galvan Industries, Inc.; Electrical Products Division, LLC.
4. ILSCO.
5. O-Z/Gedney; an EGS Electrical Group brand; an Emerson Industrial Automation business.

2.2 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.3 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.

6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare copper conductor, No. 6 AWG minimum.

1. Bury at least 24 inches below grade.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. metal-clad cable runs.

C. Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

3.4 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Test Wells: Ground rod driven through bottom of handhole.

1. Test Wells: Install test well as indicated on the drawing. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

E. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.

F. Grounding for Steel Building Structure: Refer to ground ring detail on the drawings.

G. Ground Ring: Install a grounding conductor, electrically connected to water tower structure ground rod and to indicated item, extending around the perimeter of area or item indicated.

1. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps to structure steel.
2. Bury ground ring not less than 24 inches from building's foundation.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.

F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project.

1.5 ACTION SUBMITTALS

A. Product Data: For the following:

1. Steel slotted support systems.

1.6 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Cooper B-Line, Inc.; a division of Cooper Industries.
   b. ERICO International Corporation.
   c. Thomas & Betts Corporation.
   d. Unistrut; an Atkore International company.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
3. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to structure surface include the following:

1. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
2. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
3. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
4. Toggle Bolts: All-steel springhead type.
5. Hanger Rods: Threaded steel.
6. Weld studs on surface of steel structure.
7. Weld conduits support brackets to the surface for the steel structure.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slottedsupport system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
1. To New Concrete: Bolt to concrete inserts.
2. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Touchup: Comply with requirements in Division 9 for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

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

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Handholes and boxes for exterior underground cabling.

B. Part 2 of this section includes material requirements for all raceways and boxes that may or may not be used on the project. Part 3 of this Section defines where a given type of product shall be or is permitted to be utilized.

1.3 DEFINITIONS

A. GRC: Galvanized rigid steel conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For conduits, fittings and hinged-cover enclosures.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.5 INFORMATIONAL SUBMITTALS

A. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Allied Tube & Conduit.
2. O-Z/Gedney; an EGS Electrical Group brand; an Emerson Industrial Automation business.
3. Robroy Industries.
4. Thomas & Betts Corporation.

B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. EMT: Comply with ANSI C80.3 and UL 797.

E. FMC: Comply with UL 1; zinc-coated steel.

F. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
1. Fittings for EMT:

a. Material: Steel.
b. Type: compression.

H. Joint Compound for GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. AFC Cable Systems, Inc.
2. Electri-Flex Company.
3. RACO; Hubbell.
4. Thomas & Betts Corporation.

B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

D. LFNC: Comply with UL 1660.

E. Rigid HDPE: Comply with UL 651A.

F. RTRC: Comply with UL 1684A and NEMA TC 14.

G. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

H. Fittings for LFNC: Comply with UL 514B.

I. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. EGS/Appleton Electric.
2. Erickson Electrical Equipment Company.
3. Hoffman; a brand of Pentair Equipment Protection.
4. Hubbell Incorporated.
5. O-Z/Gedney; an EGS Electrical Group brand; an Emerson Industrial Automation business.
6. RACO; Hubbell.

B. General Requirements for Boxes and Enclosures: Boxes and enclosures installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

I. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

J. Gangable boxes are prohibited.

K. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 or Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

L. Cabinets:

1. NEMA 250, Type 1 or Type 3R galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

2.4 HANDHOLES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes:

1. Handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fiberglass Handholes: Molded of fiberglass-reinforced polyester resin, with frame and covers of fiberglass.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Armorcast Products Company.
b. Carson Industries LLC.
c. Quazite: Hubbell Power Systems, Inc.

2. Standard: Comply with SCTE 77.
3. Color of Frame and Cover: Gray.
4. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
5. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
6. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
7. Cover Legend: Molded lettering, "ELECTRIC."

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC.
2. Concealed Conduit, Aboveground: GRC.
3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.

4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: GRC.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
5. Damp or Wet Locations: GRC.
6. Boxes and Enclosures: NEMA 250, Type 1.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Install surface raceways only where indicated on Drawings.

F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to structure lines.

H. Support conduit within 12 inches of enclosures to which attached.

I. Raceways Embedded in Slabs:

1. Are not permitted, except as required for entry into recessed floor boxes.
2. Conduits run below slab on ground floor level shall be buried within the porous fill and stub-up at the required location. Transition from RNC to RGS with RGS elbow before rising above the floor. After RGS elbow, stub-up conduit shall be type indicated in Part 3.1 above.
3. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from ENT to GRC before rising above floor.

J. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

N. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

O. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

P. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

Q. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a

blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

R. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

S. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

1. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
2. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

T. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

U. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements and also refer to Architectural elevations. Install boxes with height measured to center of box unless otherwise indicated.

V. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

W. Fasten junction and pull boxes to or support from structure. Do not support boxes by conduits.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Section 312000 "Earth Moving."

3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
5. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES

A. Install handholes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Install handholes with bottom below frost line, below grade.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.

F. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

2.2 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. HOLDRITE.

2.3 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.4 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.

D. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's

wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

C. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.

B. Colors for Cables Carrying Circuits at 600 V and Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

C. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

2.3 POWER CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.

B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

2.4 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.

2.5 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Baked-Enamel Warning Signs: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4-inch grommets in corners for mounting. Nominal size, 7 by 10 inches.

2.6 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

2.7 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black except where used for color-coding.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

G. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

H. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl label. Install labels at 10-foot maximum intervals.

B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
1. Power.

C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 240/120-V Circuits:

1) Phase A: Black.
2) Phase B: Orange. (High Leg) Confirm with Power Company.
3) Phase C: Blue.
4) Grounded (Neutral): White.
5) Ground: Green.

c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

E. Control-Circuit Conductor Termination Identification: For identification at terminations provide heat-shrink preprinted tubes or self-adhesive, self-laminating polyester labels with the conductor designation.

F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

G. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

H. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

a. Indoor Equipment: Adhesive film label with clear protective overlay. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be, laminated acrylic or melamine label.
b. Enclosures.
c. Enclosed switches.
d. Enclosed controllers.

END OF SECTION 260553

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

A. SVR: Suppressed voltage rating.

B. SPD: Surge Protection Device.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

   1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
   2. Detail enclosure types and details for types other than NEMA 250, Type 1.
   3. Detail bus configuration, current, and voltage ratings.
   4. Short-circuit current rating of panelboards and overcurrent protective devices.
   5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
   6. Include wiring diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Field Quality-Control Reports:

   1. Test procedures used.
   2. Test results that comply with requirements.

3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

B. Panelboard Schedules: For installation in panelboards.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Series rating of panelboards is not acceptable.

E. Comply with NEMA PB 1.

F. Comply with NFPA 70.

1.8 PROJECT CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet.

1.9 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. All panelboards, circuit breakers, and disconnect switches shall be of the same manufacturer.

B. Enclosures: Surface-mounted cabinets as indicated on the drawings.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1.

2. Piano Type Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
3. Finishes:

a. Panels and Trim: galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
b. Back Boxes: Galvanized steel.

4. Directory Card: Inside panelboard door, mounted in transparent card holder.

C. Incoming Mains Location: Top or bottom to match incoming conduit location.

D. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

E. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Main and Neutral Lugs: Mechanical type.
3. Ground Lugs and Bus-Configured Terminators: Mechanical type.

F. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.

G. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

H. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Siemens Industry, Inc.
2. General Electric Company.
3. Square D.
4. Eaton Electrical Sector; Eaton Corporation.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Circuit breaker or lugs only per the drawings.

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Eaton Electrical Sector; Eaton Corporation.
2. General Electric Company.
3. Siemens Industry, Inc.
4. Square D.

B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
3. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. 90 inches to top of trim above finished floor unless otherwise indicated or as required to ensure that the operating handle of the top most switch or circuit breaker is not higher than 79” above the finished floor level.

C. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

D. Install overcurrent protective devices and controllers not already factory installed.

E. Install filler plates in unused spaces.

F. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

G. Comply with NECA 1.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

B. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.

1. Measure as directed during period of normal system loading.

2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.6 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 262416

SECTION 262714 - UTILITY SERVICE ENTRANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and general provisions of the Contract Documents apply to the work of this section.

1.2 SUMMARY

A. This Section includes work required to allow Utility Company to provide power to the project, as well as provisions for Utility Company metering.

B. The Owner will pay all charges levied by the Power Company for the underground service. The Contractor shall assist the Owner with the application for electrical service.

C. The power company will furnish 240/120 volt, three phase, 4-wire, 60-Hz underground service.

1.3 COORDINATION

A. Electrical service will be supplied by Southside Electric Cooperative(SEC), herein referred to as “the power company.”

B. All work shall be in accordance with the Southside Electric Cooperative requirements. This shall not modify the scope of work indicated in the Contract Documents; only clarify the means and methods to be in compliance with Utility requirements. Communicate to the Architect any variance from the Contract Documents required by the Utility prior to bid.

C. Coordinate work with the power company within 30 days of notice to proceed. Notification shall be in writing with a brief construction schedule included. The SEC contact person shall be Mr. Jimmy Simpson, Jr. 1712 W. Virginia Avenue, Crewe, Virginia 23930-1049. 1-800-552-2118, ext 3292. Email jimmy.simpson@sec.coop . Subsequent to notification, schedule a preconstruction meeting be held at the power company's District Office or other location and time acceptable to the power company. Representatives of the general Contractor and appropriate sub-contractors shall attend. A power company Construction Department representative will review the proposed construction schedule and discuss any construction practices and/or methods applicable to the project. No work shall commence until construction schedule and ductbank installation drawings are approved by the power company.

D. The Contractor shall notify the power company at least seven days prior to beginning of duct bank construction.

E. Equipment fault current ratings shown on the documents are based on preliminary information provided by the Power Company and are shown for bidding purposes only. Exact available fault current values at the service connection point will be determined by the Power Company after the

project is awarded. Verify equipment fault current interrupting capacity requirements prior to ordering electrical distribution equipment in accordance with Section 260572 “Overcurrent Protective Device Short Circuit Study.” Provide a copy of the Power Company's calculated maximum available fault current to the Architect.

PART 2 - PRODUCTS

2.1 SPECIFICATION

A. Products required by this Section are specified in other Sections, or are furnished/specified by the Utility Company.

2.2 UTILITY COMPANY PROVIDED WORK AND MATERIALS

A. Pole mounted transformer.

B. Primary conductors and terminations to the transformer.

C. Cable terminations at secondary bushings of transformer.

D. Underground secondary service conductors direct buried from the service pole to the point of demarcation indicated by the contractor..

E. Metering circuitry from self-contained meter.

2.3 CONTRACTOR PROVIDED WORK AND MATERIALS

A. Grounding at service entrance panelboard.

B. Installation of the meter and support rack.

C. Conduit from the meter to the panelboard.

D. Secondary conductors from the meter to the main circuit breaker in the service entrance panelboard.

E. Conduit seals.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All work shall be in accordance with the Southside Electric Cooperative requirements and any supplemental requirements communicated by the power company.

B. Furnish two (2) copies of as-built drawings showing the actual location and installation of the duct bank to the power company.

END OF SECTION 262713

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Receptacles, and associated device plates.
2. Snap switches.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

D. RFI: Radio-frequency interference.

E. SPD: Surge Protective Device.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Cooper Wiring Devices, Inc.
2. Hubbell.
3. Leviton Manufacturing Co., Inc.
4. Pass & Seymour/Legrand (Pass & Seymour).

B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Cooper Wiring Devices, Inc.
b. Hubbell.
c. Leviton Manufacturing Co., Inc.
d. Pass & Seymour/Legrand (Pass & Seymour).

2.4 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120V, 20 A:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Single Pole:

      1) Cooper; AH1221.
      2) Hubbell; HBL1221.
      3) Leviton; 1221-2.
      4) Pass & Seymour; CSB20AC1.

2.5 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

2.6 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: Ivory unless otherwise indicated or required by NFPA 70 or device listing.

B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

F. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.2 IDENTIFICATION

A. Comply with Section 260553 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

A. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. Using the test plug, verify that the device and its outlet box are securely mounted.
5. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

B. Wiring device will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 262726

SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600 V ac and less for use in the following:

a. Control circuits.
b. Enclosed switches.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:

1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.

a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
3. Coordination charts and tables and related data.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Ambient temperature adjustment information.
2. Current-limitation curves for fuses with current-limiting characteristics.

3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse used on the Project. Submit in electronic format suitable for use in coordination software and in PDF format.
4. Coordination charts and tables and related data.

1.5 FIELD CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Cooper Bussmann; a division of Cooper Industries.
2. Edison; a brand of Cooper Bussmann; a division of Cooper Industries.
3. Littelfuse, Inc.

B. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, current-limiting, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

1. Type RK-1: 600-V, zero- to 600-A rating, 200 kAIC, time delay.
2. Type CC: 600-V, zero- to 30-A rating, 200 kAIC , time delay.
3. Type RK-5: 600-V, zero- to 600-A rating, 200 kAIC.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

E. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Cartridge Fuses:
   1. Motor Branch Circuits: Class RK5, time delay.
   2. Other Branch Circuits: Class RK1, time delay.
   3. Control Transformer Circuits: Class CC, time delay, control transformer duty.
   4. Provide open-fuse indicator fuses or fuse covers with open fuse indication.

3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information inside of door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813

SECTION 262913 - ENCLOSED CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes the following enclosed controllers rated 600 V and less:
   1. Full-voltage magnetic.

1.3 DEFINITIONS

A. CPT: Control power transformer.

B. N.C.: Normally closed.

C. N.O.: Normally open.

D. OCPD: Overcurrent protective device.

E. SCR: Silicon-controlled rectifier.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of enclosed controller. Include manufacturer's technical data on features, performance, electrical characteristics, ratings, and enclosure types and finishes.

B. Shop Drawings: For each enclosed controller. Include dimensioned plans, elevations, sections, details, and required clearances and service spaces around controller enclosures.

   1. Show tabulations of the following:

      a. Each installed unit's type and details.
      b. Factory-installed devices.
      c. Nameplate legends.
      d. Short-circuit current rating of integrated unit.
      e. Listed and labeled for integrated short-circuit current (withstand) rating of OCPDs in combination controllers by an NRTL acceptable to authorities having jurisdiction.
      f. Features, characteristics, ratings, and factory settings of individual OCPDs in combination controllers.

2. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Load-Current and Overload-Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

C. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed, and arrange to demonstrate that switch settings for motor running overload protection suit actual motors to be protected.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed controllers to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Routine maintenance requirements for enclosed controllers and installed components.
2. Manufacturer's written instructions for setting field-adjustable overload relays.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store enclosed controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
2. Altitude: Not exceeding 6600 feet.

1.10 COORDINATION

A. Coordinate layout and installation of enclosed controllers with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 FULL-VOLTAGE CONTROLLERS

A. General Requirements for Full-Voltage Controllers: Comply with NEMA ICS 2, general purpose, Class A.

B. Motor-Starting Switches: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off or on.

C. Magnetic Controllers: Full voltage, across the line, electrically held.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Eaton Electrical Sector; Eaton Corporation.
   b. General Electric Company.
   c. Siemens Industry, Inc.
   d. Square D.

2. Configuration: Nonreversing.
3. Contactor Coils: Pressure-encapsulated type with coil transient suppressors.

   a. Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.

4. Power Contacts: Totally enclosed, double-break, silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.

5. Bimetallic Overload Relays:

   a. Inverse-time-current characteristic.
   b. Class 20 tripping characteristic.
   c. Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
   d. Ambient compensated.
   e. Automatic resetting.

6. N.O., isolated overload alarm contact.
7. External overload reset push button.

D. Combination Magnetic Controller: Factory-assembled combination of magnetic controller, OCPD, and disconnecting means.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Eaton Electrical Sector; Eaton Corporation.
b. General Electric Company.
c. Siemens Industry, Inc.
d. Square D.

2. Fusible Disconnecting Means:

a. NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate [**Class J**] [**Class R**] [**indicated**] fuses.
b. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.

3. Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.

2.2 ENCLOSURES

A. Enclosed Controllers: NEMA ICS 6, to comply with environmental conditions at installed location.
1. Outdoor Locations: Type 4X.

2.3 ACCESSORIES

A. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings.

B. Space heaters, with N.C. auxiliary contacts, to mitigate condensation in Type 4X enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and surfaces to receive enclosed controllers, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine enclosed controllers before installation. Reject enclosed controllers that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. For controllers not at walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems."

B. Install fuses in each fusible-switch enclosed controller.

C. Install fuses in control circuits if not factory installed. Comply with requirements in Section 262813 "Fuses."

D. Install heaters in thermal overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.

E. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.

F. Comply with NECA 1.

3.3 IDENTIFICATION

A. Identify enclosed controllers, components, and control wiring. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved nameplate.
3. Label each enclosure-mounted control and pilot device.

3.4 CONTROL WIRING INSTALLATION

A. Install wiring between enclosed controllers and remote devices. Comply with requirements in Section 260523 "Control-Voltage Electrical Power Cables."

B. Bundle, train, and support wiring in enclosures.

C. Automatic-control selection devices where applicable.
1. Connect selector switches with enclosed-controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed controller, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Inspect controllers, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
2. Test insulation resistance for each enclosed-controller element, component, connecting motor supply, feeder, and control circuits.
3. Test continuity of each circuit.
4. Verify that voltages at controller locations are within plus or minus 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Engineer before starting the motor(s).
5. Test each motor for proper phase rotation.
6. Perform each electrical test and visual and mechanical inspection stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

8. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

D. Enclosed controllers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports including a certified report that identifies enclosed controllers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.6 ADJUSTING

A. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.

B. Adjust overload-relay heaters or settings if power factor correction capacitors are connected to the load side of the overload relays.

3.7 PROTECTION

A. Replace controllers whose interiors have been exposed to water or other liquids prior to Substantial Completion.

3.8 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers, and to use and reprogram microprocessor-based, reduced-voltage solid-state controllers.

END OF SECTION 262913

SECTION 265119 - LED INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior solid-state luminaires that use LED technology.
2. Lighting fixture supports.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. LED: Light-emitting diode.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaires.
4. Include emergency lighting units, including batteries and chargers.
5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
6. Photometric data and adjustment factors based on laboratory.

a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Product Certificates: For each type of luminaire.

C. Product Test Reports: For each luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.7 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

B. Provide luminaires from a single manufacturer for each luminaire type.

C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.9 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Recessed Fixtures: Comply with NEMA LE 4.

C. Bulb shape complying with ANSI C79.1.

D. CRI of minimum 80. CCT of 3500 K.

E. Rated lamp life of 50,000 hours.

F. Lamps dimmable from 100 percent to 0 percent of maximum light output.

G. Internal driver:
1. Minimum efficiency: 85% at full load.
2. Minimum Operating Ambient Temperature: -20˚ C. (-4˚ F.).
3. Input Voltage: 120 - 277V (±10%) at 60 Hz.
4. Integral short circuit, open circuit, and overload protection.
5. Power Factor: ≥ 0.95.
6. Total Harmonic Distortion: ≤ 20%.
7. Comply with FCC 47 CFR Part 15.

H. LED Modules:
1. Comply with IES LM-79 and LM-80 requirements.
2. Minimum CRI 80 and color temperature 4200˚K unless otherwise specified in LIGHTING FIXTURE SCHEDULE.
3. Minimum Rated Life: 50,000 hours per IES L70.
4. Light output lumens as indicated in the LIGHTING FIXTURE SCHEDULE.

I. Nominal Operating Voltage: 120 V ac.

J. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

K. Housings:

1. Extruded-aluminum or painted stamped steel housing and heat sink.
2. Powder-coat painted finish.

2.2 INDUSTRIAL GLOBE

A. Manufacturers: Subject to compliance with requirements, provide products as scheduled on the drawings.

B. Minimum 1800 lumens. Minimum allowable efficacy of 80 lumens per watt.

C. With integral mounting provisions.

2.3 WALL PACK

A. Manufacturers: Subject to compliance with requirements, provide products as scheduled on the drawings.

B. Minimum 8,000 lumens. Minimum allowable efficacy of 80 lumens per watt.

2.4 HIGHBAY, NONLINEAR

A. Manufacturers: Subject to compliance with requirements, provide products as scheduled on the drawings.

B. Minimum 18,000 lumens. Minimum allowable efficacy of 80 lumens per watt.

C. Universal mounting bracket.

D. Integral junction box with conduit fittings.

2.5 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

C. Diffusers and Globes:

1. Prismatic glass.
2. Glass: Annealed crystal glass unless otherwise indicated.
3. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

D. Housings:

1. Extruded-aluminum or painted stamped steel housing and heat sink.
2. Powder-coat painted finish.

E. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

a. "USE ONLY" and include specific lamp type.
b. Lamp diameter, shape, size, wattage, and coating.
c. CCT and CRI for all luminaires.

2.6 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.7 LUMINAIRE FIXTURE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

D. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before fixture installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the Engineer, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.3 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.

E. Wall-Mounted Luminaire Support:

1. Attached to a minimum 20 gauge backing plate attached to wall structural members.

F. Suspended Luminaire Support:

1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.

G. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 265119

SECTION 33 0910 – SEQUENCE OF OPERATION

PART 1 - GENERAL

1.1 RELATED INFORMATION

A. The following sequence of operation describes the automatic and manual operation of equipment that is directly controlled by the R.T.U. system. Equipment that is operationally a stand-alone unit is not described under this section but shall be considered an integral part of the whole system when incorporating these sequences of events in order to provide for a complete operating system. Items shown or described in one section but not in the other shall be provided. Operating and alarm levels and conditions stated in this document are based on nominal values and may be field adjusted as required.

B. The R.T.U. shall be compatible with the County's SCADA system.

1.2 ALARM ANNUNCIATION

A. Audible alarms shall be able to be silenced locally, while maintaining visual display until the alarm condition is cleared. Every alarm condition shall require manual acknowledgement. Alarms shall be annunciated at the Well Pump Panel.

B. The following conditions shall be monitored by the R.T.U. system:

1. H-O-A Status
2. Power Failure
3. Well Pump Failure
4. Well Pump Running
5. Tank HWL Alarm (high water level exceeded)
6. Tank LWL Alarm (low water level exceeded)

C. The following conditions shall be annunciated as alarms at the Well Pump Panel (or location designated by owner):

1. Motor Seal Leak
2. Motor High Temperature
3. Phase Monitor Fault
4. Tank HWL Alarm (high water level exceeded)
5. Tank LWL Alarm (low water level exceeded)

1.3 FIRE SUPPRESION WATER SYSTEM

A. The new Powhatan Tank and well will be a standalone fire suppression system for the new Transportation Maintenance Facility and the new Powhatan Middle School. The water system shall operate as follows:

1. The well pump operation shall be controlled by the R.T.U. system based on the tank level in the new on-site elevated tank.
2. If the demand is such that the level drops to the Low Water Level in the tank, the R.T.U. shall call for well pump to start.
3. Pump shall operate until the High Water Level is achieved in the elevated tank.
4. The pump shall not operate if:

a) The tank is at HWL.

b) Alarms have not been cleared manually.

5. The pump shall be shut off using the following procedure.

a) If the elevated storage tank achieves the high water level, well pump shall turn off.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION 33 0910

SECTION 33 1123 – WATER SUPPLY WELL

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The work to be completed under these specifications includes the furnishing of all labor, materials, transportation, tools, supplies, equipment and appurtenances, unless specifically excepted, necessary for the complete and satisfactory construction, development and testing of a new water supply Class IIB well. Also included in the scope is the execution of sampling, drill logging, and recording of related information required by the Virginia Department of Health (VDH). At a minimum the scope shall include:

1. Drilling a well to a maximum depth of approximately 400 feet and a minimum capacity of approximately 50 gpm.
2. Cement grout for a Class IIB well.
3. Furnish test pump.
4. 48-hour Well Drawdown and Yield Test.
5. 6-hour Recovery Test.
6. Disinfect well as required by VDH Office of Drinking Water (ODW).
7. Plumbness and alignment test report.
8. Complete and submit a signed copy of a Well Completion Report (VDH Form GW-2), Well Yield and Drawdown Report, Well Recovery Report, and Geophysical Log.
9. Chemical, physical, and radiological sampling/testing per VDH-ODW requirements.
10. Meet all other requirements set forth by VDH where applicable.
11. Coordinate with VDH. The well driller must notify in advance the appropriate ODW Field Office of the date and time of specific construction activities as required.

B. Prior to ordering and installation of the production well pump, Contractor shall provide the Well Completion Report and pump product data and pump curve to the Engineer for approval.

C. The Engineer shall confirm that the proposed production pump is satisfactory for permanent installation.

D. The well driller shall be a National Ground Water Association Master Groundwater Contractor.

1.2 REGULATIONS

A. General: All work, details, materials and procedures shall comply with the effective Virginia Department of Health (VDH) well construction requirements set forth in the Waterworks Regulations.

B. Utilities: The Contractor is responsible for having the appropriate local authorities locate all utilities in the working areas.

C. Setback Distances: The well shall be at least 50 feet from any sewer pipe, septic system, or any other source of potential contamination.

PART 2 - PRODUCTS

2.1 DRILLING WATER

A. Potable drilling water must be provided by the Contractor. Where water lines cross vehicle traffic, a steel pipe shall be used to prevent breaks and leaks.

2.2 MATERIALS

A. Materials used in well construction shall meet the requirements of the Virginia Department of Health Waterworks Regulations and be NSF-61 approved.

2.3 PUMP

A. The test pump shall be suitable for drinking water applications and at no time shall have been used to convey any substance capable of introducing contaminates to the drinking water supply.

2.4 WELL ACCESSORIES

A. An airline of sufficient length to maintain submergence at stabilized water surface elevation, pressure gauge with diaphragm and fitting (for compression attachment to the well below), shall be installed. Contractor shall submit product data sheets to the Engineer for approval prior to installation.

PART 3 - EXECUTION

3.1 EQUIPMENT

A. All equipment necessary to do all phases of work shall be in good operating condition.

3.2 MUD PITS

A. For the circulation of the drilling fluid and cuttings, mud pits may be dug. Above the surface, deep and broad tubs may also be used. Appropriate erosion and sediment control measures shall be implemented as set forth in the latest edition of the Virginia Erosion and Sediment Control Handbook.

3.3 GEOPHYSICAL LOG

A. An accurate and detailed Geophysical Log of the materials penetrated shall be recorded by a qualified individual using the United Soil Classification System (USCS). The log shall be based directly on drilling cuttings and kept continuously during drilling operations. At a minimum, the log shall contain the following: descriptions, grain size, colors, depth, consolidation, and thicknesses of the strata encountered; measured losses of drilling fluids; and any other data that may be useful in the interpretation of the subsurface materials and conditions for constructing the well.

3.4 WELL CONSTRUCTION

A. Measurements: All materials assembled (i.e., casing and other pieces) and equipment used for assembly (e.g., conductor pipe) shall be carefully measured during assembly.

B. Riser Pipe Joints: Joints and caps shall be threaded. Glues are not permitted.

C. Removal of Drilling Fluid: To reduce development time and provide for better well efficiency, the drilling fluid shall be flushed out of the hole with a conductor pipe, placed within 1 foot of the bottom of the hole. During this procedure, chlorinated water shall be pumped into the well. Circulate chlorinated water through the drill pipe until the returning fluid is clean.

D. Grouting: The annular space between the bore hole and the casing shall be filled with cement grout, screened through 1/4-inch mesh to keep out lumps, through the conductor pipe in one continuous operation, upward from the bottom, until pure grout overflows at the land surface. Type II neat Portland cement shall be used with 6 gallons of water per 94-pound sack of cement or in accordance with the State regulations. No additional work shall be done on the well until at least 12 hours after the grouting is completed.

E. Top of Well: The well casing shall extend a minimum of 24 inches above the land surface, and have a metallic cap with watertight seal.

F. Well Slab: Subsequent to Substantial Completion and prior to Final Acceptance, a concrete (4,000 psi) slab measuring a minimum of 7 feet by 7 feet by 6 inches thick is to be constructed around the exposed casing. The exposed casing is to be in the center of the concrete slab. The concrete slab surface shall be sloped at approximately ¼" per linear foot to provide positive drainage away from the well head.

G. Local Disconnect: A local disconnect shall be mounted on a stainless steel unistrut and anchored to the concrete slab.

3.5 PUMP TEST

A. The Contractor shall perform a 48-hour drawdown test with the well to confirm the well yield, and to obtain samples for water quality analysis.

B. Equipment: The Contractor shall provide the following equipment for the 48-hour test:

1. Test pump capable of pumping the maximum well yield.
2. A variable frequency drive or other means of adjusting the pump speed.
3. A flow meter or other accurate means of measuring the flow rate.
4. Discharge piping.
5. Airline and pressure gauge.
6. Air compressor.
7. Generator.

C. Discharge: The Contractor shall furnish all necessary discharge piping, without leaks, to direct the water for disposal to avoid erosion, nuisance, discoloration of streets and pavements, flooding, or endangerment of adjacent property. The Contractor will be responsible for any such damage or flooding on or off the site.

D. 48 Hour Test Procedure: The Contractor shall pump water out of the well continuously for a total of 48 hours. The Contractor shall measure and record the depth of water in the well every 15 minutes during the test.

E. Water Sampling: The Contractor shall obtain sample bottle test kit from a state approved laboratory, take samples and deliver samples to a state approved laboratory to analyze water samples. The water samples shall be collected from the well discharge immediately before the end of the 48-hour well pumping test and transported to the laboratory within the time required to obtain valid test results.

3.6 CONTAMINATION

A. The Contractor shall use due precaution to maintain the premises in a sanitary condition and prevent the entrance of surface water or any other matter into the well to keep the well safe from contamination. The Contractor shall be responsible for any objectionable material that may fall into the well and any effect it may have on water quality or quantity.

3.7 TEMPORARY CAPPING

A. At all times during the progress of the work, the Contractor shall protect the well with temporary capping in such a manner as to prevent effectively either tampering or the entrance of foreign matter. After testing and disinfection, the Contractor shall furnish and install a watertight cap.

3.8 ABANDONMENT OF WELL

A. In the event that the Contractor fails to complete construction of the well or should he abandon any well because of loss of tools or for any other cause, if ordered by the Owner, he shall fill the abandoned hole(s) as required by VDH regulations. Salvaged material furnished by the Contractor shall remain his property. No payment will be made for any items whatsoever under the contract.

3.9 COMPLETION OF OPERATIONS

A. The site shall be left in an orderly and clean condition as when work began.

3.10 FINAL REPORT

A. Two copies of a report shall be submitted to the Owner within two weeks after the laboratory data is received by the Contractor. The report shall include the following:

1. State Water Well Completion Report
2. Well test data
3. Laboratory data
4. All logs

END OF SECTION 33 1123

SECTION 33 1133 – WELL PUMP

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Publications listed below form part of this specification to extent referenced in the text by basic designation only. Consult latest edition of publication unless otherwise noted.

1. American National Std. Institute (ANSI) / American Water Works Assoc. (AWWA)
2. American Society for Testing and Materials (ASTM)
3. Institute of Electrical and Electronics Engineers (IEEE)
4. National Electric Code (NEC) / National Electrical Manufacturers' Assoc. (NEMA)

1.2 SUBMITTALS

A. Product Data

1. Contractor shall submit 6 copies of submittal data for review and approval. Submittals shall include shop drawings, electrical ladder logic drawings, and support data.

B. Operations and Maintenance Manuals

1. Contractor shall submit 6 copies of submittal data for review and approval. Operation and maintenance instructions must be provided for the pump and control system and must be specific to equipment supplied in accordance with these specifications.

1.3 MANUFACTURER'S WARRANTY

A. The pump manufacturer shall warrant all equipment to be of quality construction, free of defects in material and workmanship for a period of 18 months from date of installation. A written warranty shall be furnished to the owner.

PART 2 - PRODUCTS

2.1 UNITARY RESPONSIBILITY

A. In order to unify responsibility for proper operation of the system, it is the intent of these Specifications that all system components including pump, motor, and control panel shall be furnished by a single supplier (unitary source). Acceptable manufacturers are Goulds, Grundfos, or approved equal.

2.2 WELL PUMP

A. The pump shall be submersible, vertical deep well turbine style with multiple bowls, designed and constructed in accordance with AWWA E101. The pump size shall be determined upon completion of well development and testing. Well pump submittals shall be approved by the Engineer prior to acceptance to meet the design criteria specified in this specification section and on the pump curve shown on the drawings. The pump shall be designed for continuous submerged operation.

B. Pump, column check valve, cable, motor and control panel shall be the single responsibility of the pump manufacturer.

C. Pump: The pump shall have a discharge housing with integral check valve, protection against upthrust and motor thrust bearing to absorb downthrust. Each impeller shall be fitted with a seal ring around its eye or skirt to prevent hydraulic losses. A filter screen shall be included on the suction inlet assembly.

D. Materials of Construction: the pump bowls, impellers, guide vanes, strainer, and check valve shall be 304 stainless steel. The pump shaft shall be 431 stainless steel.

E. Impellers: The impellers shall be the enclosed type and shall be free from defects and must be accurately cast, machined, balanced, and filed for optimum performance and minimum vibration.

F. Submersible Cable: The pump cable shall be sized to limit the voltage drop to no more than 5%. The cable shall have three separate conductors, and a ground. Each conductor shall be insulated separately with a synthetic rubber or plastic insulation suitable for continuous immersion in water and shall be water and oil resistant. The cable should be the length of the column pipe plus extend from the well plate to pump electrical controller. The cable should be adequately secured to the column pipe by plastic ties, or other non-metallic means, at 10-foot intervals. It should conform to NEC codes and be shielded when passing bowls.

G. Submersible Electric Motor: The motor shall be a heavy duty submersible type NEMA design for 4" motors, 3450 rpm and inverter duty rated. The motor shall be capable of continuous operation under water. A suitable thrust bearing shall be incorporated in the lower end of the motor adequate to receive the entire hydraulic thrust load of the pump unit plus the weight of the rotating parts regardless of the direction of rotation. The motor shall have a 1.15 service factor, and shall be suitable for use on a 230 volt, three phase electric service. The motor leads shall be protected against the pump with a 304 stainless steel cable guard held in place with stainless steel banding. As the motor lead exits the top of the cable guard it shall be properly protected to prevent damaging or cutting the lead by the cable guard material.

H. Check Valve: The column check valves shall be installed to prevent backflow. Valves shall be either bronze or ductile iron designed for minimum head loss, to provide a positive seal under high or low pressure applications. The lowest check valve shall be installed within 20' of the pump discharge. Valves shall be lead and zinc free, and rated at a minimum 425 psi. All internal components except the nitrile seal shall be stainless steel.

2.3 CONTROLS

A. The well pump control panel shall be provided by the well pump manufacturer. The control panel shall work with the level transducer and R.T.U. system to control the operation of the well pump.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The well pump and all appurtenances shall be installed in accordance with the well pump manufacturer's recommendations and requirements.

3.2 CONTAMINATION

A. The Contractor shall use due precaution to maintain the premises in a sanitary condition and prevent the entrance of surface water or any other matter into the well and keep the well safe from contamination. The Contractor shall be responsible for any material that may fall into the well and any effect it may have on water quality or quantity.

B. The well pump and piping installation shall come complete with all appurtenances and shall be disinfected and tested in accordance with VDH Waterworks Regulations.

END OF SECTION 33 1133

SECTION 33 1233 – SUBMERSIBLE MIXER

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. This section covers submersible tank mixing systems up to 0.5 HP in size intended for continuous use while submersed in potable water storage tanks. Each mixer shall have the ability to function continuously on a year-round basis, regardless of drain and fill cycles. Each mixer shall consist of a submersible motor, an impeller and a non-submersible control center that houses all control electronics.

1.2 THE REQUIREMENT

A. Contractor shall furnish and install submersible mixing system together with all drives, motors, controls, and accessories necessary for a complete and operable system.

B. Contractor shall furnish electrical conduit with 110-120 VAC disconnect switch or circuit breaker at the point of installation of the mixing system control center. Contractor shall also provide conduit from control center to tank penetration for submersible motor cable and penetration through tank above high water level for same cable.

1.3 CONTRACTOR SUBMITTALS

A. NSF Certification

1. Copies of the NSF-61 certified listing for all material being placed inside the tank and headspace, including the motor power cable.

B. Design Calculations

1. Based on models validated and/or calibrated with experimental data from laboratory-scale and real scale representative systems for similarly-sized reservoirs, manufacturer shall show completely mixed conditions for equipment configuration. The manufacturer shall provide documentation of the Computational Fluid Dynamics (CFD) model parameters and assumptions, tank geometry and dimensions considered, mesh information, and CPU time required.

2. Analysis should include the following sections:

a) Method of calibration reflecting field studies

b) Velocity vectors and contour plot at different cross-sections

c) The average flow induced throughout the tank

d) The corresponding average turnover for the tank (in hours)

e) The corresponding average power consumption of the mixer

C. Installation, Operations, and Maintenance Manuals shall be obtained from the equipment manufacturer and submitted. The following sections shall be included:

1. General equipment specifications and data sheets

2. Installation, start-up, operation, and maintenance instructions

3. Factory-recommended maintenance schedule

4. Wiring diagrams specifying what electrical wiring needs to be done onsite during and prior to the installation, and by which responsible party

5. List of equipment or tooling necessary for diagnostics, trouble-shooting, repair or general maintenance

1.4 QUALITY ASSURANCE

A. Each mixing system shall be tested prior to deployment according to standard engineering practices at the factory testing facilities. Certification of this completed testing shall accompany mixer installation documentation.

1.5 WARRANTY

A. For the period of time beginning with shipment to Buyer and ending on the time periods listed below, the Product is warranted to be substantially free from defects in material and workmanship and to conform to Seller's specifications applicable to the Product -

1. Five (5) years on all supplied parts
2. One hundred twenty (120) days labor

PART 2 - PRODUCTS

2.1 PERFORMANCE

A. Based on models validated and calibrated with experimental data from laboratory-scale and real scale representative systems for similarly-sized reservoirs, manufacturer shall show mixing system shall have an output flow-rate that is equal to, or larger than, the following:

1. For tanks 500,000 gallons and larger in volume, mixer shall output at least 10,000 GPM

B. In addition, mixing system shall completely mix reservoir according to the following minimum performance requirements.

1. Temperature Uniformity

a) For tanks 500,000 gallons and larger in volume: All temperatures shall converge to within 0.2°C within 24 hours after mixer is installed and activated. During continuous operation of the mixer, all temperatures will remain converged to within 0.2°C at least 75 percent of the time.

2. Disinfectant Residual Uniformity

a) For tanks 500,000 gallons and larger in volume: Disinfectant residual within top five feet of tank and bottom five feet of tank will converge to within 0.20 ppm within 2 days after mixer is installed and activated. During continuous operation of the mixer, disinfectant residual will remain converged to within 0.20 ppm at least 75 percent of the time.

2.2 GENERAL

A. Mixing system consists of an impeller mounted on a submersible motor and supported approximately three feet in height from the tank floor in order for it to launch a jet of water from the bottom of the tank up toward the surface of the water. Floating devices shall not be acceptable. Mixer duty cycle shall be variable with the size and volume of the tank. Mixer control and operation shall be independent of tank drain and fill cycles to ensure constant mixing. Wet-side of Mixer shall weigh less than 75 pounds (~34 kg) and dry-side shall weigh less than 50 pounds (~22 kg). Both wet-side and dry-side shall be able to be hoisted, installed, and/or removed by on-site personnel without additional equipment needed, and so that there is no crush hazard or entanglement hazard present, and so that weight of mixer on tank floor does not cause damage to interior coating.

B. Mixing system active components shall be elevated above tank floor to avoid disturbing accumulated tank sediment.

C. Mixers using submersible pump with slit or "water sheet" designs are not acceptable.

D. Power source for mixer shall be 110VAC grid power to allow unit to continue 24/7 operation where necessary.

2.3 CONSTRUCTION

A. Components - wet-side: The entire unit and all parts including motor and cable shall be NSF/ANSI Standard 61 certified and listed on NSF's website.

B. Equipment entering tank shall not adhere to, scratch, or otherwise cause damage to internal tank coating or put undue stress on the materials of the tank construction. Equipment shall fit through a roof hatch on tank.

C. Each submersible mixer shall consist of the following components, regardless of the power source selected:

1. Impeller

a) AISI Type 316 Stainless Steel

b) Balanced to within 0.5 gram-inches

c) Passivated per ASTM A380 to minimize corrosion

d) Not more than 8 inches in overall height

e) Not more than 4.5 inches in diameter

f) Not more than 2.4 lbs. in weight

g) Shall not create cavitation at any rotational speed up to 2500 RPM

2. Motor

a) AISI Type 304 Stainless Steel body

b) Chlorine/Chloramine resistant rubber seals

c) Fully submersible

d) Low power (0.5 HP maximum)

e) Water-filled motor

f) Water-lubricated motor

3. Mounting Tripod

a) AISI Type 316 Stainless Steel

b) Three-foot long detachable legs or pedestal mount

c) NSF/ANSI Standard 61 certified EPDM rubber, non-skid, non-scratch feet or insulating pad

d) Attachments secure motor cable away from impeller

e) Overall weight of wet-side unit not to exceed 75 lbs. to avoid damaging tank floor

f) Overall height of unit not to exceed 5 ft.

D. Components - dry-side: Each 110VAC control center shall consist of the following components:

1. Enclosure

a) Lockable

b) Weather Resistant

c) Overall weight of control center not to exceed 50 lbs.

d) Green and Red LED Indicator lights show motor status

2. Motor Controller/VFD

a) Rated to 1.0 HP

b) Operating temperature range -30°C up to 50°C (-34°F to 122°F)

c) Manual speed control (potentiometer)

d) Thermal shut-off protection built-in

e) Current overload protection built-in

f) SCADA outputs included:

(1) Digital Output signal indicating motor running

(2) Digital Output signal indicating fault alarm

(3) Digital Input/output signal allowing remote motor on/off

(4) RS-232 (MODBUS) or RS-485 or Dry Contact connections

3. GFCI-protection

a) 120-volt, 60-Hz, single-phase GFCI included inside control center

b) 40-Amp, 300mA trip level

2.4 CONTROLS

A. Each unit shall be equipped with all necessary controls, interwired, to provide the following minimum functions:

1. On/Off switch to control power to mixer.

2. Automatically-activated motor shut-off if water level drops below motor height in tank.

3. Any other controls shown on electrical and instrumentation drawings.

2.5 ACCEPTABLE MANUFACTURERS:

A. PAX Water Technologies (Richmond, California), or engineer pre-approved alternate.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The contractor shall furnish services of a factory-trained installation contractor or crew having experience with installation procedures and operation and maintenance requirements for the type of equipment installed under these specifications. Mixer must be able to be installed without draining tank or taking tank out of service. Wet-side of Mixer shall weigh less than 75 pounds (~34 kg) and dry-side shall weigh less than 50 pounds (~22 kg). Both wet-side and dry-side shall able to be hoisted, installed, and/or removed by on-site personnel without additional equipment needed, and so that there is no crush hazard or entanglement hazard present, and so that weight of mixer on tank floor does not cause damage to interior coating.

B. Tank penetration shall be above tank high water line through the hatch side-wall.

1. Fitting shall prevent moisture intrusion into tank and be horizontally oriented.

2. Fitting shall be 1-inch diameter fitting to allow cable to pass through.

3. Strain relief for power cable shall be provided.

C. Installation of the in-tank ("wet-side") components may be performed in any of the following ways:

1. Installation by a factory-trained and drinking-water-certified potable water tank diver.

2. Installation by personnel with confined space training while the tank is drained and empty.

3. Installation by tank manufacturer personnel during tank manufacture.

3.2 TRAINING

A. Mixer manufacturer (or their representatives) will instruct designated Owner personnel in the safe and proper operation of the mixer and controls. This training will reference the operations manual provided with equipment, and show how to check for proper functioning of the equipment.

END OF SECTION 33 1233

SECTION 33 1619 – ELEVATED WATER STORAGE TANK

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The scope of work defined by this specification section includes all labor, materials, and equipment required to design, construct, coat, inspect, test, and disinfect the elevated tank, including the foundation and accessories.

1.2 SYSTEM DESCRIPTION

A. The elevated tank shall be a single pedestal style elevated tank constructed of welded steel plate. The tank shall consist of a self-supporting spherical roof, toroidal upper shell, conical lower shell, conical bottom within the support structure, and a cylindrical access tube at the center. The support structure shall consist of a cylindrical section (shaft) and a conical base section (bell). The tank and support structure shall be supported by a reinforced concrete foundation.

1.3 REFERENCES

A. The following references, in the editions noted, shall be considered part of the specifications:

1. American Concrete Institute

   ACI 318 Building Code Requirements for Structural Concrete, 2014 Edition

2. American Water Works Association

   ANSI/AWWA D100 Standard for Welded Carbon Steel Tanks for Water Storage, 2011 Edition

   ANSI/AWWA D102 Standard for Coating Steel Water Storage Tanks, 2014 Edition

3. U.S. Department of Labor

   OSHA Occupational Safety and Health Standard, 29CFR, Part 1910, Current Edition

1.4 SUBMITTALS

A. The Contractor shall submit the following items to the Owner, unless otherwise noted:

1. Design Summary. The design summary shall include a summary of the loads considered in the design of the tank, support structure, and foundation, and a summary of the foundation design. Provide six copies of the design submittal. Each copy shall be stamped by a professional engineer registered in the state of Virginia.

2. Construction Drawings. Construction drawings shall show assembly instructions, major dimensions, thicknesses, materials of construction, weld details, welding procedure specifications, and special requirements. Construction drawings shall be submitted for the tank, support structure, accessories, and foundation. Provide six copies of the construction drawings. Each copy shall be stamped by a professional engineer registered in the state of Virginia.

3. Concrete Mix Designs. Concrete design mixes shall show mix parameters and intended results. Concrete mix designs shall be submitted for the foundation, floor slab, and miscellaneous items such as thrust blocks. Provide six copies of each concrete mix design.

4. Concrete Test Results. Concrete test results shall show test results for air entrainment, slump, water-cement ratio, and compressive strength. Provide one copy of all concrete test results.

5. Material Test Results. When requested, material test reports showing mechanical and chemical test results for steel plate used in the construction of the tank and support structure shall be submitted. Provide one copy of each material test result.

6. Welder Certifications. When requested, a certification showing evidence of current certification by welding procedure specification shall be submitted for each welder. Provide one copy of each welder certification.

7. Radiographic Inspection Report. The radiographic inspection report shall include a weld joint record, evaluation reports for all radiographic shots, and all radiographic film. The joint weld record shall show the welds made by each welder and the location of all radiographic shots. Provide one copy of the radiographic inspection report.

8. Method 2 or Method 3 Certification. For shells designed by Method 2 or Method 3 of ANSI/AWWA D100, a certification that the as-built shell meets the required tolerances shall be submitted. Provide one copy of the Method 2 or Method 3 certification.

9. Product Data. Product data (e.g., catalog cuts, manufacturer's data sheet, MSDS's) shall be submitted for ladder safety devices, all electrical equipment, buried/floor piping, and coating materials. Submittals for buried/floor piping shall include product data for the pipe, valves, and fittings. Provide six copies of all product data.

10. Clean and Painting Instructions. The instructions shall include descriptions of the coating systems, surface preparation requirements for each system, coating application requirements (including dry film thicknesses) for each system, and disinfection requirements. Provide six copies of the cleaning and painting instructions.

11. Operating and Maintenance Manual. The operating and maintenance manual shall include information for safe operation and maintenance of the tank and equipment; as-built drawings of the tank, support structure, and foundation; and catalog cuts for significant equipment. Provide three copies of the operating and maintenance manual.

1.5 QUALITY ASSURANCE

A. Quality and workmanship shall meet the requirements of ANSI/AWWA D100, ACI 318, and the specifications.

1.6 DELIVERY, STORAGE, AND HANDLING

A. The contractor shall handle and store materials and fabricated components in a manner that will protect them from damage. Store materials and fabricated components in well drained areas and provide blocking to minimize contact with the ground.

1.7 PROJECT SITE CONDITIONS

A. The Contractor shall provide and maintain access from public roads to the site unless otherwise specified.

B. The Contractor shall perform all work in a safe manner and shall comply with applicable health and safety regulations of OSHA and state and local regulatory agencies, and material safety data sheet (MSDS) recommendations.

1.8 WARRANTY

A. All work shall be guaranteed by the Contractor for a period of one (1) year from the date of substantial completion against faulty design, defective materials, and faulty workmanship. Substantial completion shall be the date the elevated tank is placed, or available to be placed, in service.

B. Material, equipment and installation shall meet requirements of applicable codes and standards listed below. Electrical material and equipment shall bear the UL label except where UL does not label such types of material and equipment.

C. Reference to standards are referred to by abbreviation as follows:

1. Certified Ballasts Mfg CBM

2. Electrical Testing Lab ETL

3. National Fire Protection Association NFPA

4. National Electrical Code (NFPA No. 70) NEC
5. Underwriters' Laboratories, Inc. UL
6. National Electrical Manufacturers' Association NEMA
7. Institute of Electrical & Electronics Engineers, Inc. IEEE
8. Insulated Power Cable Engineers Association IPCEA
9. National Electrical Safety Code NESC
10. Illuminating Engineering Society IES
11. Edison Electric Institute EEI
12. Electronic Industries Association EIA
13. American Concrete Institute ACI
14. American National Standards Institute ANSI
15. American Society for Testing and Materials ASTM
16. Virginia Statewide Building Code VAS BC

D. Association of Edison Illuminating Companies AEIC

PART 2 - PRODUCTS

2.1 SYSTEM PERFORMANCE

A. System Parameters

1. The tank and support structure shall be a single pedestal spheroid style elevated tank.
2. The tank and support structure shall comply with the capacity and head range parameters shown on the plans.

B. Design Requirements

1. Design of the steel tank and support structure shall be in accordance with ANSI/AWWA D100. Design of the foundation shall be in accordance with ACI 318.
2. Unfactored load combinations and design of the tank and support structure shall be in accordance with ANSI/AWWA D100.
3. Factored load combinations and design of the foundation shall be in accordance with ACI 318. The size of the foundation shall be determined using the unfactored load combinations of ANSI/AWWA D100.
4. Loads shall be determined and applied in accordance with ANSI/AWWA D100.

2.2 TANK AND SUPPORT STRUCTURE

A. The tank and support structure shall comply with the following:

1. Materials shall be in accordance with ANSI/AWWA D100.
2. All joints within the tank and support structure that are subject to primary membrane force due to the weight or pressure of the stored water shall be welded for complete penetration.
3. Pressed knuckles shall be provided at the tank-to-shaft and the shaft-to-bell transitions. The knuckles shall be double curved to provide a smooth transition between the tank and shaft and between the shaft and bell.

4. The minimum thickness for elements in contact with the stored water shall be 0.25 inches. The minimum thickness for elements not in contact with the stored water shall be 0.1875 inches.
5. No additional thickness is required for corrosion allowance.
6. The underside of the roof shall be seal welded.

2.3 FOUNDATION AND FLOOR SLAB

A. The foundation and floor slab shall comply with the following:

1. Materials shall be in accordance with ACI 318.
2. Minimum specified 28-day compressive strength f'c shall be 4,000 psi.
3. Reinforcing steel shall be in accordance with ASTM A615 grade 60.
4. The minimum foundation depth below finish grade shall be 3 feet based on extreme frost penetration.

2.4 ACCESSORIES

A. Accessories shall comply with the requirements of Section 5 of ANSI/AWWA D100. Materials shall be in accordance with ANSI/AWWA D100 where appropriate. The minimum thickness for elements in contact with the stored water shall be 0.25 inches. The minimum thickness for elements not in contact with the stored water shall be 0.1875 inches.

B. Supply/discharge

1. The tank supply/discharge shall consist of ductile iron pipe from the buried base elbow to the flanged expansion joint (buried/floor piping), and welded steel pipe from the flanged expansion joint to the tank bottom (vertical piping) as shown on the design drawings. The supply/discharge shall be as shown on the drawings and shall comply with the following requirements.
2. Buried/Floor Piping
   a) Buried/floor piping shall be constructed of ductile iron pipe, diameter as specified on design drawings, and shall be in accordance with the Chesterfield County Department of Public Utilities Specifications.
   b) Floor piping shall be as shown on the drawings. Gate valves and check valves shall comply with the requirements of the Chesterfield County Department of Public Utilities Specifications.
   c) Provide thrust blocks and piping supports as shown on the drawings, and in accordance with the Chesterfield County Department of Public Utilities Specifications.
   d) Minimum pipe cover shall be 3.5 feet.
3. Vertical Piping
   a) Vertical piping shall be constructed of 12-inch diameter (0.33-inch wall thickness), standard weight steel pipe that complies with ASTM A53/A53M. Field splices shall be partial penetration welds unless otherwise specified. Provide a flanged connection at the base of the vertical pipe run. The interior of the pipe shall be unlined and uncoated.
   b) Provide a flanged expansion joint at the base of the vertical pipe run as shown on the drawings.
   c) Vertical piping shall be supported from the tank bottom and shall be laterally braced from the shaft.
   d) Provide one 1.0-inch diameter threaded coupling in the vertical pipe run. The coupling shall be located 6 feet above the TOF and shall be welded into the pipe. Provide threaded pipe, threaded bronze corporation stops, threaded tees, threaded ball valves, threaded pressure gauge, and threaded pressure transmitter as shown on the drawings.

C. Overflow

1. The overflow shall consist of a siphon entrance, welded steel pipe, and discharge as shown on the drawings. The overflow shall comply with the following requirements.

   a) The overflow shall be capable of discharging at a rate of 1,500 gpm with a freeboard of not more than 6 inches above the TCL.

   b) Overflow piping shall be constructed of 12-inch diameter, schedule 20 (0.25-inch wall thickness) steel pipe that complies with ASTM A 53/A53M. All elbows shall be mitered. All pipe splices shall be partial penetration welds unless otherwise specified. The interior of the pipe shall be unlined and uncoated.

   c) Overflow piping shall be laterally supported from the bell, shaft, and access tube.

   d) The overflow shall terminate outside the support structure and discharge downward onto a concrete splash block. The discharge shall be approximately 2 feet above the top of the splash block. The discharge shall be equipped with a bolted connection that will accommodate a removable, number 4, stainless steel screen.

D. Tank Drain

1. Provide a 6-inch diameter tank drain as shown on the drawings. The tank drain shall be located at the lowest point of the tank and shall drain to the overflow. The drain shall include a freeze-proof valve that is connected to the overflow by a flexible hose.

E. Tank Vent

1. Provide a pressure-vacuum tank vent mounted on the roof exhaust opening. The tank vent shall be constructed of aluminum and shall have a screen of 2 by 2 aluminum wire cloth. Vent details shall allow for easy disassembly and cleaning. The tank vent shall be designed to relieve pressure differentials caused by maximum inflow and outflow rates. The maximum inflow rate is estimated to be 50 gpm and the maximum outflow rate is 4,500 gpm. The tank vent shall have pressure and vacuum pallets that are designed to relieve pressure differentials in the event the screen frosts over or is otherwise clogged. The pressure and vacuum pallets shall be self-correcting.

F. Access Openings and Doors

1. Provide access openings and doors as shown on the drawings and described below.

   a) Personnel Door. Provide a 36-inch wide by 80-inch high personnel door in the base of the support structure. The personnel door shall be constructed of steel plate and shall include a drip hood, handle, and dead bolt lock. The threshold shall be flush with the base plate with a 0.50-inch door stop.

   b) Access Tube. Provide a 60-inch diameter access tube at the center of the tank for access from the top platform to the roof.

   c) Tank Bottom Manhole. Provide one 24-inch diameter manhole in the tank bottom for access to the tank interior. The manhole shall be operable from the tank bottom ladder. The manhole shall have a water-tight gasket. Provide one spare gasket.

   d) Painters Hatch. Provide one 24-inch diameter hatch in the support structure for access to the exterior painters' rails. The hatch shall have a drip bar and hinged cover.

   e) Access Tube Hatch. Provide one 30-inch hatch in the top of the access tube for access to the roof. The hatch shall have a hinged cover that is spring-assisted for ease of opening.

   f) Roof Hatch. Provide one 30-inch hatch in the roof for access to the inside tank ladder. The hatch shall have a hinged cover and hasp for locking.

   g) Roof Exhaust Opening. Provide one 24-inch diameter exhaust opening in the roof. The opening will be utilized for ventilation during painting operations and shall be flanged to match the tank vent.

G. Ladders, Platforms, Railings, and Ladder Safety Devices

1. Provide ladders, platforms, and railings as shown on the drawings and described below. All ladders, platforms, railings, and ladder safety devices shall comply with OSHA.

    a) Condensate/Bottom Platform. Provide a full platform at the base of the shaft. The platform shall be constructed of steel plate. The ladder opening shall be a 30-inch hatch with hinged cover. The condensate/bottom platform shall also function as a condensate ceiling. Provide a 2-inch diameter drain with check valve that connects to the overflow.

    b) Top Platform. Provide a full platform directly beneath the tank bottom. The platform shall be constructed of steel plate. The ladder opening shall be a 30-inch hatch with hinged cover.

    c) Support Structure Ladders. Provide ladders for access from the floor slab to the condensate/bottom platform, and from the condensate/bottom platform to the top platform. All support structure ladders shall be equipped with ladder safety devices. Ladder extensions shall be provided at the condensate/bottom and top platforms.

    d) Tank Bottom Ladder. Provide a ladder for access from the top platform to the tank bottom manhole.

    e) Access Tube Ladder. Provide a ladder inside the access tube for access from the top platform to the roof. The access tube ladder shall be equipped with a ladder safety device.

    f) Inside Tank Ladder. Provide a ladder on the outside of the access tube for access from the roof hatch to the tank bottom. The ladder shall be equipped with a ladder safety device.

    g) Roof Railing. Provide a circular standard railing with toeboard that encompasses the vent and all centrally located hatches.

    h) Ladder Safety Device. Ladder safety devices shall be an OSHA approved fall prevention system. Ladder safety devices shall be a galvanized cable type system. Provide two harnesses and two sleeves.

H. Painters Rails

1. Provide three exterior painters rails near the top of the support structure as shown on the drawings. The painters rails shall be accessible from the painters hatch.

I. Electrical

1. Provide electrical equipment as shown on the drawings and described below.

    a) Provide three 2-inch diameter schedule 40 PVC conduits through the ringwall for electrical cables. Conduits shall be at least 2 feet below finish grade. Conduits shall extend 8 feet outside the ringwall and 6 inches above the top of the floor slab.

    b) Provide a 4-foot wide by 3-foot high bent-plate mounting bracket for support of power and control panels. The mounting bracket shall be welded to the bell.

    c) Provide angle brackets for conduit support in the bell. The brackets shall be equally spaced and welded to the bell.

J. Provisions for Communication Equipment

1. Provisions for future communication equipment shall be as shown on the drawings and described below.

    a) Provide eight 6-inch diameter schedule 40 PVC conduits through the ringwall. Conduits shall be at least 2 feet below finish grade. Conduits shall extend 8 feet outside the ringwall and 6 inches above the top of the floor slab.

    b) Provide bent-plate brackets in the bell, shaft, and access tube for cable support. The brackets shall be equally spaced and welded to the support structure and access tube.

    c) Provide eight 6-inch diameter pipe sleeves in the condensate/bottom and top platforms. Provide one 6-inch diameter RSC rainproof gooseneck and seven 6-inch diameter pipe sleeves in the access tube cover. Provide caps for the pipe sleeves.

PART 3 - EXECUTION

3.1 FOUNDATION AND FLOOR SLAB

A. Construction, testing, and inspection of the foundation and floor slab shall comply with the following:

1. The ringwall shall each be placed monolithically.
2. Testing and inspection of reinforcing steel and concrete shall be in accordance with the Chesterfield County Department of Public Utilities Specifications.
3. Backfill, compaction, and testing shall be in accordance with the Chesterfield County Department of Public Utilities Specifications. Backfill within and outside the ringwall shall be compacted to 95%.

3.2 TANK, SUPPORT STRUCTURE, AND ACCESSORIES

A. Construction, testing, and inspection of the tank, support structure, and accessories shall comply with the following:

1. Fabrication (i.e., layout, cutting, forming, edge preparation, and workmanship) for the tank, support structure, and accessories shall be in accordance with ANSI/AWWA D100.
2. Erection of the tank, support structure, and accessories shall be in accordance with ANSI/AWWA D100.
3. Qualification of welding procedure specifications and welders, and general welding requirements shall be in accordance with ANSI/AWWA D100.
4. Inspection of the tank and support structure shall be in accordance with ANSI/AWWA D100.

3.3 COATINGS

A. Coatings shall be applied and inspected in accordance with ANSI/AWWA D102.

3.4 HYDROTEST AND DISINFECTION

A. Hydrotest and disinfection of the tank and piping shall comply with the following:

1. Hydrostatic testing shall incorporate disinfection. Hydrostatic testing and disinfection shall be performed not less than 7 days after the application of the final coat on the interior wet surfaces.
2. The tank and piping shall be disinfected in accordance with ANSI/AWWA C652 and ANSI/AWWA C651, respectively.
3. Hydrostatic testing and repair shall be in accordance with ANSI/AWWA D100. Coatings damaged during repair shall be repaired in accordance with the cleaning and painting instructions.
4. Water discharged during or after testing shall be coordinated with Powhatan County and shall not be allowed to adversely impact downstream drainage or wetlands. The contractor shall provide dechlorination if required.

END OF SECTION 33 1619

SECTION 40 7313 – PRESSURE GAUGES AND TRANSMITTERS

PART 1 – GENERAL

1.1 SUBMITTALS

A. Product Data

1. Contractor shall submit shop drawings and support data for review and approval.

PART 2 - PRODUCTS

2.1 PRESSURE GAUGE

A. Pressure gauge shall be oil filled and have bronze bourdon tube connected to a rotary gear movement. Dial shall be white coated metal with black numerals, minimum diameter of 4.5 inches, graduated from 0-100 PSI.

B. Gauge shall be manufactured by Ashcroft, U.S. Gauge, or equal.

C. Gauge shall be located as shown on plans and in accordance with details.

2.2 PRESSURE TRANSMITTER

A. Pressure transmitter shall have 316 stainless steel wetted materials suitable for drinking water applications and 304 stainless steel case. Electrical output shall be compatible with proposed R.T.U. system. Pressure range shall be 0-100 PSI with +/- 0.25% accuracy span. Durability shall exceed 10 million cycles.

B. Transmitter shall be manufactured by Ashcroft or equal.

C. Transmitter shall be located as shown on plans and in accordance with details.

PART 3 – EXECUTION – NOT USED

END OF SECTION 40 7313

APPENDIX A

THIS REPORT IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY. BIDDERS ARE RESPONSIBLE FOR ANY INFORMATION OR CONCLUSIONS DRAWN FROM THIS REPORT. BIDDERS ARE ENCOURAGED TO PERFORM THEIR OWN GEOTECHNICAL INVESTIGATION TO CONFIRM ASSUMPTIONS.

GEOTECHNICAL ENGINEERING REPORT

POWHATAN ELEVATED WATER STORAGE TANK
OLD BUCKINGHAM ROAD
POWHATAN COUNTY, VIRGINIA

JOB NUMBER: 37385

PREPARED FOR:

MOSELEY ARCHITECTS
3200 NORFOLK STREET
RICHMOND, VIRGINIA 23230

February 16, 2017

TIMMONS GROUP

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TABLE OF CONTENTS

APPENDICES

EXECUTIVE SUMMARY

For your convenience, this report is summarized in outline form below. This brief summary should not be used for design or construction purposes without reviewing the more detailed conclusions and recommendations contained in this report.

1. The subsurface exploration included a visual site reconnaissance, performance of three (3) test borings to a depth of approximately 60 feet below the ground surface, and quantitative laboratory testing.

2. The ground surface cover encountered at the boring locations consisted of approximately 1 to 2 inches of a topsoil and gravel mixture. Beneath the topsoil and gravel mixture, undisturbed residual soils were encountered to a depth of up to 60 feet below the ground surface. These soils consisted of stiff to very hard SILT and Elastic SILT (ML, MH), and loose to dense Silty SAND (SM). Water was encountered in the borings at depths ranging from 28 to 29 feet below current grades at the time of our exploration.

3. The proposed elevated water storage tank may be supported on shallow foundations designed using an allowable bearing pressure of 4,000 or 5,000 psf, provided that estimated foundation settlements are tolerable. The higher allowable bearing pressure will result in higher anticipated foundation settlement. The tank load is anticipated to be 5,500 kips when the tank is fully loaded.

4. As an alternative, the proposed elevated water storage tank may be supported on a deep foundation system consisting of driven steel H-piles installed to a depth of 50 feet and possessing an allowable axial capacity of 150 kips.

5. We recommend the site be considered Seismic Site Classification D based on the 2012 International Building Code.

6. If actual structural loading and proposed grades differ from those assumed in this report, we must be contacted to confirm or modify the recommendations of this report.

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February 16, 2017

Moseley Architects
3200 Norfolk Street
Richmond, Virginia 23230

Attention: Mr. Stephen E. Halsey, AIA, REFP, LEED AP

Re: **GEOTECHNICAL ENGINEERING REPORT**
Powhatan Elevated Water Storage Tank
Old Buckingham Road
Powhatan County, Virginia
Timmons Group Project No. 37385

Mr. Halsey:

Timmons Group is pleased to submit this geotechnical engineering report for the referenced project. The objectives of our services were to explore subsurface conditions and provide our geotechnical recommendations for site grading and foundation support.

1. PROJECT INFORMATION

The project site is located west of the existing Powhatan County School Bus Garage at 3975 Old Buckingham Road and south of an existing auto repair facility located at 3979 Old Buckingham Road in Powhatan County, Virginia. A Site Vicinity Map is shown on Figure 1 in Appendix A.

The site currently consists of partially grass and gravel covered areas and a lightly wooded area. Ground surface elevations across the tank footprint range from roughly 374 feet to 375 feet MSL. The proposed construction at this site will consist of a new approximately 500,000 gallon elevated water storage tank structure (pedesphere type). The tank is expected to have a load of approximately 5,500 kips when fully loaded. The construction will also include a new gravel paved parking and drive aisle area. We assume mass grading in the tank area will require cut and fill depths of less than 2 feet.

2. FIELD EXPLORATION

The field exploration included a visual site reconnaissance by a representative of Timmons Group and performance of three (3) soil test borings (B-1, B-2 and B-3). Boring locations were selected by Timmons Group in coordination with the client. A representative of Timmons Group

established locations using GPS equipment. Approximate boring locations are shown on Figure 2 in Appendix A.

Borings were performed to depths of approximately 60 feet below the existing ground surface with hollow stem auger drilling techniques. Boring B-3 encountered refusal drilling conditions at the above depth, while the other two borings did not encounter refusal. Split-spoon samples of subsurface soils were taken within soil test borings at approximate 2-foot intervals above a depth of 10 feet and at 5-foot intervals below 10 feet. Standard Penetration Tests were conducted in conjunction with split-spoon sampling in general accordance with ASTM D 1586-99.

Water levels were measured in open boreholes at the time of drilling. Upon their completion, boreholes were then backfilled up to the original ground surface with drill cuttings. Representative portions of split-spoon soil samples were returned to our laboratory for quantitative testing and visual classification in general accordance with Unified Soil Classification System guidelines.

Boring logs and a generalized soil profile (Figure 3), which present specific information from the borings, are included in the Appendices. Stratification lines shown on the boring logs and profiles are intended to represent approximate depths of changes in soil types. Naturally, transitional changes in soil types are often gradual and cannot be defined at particular depths. Elevations presented on the boring logs and soil profile were interpolated from a topographic survey of the site and should be considered approximate.

3. LABORATORY TESTING

Laboratory testing was performed on representative split-spoon samples obtained from the borings. This testing consisted of natural moisture content, Atterberg limits, and grain size analyses tests. Laboratory tests were performed in general accordance with applicable ASTM procedures. Individual laboratory test data sheets are provided in Appendix C. A summary of laboratory test data is provided in the table below.

Natural Moisture and Classification Tests

Boring	Depth (ft.)	Natural Moisture Content (%)	Atterberg Limits			Grain Size Analysis			USCS Classification
			LL	PL	PI	% Sand	% Fines*	% Gravel	
B-1	2-3.5	28.5	60	40	20	28.0	72.0	0.0	MH
B-2	7-8.5	25.7	51	35	16	59.8	40.2	0.0	SM
B-3	14-15.5	20.8	41	32	9	52.0	47.4	0.6	SM

*Material passing No. 200 sieve (Clay and Silt)

Based on the Atterberg limits testing, the near-surface soils are typically of moderate to high plasticity. The time of year the grading occurs will likely have a significant impact on the moisture levels of near-surface soils.

4. SITE GEOLOGY

Based on the 1993 Geologic Map of Virginia, the site is located within Piedmont Physiographic Province. Within upland areas, natural soils within the Piedmont Province are the residual product of chemical and physical weathering of parent rock materials. The typical residual profile consists of finer grained silts and clays near the surface which gradually transition to coarser and denser material with depth. In many locations, the transitional zone between soil and rock is not well defined. Locally, the transitional zone is termed weathered rock. For engineering purposes, weathered rock is considered residual material in which Standard Penetration Test N-values of 60 blows per foot or greater. Locally, the site appears to be underlain by Porphyroblastic Garnet-Biotite Gneiss and Granite Gneiss, which are metamorphic rocks of Proterozoic Age.

5. SUBSURFACE CONDITIONS

The following is a summary of subsurface conditions encountered during the exploration.

5.1 Ground Surface Cover

The borings encountered approximately 1 to 2 inches of a surficial topsoil and gravel mixture.

5.2 Residual Soils

Beneath the topsoil and gravel mixture, undisturbed residual soils were encountered to depths ranging from 54 to 60 feet below the ground surface. These soils consisted of stiff to very hard SILT and Elastic SILT (ML, MH), and loose to dense Silty SAND (SM). SPT N-values within the soil profile ranged from 10 to 56 blows per foot (bpf).

5.3 Weathered Rock

Weathered rock materials were encountered below the residual soil profile. Weathered rock was encountered at each of the boring location and exhibited thicknesses ranging from about 6 to 20 feet. Weathered rock was either encountered as moderately thin lenses within the residual soil profile or as a continuous layer to the boring termination depth. SPT N-values in weathered rock ranged from 60 blows per foot to 50 blows in 2 inches of penetration (50/2”).

Drilling refusal was encountered in boring B-3 at a depth of approximately 60 feet. Refusal could represent the top of bedrock or thin, relatively un-weathered zones with the weathered rock profile.

5.4 Groundwater

At the time of exploration, groundwater was encountered at depths ranging from approximately 28 to 29 feet below the ground surface. It is important to realize that groundwater levels will fluctuate with changes in rainfall and evaporation rates. In addition, perched groundwater could be encountered within near-surface soils, particularly after rainfall and near the interface of soil and weathered rock/rock.

6. CONCLUSIONS AND RECOMMENDATIONS

Our geotechnical conclusions and recommendations for the proposed elevated tank construction are presented in the following sections. When reviewing our recommendations, it is important to note that prior development activities have occurred at this site. Based on our past experience with previously developed sites, unexpected subsurface conditions are often encountered. These conditions could include zones of low-consistency fill, debris-laden materials, abandoned utilities, and others. These conditions, if encountered, can be addressed by on-site engineering evaluation at the time of construction.

If subsurface conditions adverse to those indicated by this report are encountered during construction, those differences should be reported to us for review and comment. The following conclusions and recommendations are based upon our borings, laboratory testing, engineering analysis, and past experience with similar projects and subsurface conditions. If actual tank loads are higher than the assumed value previously noted, or future site grades differ from those assumed, we must be contacted to confirm or revise the recommendations of this report.

6.1 Water Storage Tank Foundations

For the purposes of our engineering analysis, we assumed a maximum load of 5,500 kips for the proposed tank. Based on assumed loading, the borings, laboratory testing, and our engineering analysis, the proposed tank may be supported on a shallow mat foundation, or a deep foundation system consisting of driven steel H-piles. These options are discussed in detail below.

6.1.1 Shallow Mat Foundation

Based on the assumed maximum loading condition and our analysis, the proposed tank can be supported on a shallow mat foundation designed using an allowable bearing pressure of 4,000 or 5,000 pounds per square foot (psf), provided the estimated mat foundation settlements are tolerable. If the settlement magnitudes are not tolerable, the tank can be supported on a deep foundation system, discussed later in this report.

For a shallow mat foundation, the lower bearing pressure would result is less anticipated settlement. We recommend the mat foundation bear at least 48 inches below existing grade, resulting in a bearing elevation of 371 feet or below. The following table provides estimated settlements for the recommended values of allowable bearing pressure.

Allowable Bearing Pressure and Estimated Settlements

Mat Foundation Load (Kips)	Allowable Bearing Pressure for Shallow Mat Foundation (Psf)	Estimated Total Foundation Settlement (Inches)	Anticipated Differential Foundation Settlement (Inches)
5,500	4,000	1.0 to 1.5	0.5 to 0.75
5,500	5,000	1.5 to 2	0.75 to 1.0

We recommend that any foundation bearing soils which appear to be soft, unstable or otherwise unsuitable (existing fill material) be over-excavated below the foundations' bearing elevation and replaced with VDOT No. 57 stone. Existing fill (if encountered) is not considered a suitable bearing material for foundations. During backfilling, the stone should be placed in maximum 18-inch thick lifts, and the surface of the lifts should be thoroughly tamped with a backhoe bucket to "seat" the stone. Over-excavation may be conducted "neat-line."

If groundwater or surface water runoff collects in any excavation, it should be removed promptly. Care should be exercised during construction of foundations in order not to disturb bearing soils and reduce their bearing strength. Concrete for the foundations should be placed as soon as practical following excavation. If concrete placement is delayed, placement of a concrete "mud mat" on exposed bearing soils should be considered.

6.1.2 Deep Foundations

If the settlement magnitudes presented above are deemed unacceptable, the proposed tank can be supported on a deep foundation system consisting of driven steel H-piles.

Recommended allowable axial and uplift capacities for individual HP 12x53 steel piles are presented in the table below. We recommend piles have a center to center spacing of at least 3 times the pile diameter. We assume the bottom of the pile cap will be established between elevation 370 and 372 feet.

Pile Type	Pile Length (feet)	Allowable Axial Capacity (kips)	Allowable Uplift Capacity (kips)	Lateral Deflection (inches)	Lateral Load (kips)	Maximum Moment (kip-in)
HP 12x53	50*	150	100	1	47	1,801

*Pile length (or embedment) is referenced to an assumed bottom of pile cap elevation ranging between 370 and 372 feet.

Analyses were conducted on a 50-foot long HP 12x53 steel pile to evaluate lateral deflections and bending moments corresponding to a pile top deflection of one inch. Our analyses were conducted for a "fixed head" condition in which the pile head can translate but is restrained against rotation. This would apply to piles fixed within a cap at the ground surface. Calculated lateral loads for HP 12x53 piles are in the "weak axis" direction. Results of the lateral analyses are included in the table above.

Piles should conform to the requirements of the American Society of Testing Materials (ASTM) standard specifications. Final tip depths should be based on driving resistance encountered and field observations.

It is our recommendation that three (3) indicator piles be initially driven at locations selected by the Geotechnical Engineer in order to verify design recommendations presented and to establish driving criteria for the production piles. Load testing of at least one (1) of the indicator piles should be performed in accordance with the 2012 International Building Code. We recommend the indicator piles be at least 10 feet longer than the anticipated design pile lengths shown in the table above. We recommend that production piles not be ordered until the indicator piles have been driven and load tested. The indicator piles may be used as production piles as long as they do not become damaged during the driving process and they meet the required capacity.

Based on the performed borings, it is anticipated that the ultimate capacity of the driven piles may be realized several days after initial driving due to potential "set up" of the deeper silts. In other words, the number of blows it takes for the same hammer to drive a pile one foot will increase with time, to a point, before becoming constant. In order to allow proper installation of piles at this site, "set up" of the soil needs to be evaluated. This can be conducted by re-striking a driven pile (indicator piles) several days after initial driving. It is assumed that an increase in the number of blows per foot to move a pile from initial driving to the re-strike is the "set up" of the soil. Utilizing an estimate of the "set up" potential of the subsurface soils, a reduced blow count criteria can be used in estimating pile capacity during initial driving. We recommend that the pile load test, if performed, not be conducted until pile re-strikes and "set up" evaluated.

The pile contractor should be licensed in Virginia and have experience with the installation of steel H-piles. The piles have to be driven to a minimum driving resistance established in this report. Driving criteria, including refusal definition to be used during pile installation, should be developed based on the pile hammer to be used and the control pile driving records. Piles should not be out of plumb by more than 1%.

Piles should be driven using a hammer having sufficient energy to drive the piles to the recommended embedment depth and capacity. After selection of a contractor, we recommend the contractor submit for our review the specification data of the hammer that will be used to drive the piles. The hammer and pile system will then be analyzed using a "Wave Equation" program to

determine the suitability of the hammer for its intended purpose. Driving criteria will also be established by Wave Equation Analysis.

6.1.3 Deep Foundation Settlement

Based on the anticipated loading conditions and our engineering analysis, we estimate that total settlement of the pile supported tank structure will be one-half inch or less.

6.2 Seismic Site Classification

Based on our past experience, it is our opinion the site should be considered Seismic Site Classification D in accordance with the 2012 International Building Code (IBC). Additional field testing (i.e., shear wave velocity testing) could be performed in an attempt to obtain a more favorable seismic site classification.

6.3 Excavations

Excavations for the tank are not expected to exceed 5 feet. We expect these excavations will extend through moderate consistency soils. Past experience indicates that these consistency soils can be excavated by routine earth moving equipment.

Soil types with respect to trench safety must be evaluated on a case-by-case basis. The Contractor should be responsible for all site safety, including the determination of appropriate trench safety measures according to OSHA guidelines.

6.4 Re-use of On-site Soils as Structural Fill

The on-site soils encountered in the borings, excluding topsoil or debris-laden soils, could potentially be re-used as fill outside of the tank footprint in the proposed gravel paved areas. However, this determination is outside of the scope of our investigation and should be finalized based on a future subsurface and laboratory testing exploration program.

Prevailing weather conditions will have a significant impact on the amount of moisture manipulation (i.e., drying or wetting) required prior to fill placement. At the time of our exploration, near-surface soils typically appeared wet of optimum moisture. Highly plastic soils are often difficult to dry and manipulate, even during favorable weather conditions.

6.5 Backfill

Backfill placed adjacent to the constructed tank foundation may consist of on-site soils that are non-organic, are free of debris, and have a maximum particle size not greater than 3 inches. Any imported backfill material should have a liquid limit no greater than 45, plasticity index no greater than 20, and otherwise meet the material requirements above.

Backfill should be placed in maximum 8 to 10-inch loose lifts and compacted to at least 95 percent of the Standard Proctor maximum dry density (ASTM D 698). The final 12 inches of structural fill relative to finished subgrade should be compacted to at least 98 percent of the Standard Proctor maximum dry density. Backfill should be maintained within 3 percent of optimum moisture during placement and compaction.

Site preparation, including fill placement and compaction, should be observed by a qualified soils technician working under the direction of the Geotechnical Engineer. During fill placement, a sufficient amount of in-place density tests should be conducted to confirm that compaction and fill moisture is in accordance with our recommendations.

7. LIMITATIONS OF REPORT

The recommendations contained in this report are made on the basis of the site information made available to us and the surface and subsurface conditions that existed at the time of the exploration. While this exploration has been conducted in accordance with generally accepted geotechnical engineering practices, there remains some potential for variation of the subsurface conditions in unexplored areas of the site. If the subsurface conditions encountered during construction vary significantly from those presented in this report, we should be notified to reevaluate our recommendations. No other warranty, expressed or implied, is made as to the professional advice included in this report.

8. CLOSURE

We appreciate this opportunity to be of service to you on this project. If you have any questions regarding this study or if we can be of further assistance, please contact us at (804) 200-6500.

Respectfully submitted,
TIMMONS GROUP

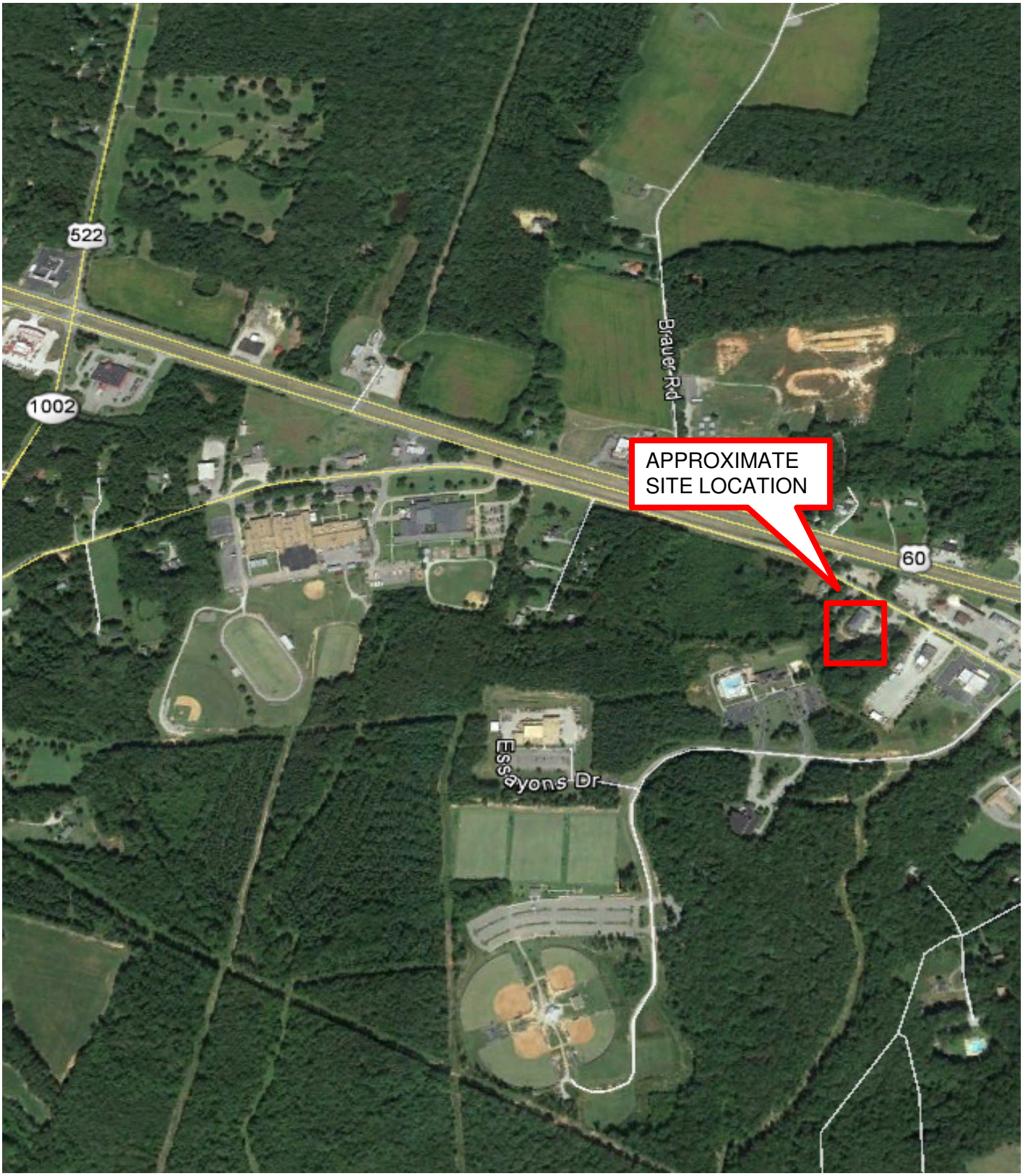
Joseph R. Robinson, P.E.
Geotechnical Engineer
VA Registration No. 050157

J. Nathan Reeves, P.E.
Senior Geotechnical Engineer
VA Registration No. 049619

APPENDIX A

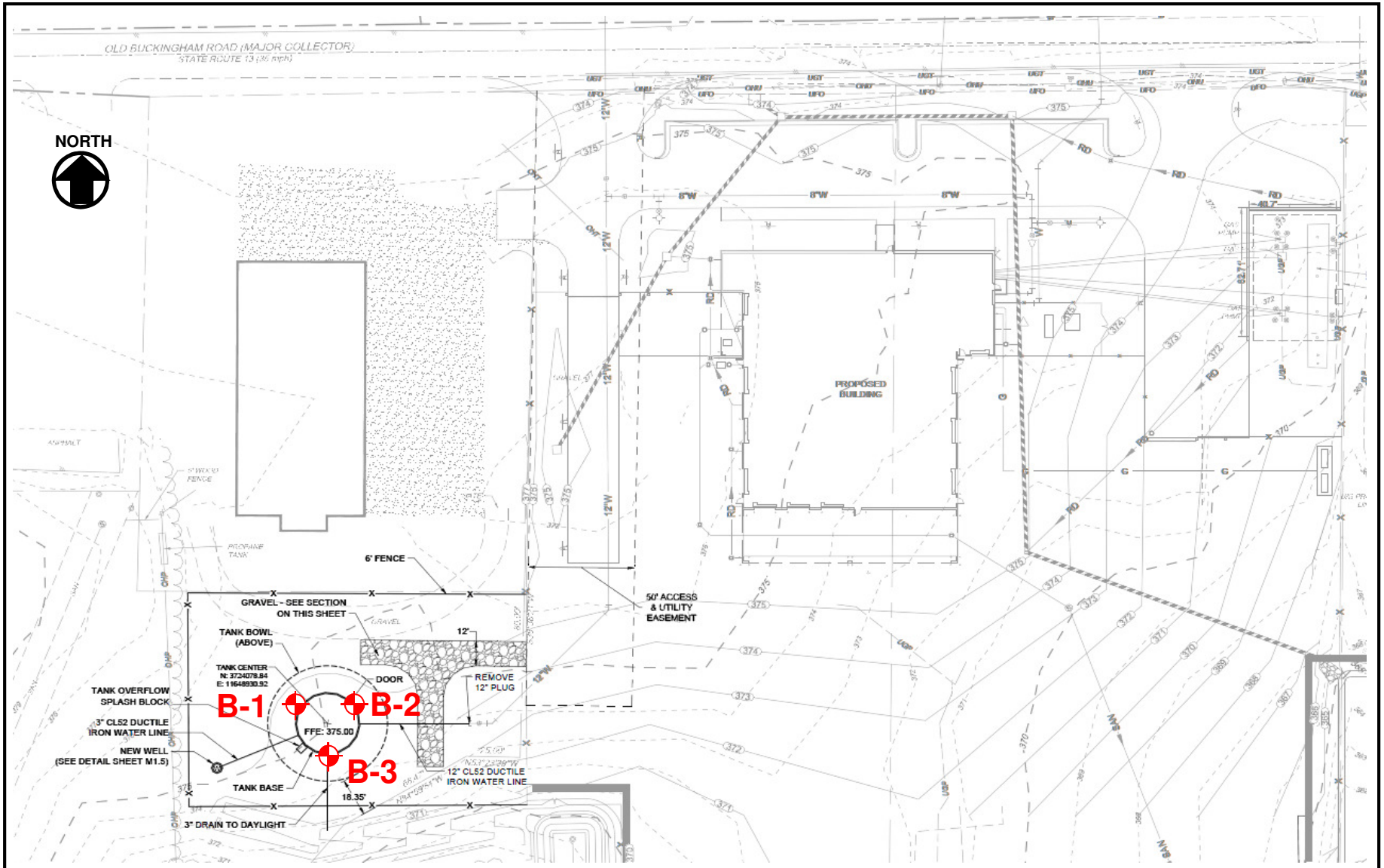
FIGURES

NORTH



Source: Google Earth

SCALE: NTS	TIMMONS GROUP YOUR VISION ACHIEVED THROUGH OURS.	**SITE VICINITY MAP** POWHATAN ELEVATED WATER STORAGE TANK OLD BUCKINGHAM ROAD POWHATAN COUNTY, VA	FIGURE 1
CHECKED BY: JNR			
PLOTTED BY: JRR			
DATE: 1-4-17	PROJECT NUMBER: 37385 G02		



Source: Sheet C1.1 - Tank Site Plan by Timmons Group
Dated: November 9, 2016

= Soil Test Borings

Scale:	Not to scale
Date:	1-4-17
Drawn By:	JRR
Project No.:	37385 G02

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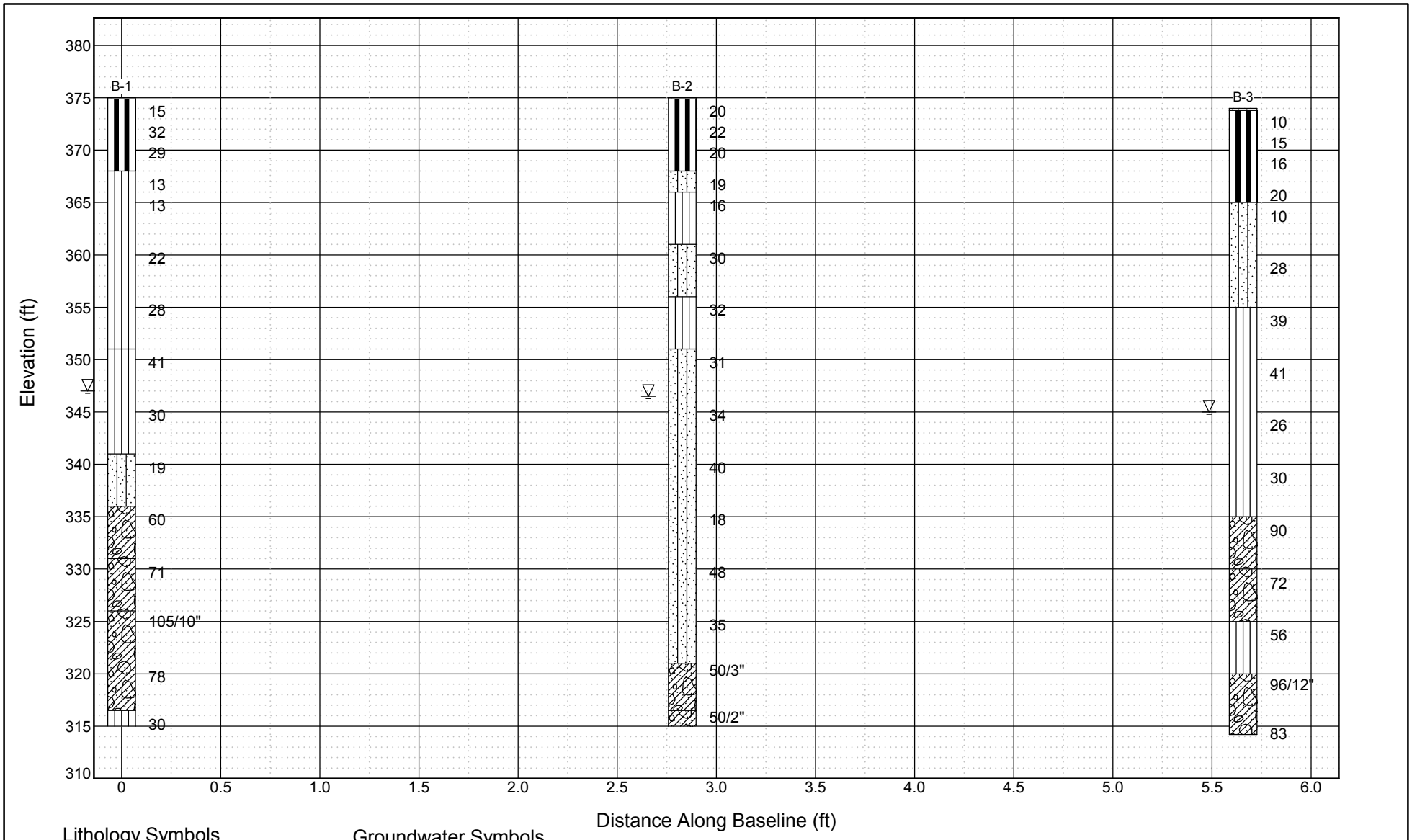
Boring Location Plan

Powhatan Elevated Water Storage Tank
Powhatan County, Virginia

Figure No.
2



Lithology Symbols

- Topsoil
- Elastic Silt
- Silt
- Silty Sand
- Weathered Rock

Groundwater Symbols

- At End of Drilling
- At 24 Hours

Exploration Symbols

B-01 (Exploration ID)

13 (N-Value)

53% 98% (RQD REC)

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Subsurface Profile

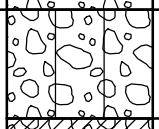
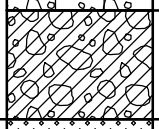
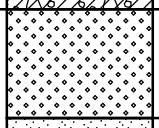
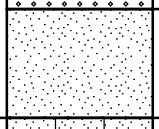
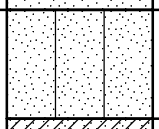
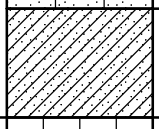
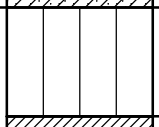
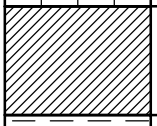
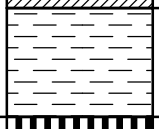
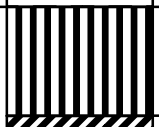
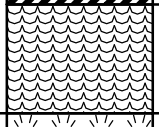
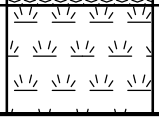
Powhatan Elevated Water Storage Tank
Powhatan County, Virginia

PROJECT NUMBER	DRAWN BY	DATE DRAWN
37385	JRR	1-3-17
HORIZONTAL SCALE	APPROVED BY	FIGURE
VERTICAL SCALE	JNR	3

APPENDIX B

BORING LOGS

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

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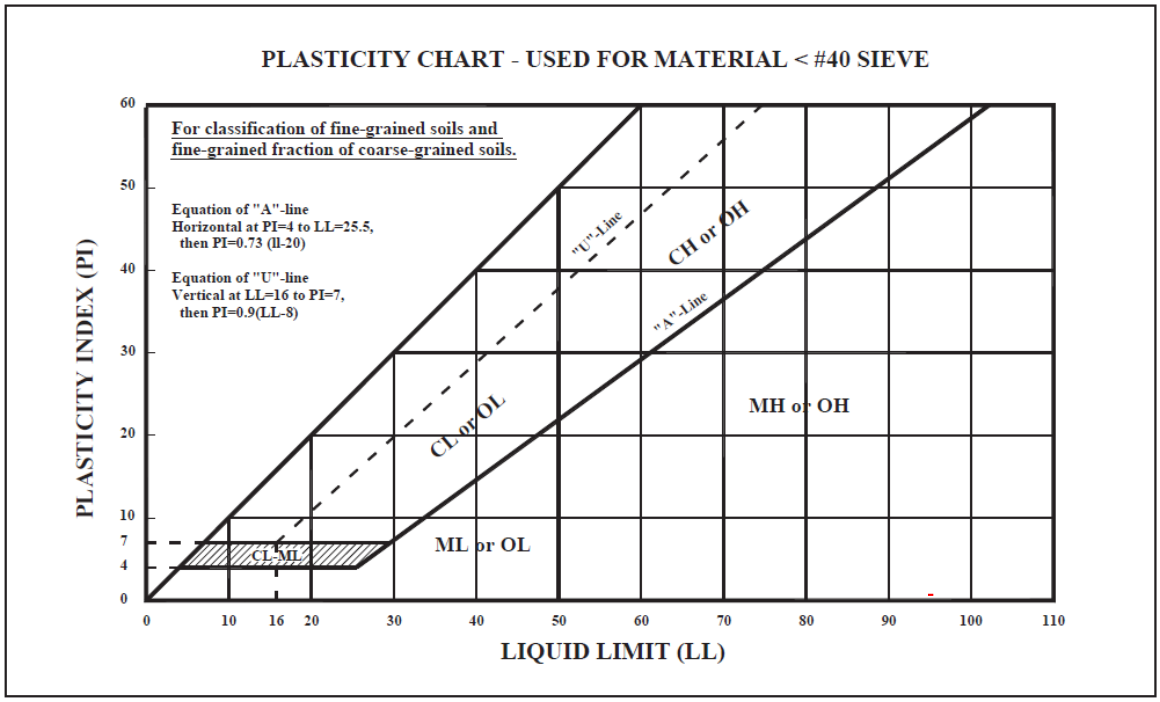
KEY TO BORING LOG TERMINOLOGY

Relative Density – Used for soils with less than 50% passing No. 200 sieve		Consistency – Used for soils with 50 percent or more passing No. 200 sieve	
Relative Density	**SPT N-Value (blows/ft)**	**Consistency**	**SPT N-Value (blows/foot)**
Very Loose	0 to 3	Very Soft	0 to 1
Loose	4 to 9	Soft	2 to 4
Medium Dense	10 to 29	Firm	5 to 8
Dense	30 to 50	Stiff	9 to 15
Very Dense	Greater than 50	Very Stiff	16 to 30
		Hard	31 to 50
		Very Hard	Greater than 50

Grain Size Terminology (U.S. Standard Sieves)		Natural Moisture Content	
Term	**Particle Size**		
Boulder	12 inches +	Dry	Very little apparent moisture, dusty
Cobble	3 to 12 inches		
Coarse Gravel	¾ to 3 inches	Moist	Damp, but no free water visible
Fine Gravel	#4 to ¾ inches		
Coarse Sand	#10 to #4		
Medium Sand	#40 to #10	Wet	Visible free water, or in cohesive soil, clearly saturated
Fine Sand	#200 to #40		
Silt and Clay	<#200		



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Timmons Group
1001 Boulders Parkway, Suite 300
Richmond, VA 23225
Telephone: (804) 200-6500

BORING B-1

PROJECT NUMBER 37385 **PROJECT NAME** Powhatan Elevated Water Storage Tank

CLIENT Moseley Architects **PROJECT LOCATION** Powhatan County, Virginia

DATE STARTED 12/8/2016 **COMPLETED** 12/8/2016 **GROUND ELEVATION** 375 ft **HOLE DEPTH** 60 feet

DRILLING CONTRACTOR Ayers & Ayers, Inc. **BOREHOLE WATER LEVELS:**

DRILLING METHOD Hollow Stem Auger ▽ **AT END OF DRILLING** 28.00 ft / Elev 347.00 ft

LOGGED BY J. Robinson, P.E. **CHECKED BY** N. Reeves, P.E. ▼ **AT 24 HOURS DRILLING** ---

NOTES **CAVE DEPTH**

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SYMBOL	SAMPLING BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	LAB TESTS	REMARKS
0	375	1-inch of Topsoil/Gravel ELASTIC SILT, (MH): reddish orange, moist, stiff to hard, trace fine sand		S-1, SPT 5-6-9 (15) S-2, SPT 8-15-17 (32) S-3, SPT 7-12-17 (29)			
5	370	SILT, (ML): orangeish gray, moist, stiff to very stiff, trace fine sand, trace mica		S-4, SPT 5-6-7 (13) S-5, SPT 5-6-7 (13)			
10	365						
15	360			S-6, SPT 7-10-12 (22)			
20	355			S-7, SPT 9-12-16 (28)			
25	350	SANDY SILT, (ML): orangeish gray white, moist to wet, very stiff to hard, trace mica		S-8, SPT 12-18-23 (41)			
30	345	▽		S-9, SPT 8-14-16 (30)			
35	340			S-10, SPT			

(Continued Next Page)

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BORING B-1

PROJECT NUMBER 37385 **PROJECT NAME** Powhatan Elevated Water Storage Tank

CLIENT Moseley Architects **PROJECT LOCATION** Powhatan County, Virginia

DATE STARTED 12/8/2016 **COMPLETED** 12/8/2016 **GROUND ELEVATION** 375 ft **HOLE DEPTH** 60 feet

DRILLING CONTRACTOR Ayers & Ayers, Inc. **BOREHOLE WATER LEVELS:**

DRILLING METHOD Hollow Stem Auger **AT END OF DRILLING** 28.00 ft / Elev 347.00 ft

LOGGED BY J. Robinson, P.E. **CHECKED BY** N. Reeves, P.E. **AT 24 HOURS DRILLING** ---

NOTES **CAVE DEPTH**

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SYMBOL	SAMPLING BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	LAB TESTS	REMARKS
35	340	SILTY SAND, (SM): orangeish brown, fine grained, wet, medium dense, trace mica *(continued)*		7-9-10 (19)			
40	335	SILTY SAND, (SM): orangeish gray white, fine to medium grained, wet, very dense, trace mica, "Weathered Rock"		S-11, SPT 10-20-40 (60)			
45	330	SILT, (ML): orangeish gray, wet, very hard, little fine sand, trace mica, "Weathered Rock"		S-12, SPT 20-35-36 (71)			
50	325	SILTY SAND, (SM): orangeish brown, fine to medium grained, wet, very dense, trace mica, "Weathered Rock"		S-13, SPT 105/10"			
55	320			S-14, SPT 22-33-45 (78)			
60	315	SILT, (ML): brown, wet, very stiff, trace fine sand, trace mica		S-15, SPT 11-13-17 (30)			

Bottom of borehole at 60.0 feet.

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Timmons Group
1001 Boulders Parkway, Suite 300
Richmond, VA 23225
Telephone: (804) 200-6500

BORING B-2

PROJECT NUMBER 37385 **PROJECT NAME** Powhatan Elevated Water Storage Tank

CLIENT Moseley Architects **PROJECT LOCATION** Powhatan County, Virginia

DATE STARTED 12/8/2016 **COMPLETED** 12/8/2016 **GROUND ELEVATION** 375 ft **HOLE DEPTH** 60 feet

DRILLING CONTRACTOR Ayers & Ayers, Inc. **BOREHOLE WATER LEVELS:**

DRILLING METHOD Hollow Stem Auger ▽ **AT END OF DRILLING** 28.50 ft / Elev 346.50 ft

LOGGED BY J. Robinson, P.E. **CHECKED BY** N. Reeves, P.E. ▼ **AT 24 HOURS DRILLING** ---

NOTES **CAVE DEPTH**

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SYMBOL	SAMPLING BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	LAB TESTS	REMARKS
0	375	1-inch of Topsoil/Gravel ELASTIC SILT, (MH): reddish orange, moist, very stiff, trace fine sand		S-1, SPT 8-9-11 (20) S-2, SPT 7-10-12 (22) S-3, SPT 4-9-11 (20)			
5	370	SILTY SAND, (SM): orangeish gray, moist, medium dense, trace mica		S-4, SPT 6-8-11 (19)			
10	365	SANDY SILT, (ML): orangeish gray white, moist, very stiff, trace mica		S-5, SPT 6-8-8 (16)			
15	360	SILTY SAND, (SM): orangeish brown, fine grained, moist, medium dense, trace mica		S-6, SPT 11-14-16 (30)			
20	355	SILT, (ML): orangeish brown, moist, hard, little fine sand, trace mica		S-7, SPT 13-15-17 (32)			
25	350	SILTY SAND, (SM): orangeish gray white, fine to medium grained, moist to wet, medium dense to dense, trace mica		S-8, SPT 11-14-17 (31)			
30	345	▽		S-9, SPT 11-14-20 (34)			
35	340			S-10, SPT			

(Continued Next Page)

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BORING B-2

PROJECT NUMBER 37385 **PROJECT NAME** Powhatan Elevated Water Storage Tank

CLIENT Moseley Architects **PROJECT LOCATION** Powhatan County, Virginia

DATE STARTED 12/8/2016 **COMPLETED** 12/8/2016 **GROUND ELEVATION** 375 ft **HOLE DEPTH** 60 feet

DRILLING CONTRACTOR Ayers & Ayers, Inc. **BOREHOLE WATER LEVELS:**

DRILLING METHOD Hollow Stem Auger **AT END OF DRILLING** 28.50 ft / Elev 346.50 ft

LOGGED BY J. Robinson, P.E. **CHECKED BY** N. Reeves, P.E. **AT 24 HOURS DRILLING** ---

NOTES **CAVE DEPTH**

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SYMBOL	SAMPLING BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	LAB TESTS	REMARKS
35	340	SILTY SAND, (SM): orangeish gray white, fine to medium grained, moist to wet, medium dense to dense, trace mica *(continued)*		22-23-17 (40)			
40	335			S-11, SPT 6-9-9 (18)			
45	330			S-12, SPT 25-25-23 (48)			
50	325			S-13, SPT 42-17-18 (35)			
55	320	SILTY SAND, (SM): orangeish gray white, fine to medium grained, wet, very dense, trace mica, "Weathered Rock"		S-14, SPT 50/3"			
60	315	SILT, (ML): orangeish gray, wet, very hard, trace fine sand, trace mica, "Weathered Rock"		S-15, SPT 50/2"			

Bottom of borehole at 60.0 feet.

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Timmons Group
1001 Boulders Parkway, Suite 300
Richmond, VA 23225
Telephone: (804) 200-6500

BORING B-3

PROJECT NUMBER 37385 **PROJECT NAME** Powhatan Elevated Water Storage Tank

CLIENT Moseley Architects **PROJECT LOCATION** Powhatan County, Virginia

DATE STARTED 12/8/2016 **COMPLETED** 12/8/2016 **GROUND ELEVATION** 374 ft **HOLE DEPTH** 59.8 feet

DRILLING CONTRACTOR Ayers & Ayers, Inc. **BOREHOLE WATER LEVELS:**

DRILLING METHOD Hollow Stem Auger ▽ **AT END OF DRILLING** 29.00 ft / Elev 345.00 ft

LOGGED BY J. Robinson, P.E. **CHECKED BY** N. Reeves, P.E. ▼ **AT 24 HOURS DRILLING** ---

NOTES **CAVE DEPTH**

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SYMBOL	SAMPLING BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	LAB TESTS	REMARKS
0		2-inches of Topsoil/Gravel		S-1, SPT 4-5-5 (10)			
		ELASTIC SILT, (MH): reddish orange, moist, stiff to very stiff, trace fine sand		S-2, SPT 5-7-8 (15)			
	370			S-3, SPT 7-8-8 (16)			
5				S-4, SPT 9-9-11 (20)			
	365						
		SILTY SAND, (SM): orangeish gray, loose to medium dense, trace mica		S-5, SPT 4-5-5 (10)			
10							
	360			S-6, SPT 11-13-15 (28)			
15							
	355						
		SILT, (ML): orangeish gray, moist to wet, very stiff to hard, trace fine sand, trace mica		S-7, SPT 14-17-22 (39)			
20							
	350			S-8, SPT 12-19-22 (41)			
25							
	345 ▽						
				S-9, SPT 12-12-14 (26)			
30							
	340						
35				S-10, SPT			

(Continued Next Page)

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Timmons Group
1001 Boulders Parkway, Suite 300
Richmond, VA 23225
Telephone: (804) 200-6500

BORING B-3

PROJECT NUMBER 37385 **PROJECT NAME** Powhatan Elevated Water Storage Tank

CLIENT Moseley Architects **PROJECT LOCATION** Powhatan County, Virginia

DATE STARTED 12/8/2016 **COMPLETED** 12/8/2016 **GROUND ELEVATION** 374 ft **HOLE DEPTH** 59.8 feet

DRILLING CONTRACTOR Ayers & Ayers, Inc. **BOREHOLE WATER LEVELS:**

DRILLING METHOD Hollow Stem Auger ▽ **AT END OF DRILLING** 29.00 ft / Elev 345.00 ft

LOGGED BY J. Robinson, P.E. **CHECKED BY** N. Reeves, P.E. ▼ **AT 24 HOURS DRILLING** ---

NOTES **CAVE DEPTH**

DEPTH (ft)	ELEVATION (ft)	MATERIAL DESCRIPTION	SYMBOL	SAMPLING BLOW COUNTS (N-VALUE)	POCKET PEN. (tsf)	LAB TESTS	REMARKS
35		SILT, (ML): orangeish gray, moist to wet, very stiff to hard, trace fine sand, trace mica *(continued)*		4-12-18 (30)			
	335						
40		SILTY SAND, (SM): orangeish gray, fine grained, wet, very dense, trace mica, "Weathered Rock"		S-11, SPT 23-40-50 (90)			
	330						
45		SANDY SILT, (ML): orangeish gray white, wet, very hard, trace mica, "Weathered Rock"		S-12, SPT 21-30-42 (72)			
	325						
50		SILT, (ML): grayish brown, wet, very hard, trace fine sand, trace mica		S-13, SPT 17-24-32 (56)			
	320						
55		SILTY SAND, (SM): orangeish brown, fine to medium grained, wet, very dense, trace mica, "Weathered Rock"		S-14, SPT 96/12"			
	315			S-15, SPT 24-33-50 (83)			

Bottom of borehole at 59.8 feet.

APPENDIX C

LABORATORY TEST RESULTS

TIMMONS GROUP

YOUR VISION ACHIEVED THROUGH OURS.

GRAIN SIZE DISTRIBUTION TEST REPORT

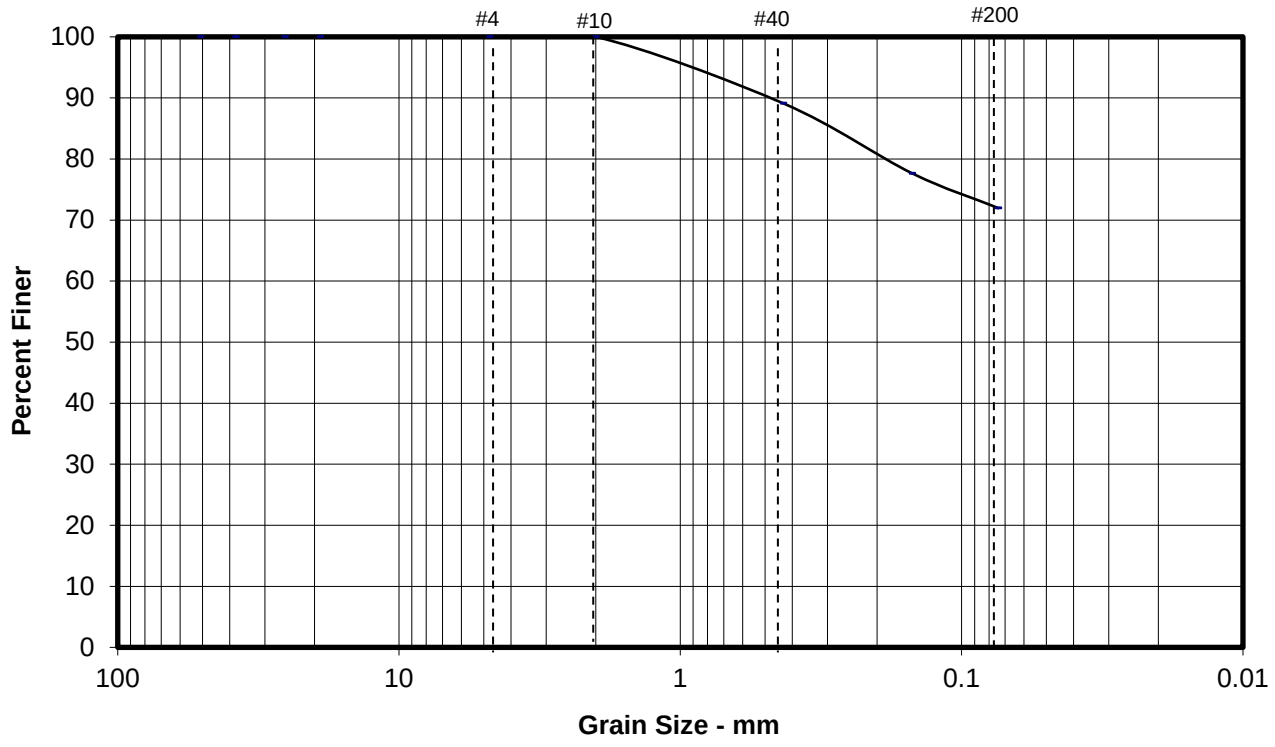
Project Number	37385
Project Name	Powhatan Elevated Water Storage Tank
Location	B-1/ 2-3.5

Liquid Limit	Plastic Index	USCS	AASHTO
60	**20**	**MH**	**A-7-5 (5.7)**

Percent Gravel	Percent Sand	Percent Silt and Clay
0.0%	**28.0%**	**72.0%**

Material Description	Elastic SILT with Sand
Natural Moisture	28.5%
SPT Blow Counts	8-15-17

Grain Size Distribution



DATE 12/22/16

FIGURE NUMBER GS4

TIMMONS GROUP

YOUR VISION ACHIEVED THROUGH OURS.

GRAIN SIZE DISTRIBUTION TEST REPORT

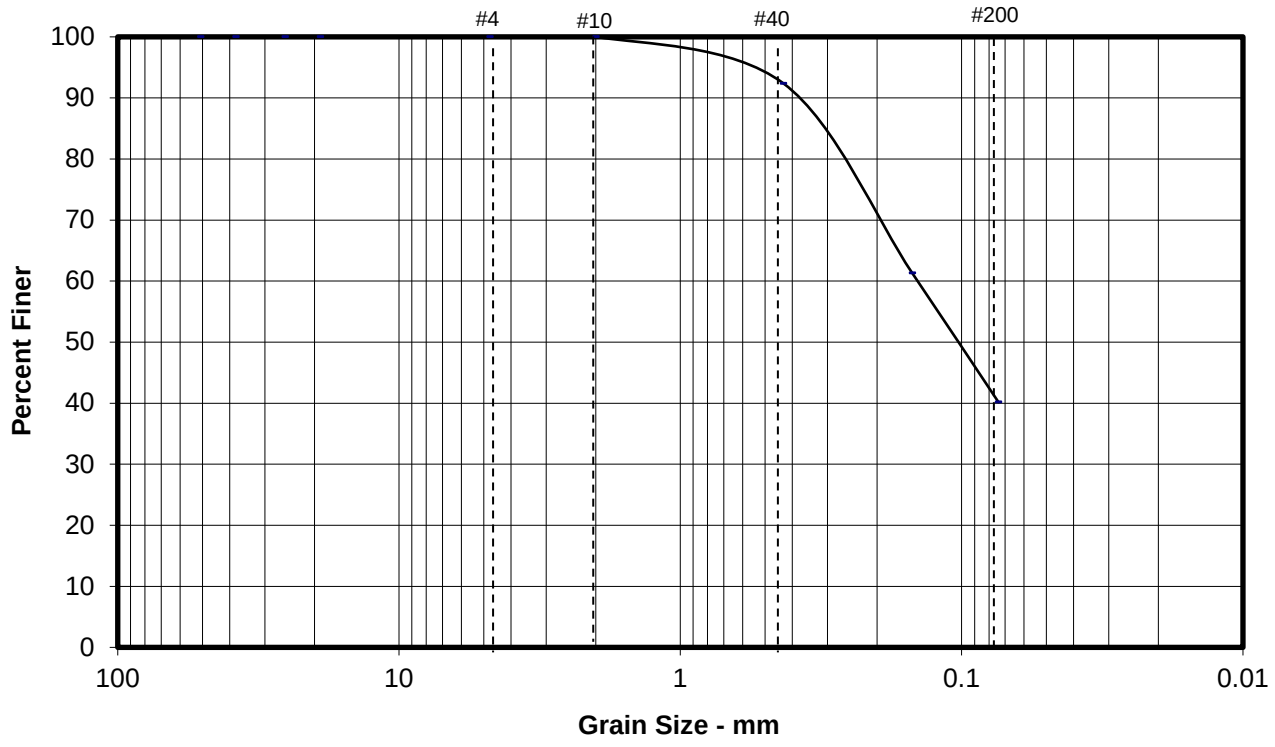
Project Number	37385
Project Name	Powhatan Elevated Water Storage Tank
Location	B-2/ 7-8.5

Liquid Limit	Plastic Index	USCS	AASHTO
51	**16**	**SM**	**A-7-5 (1.5)**

Percent Gravel	Percent Sand	Percent Silt and Clay
0.0%	**59.8%**	**40.2%**

Material Description	Silty SAND
Natural Moisture	25.7%
SPT Blow Counts	6-8-11

Grain Size Distribution



DATE 12/22/16

FIGURE NUMBER GS4

TIMMONS GROUP

YOUR VISION ACHIEVED THROUGH OURS.

GRAIN SIZE DISTRIBUTION TEST REPORT

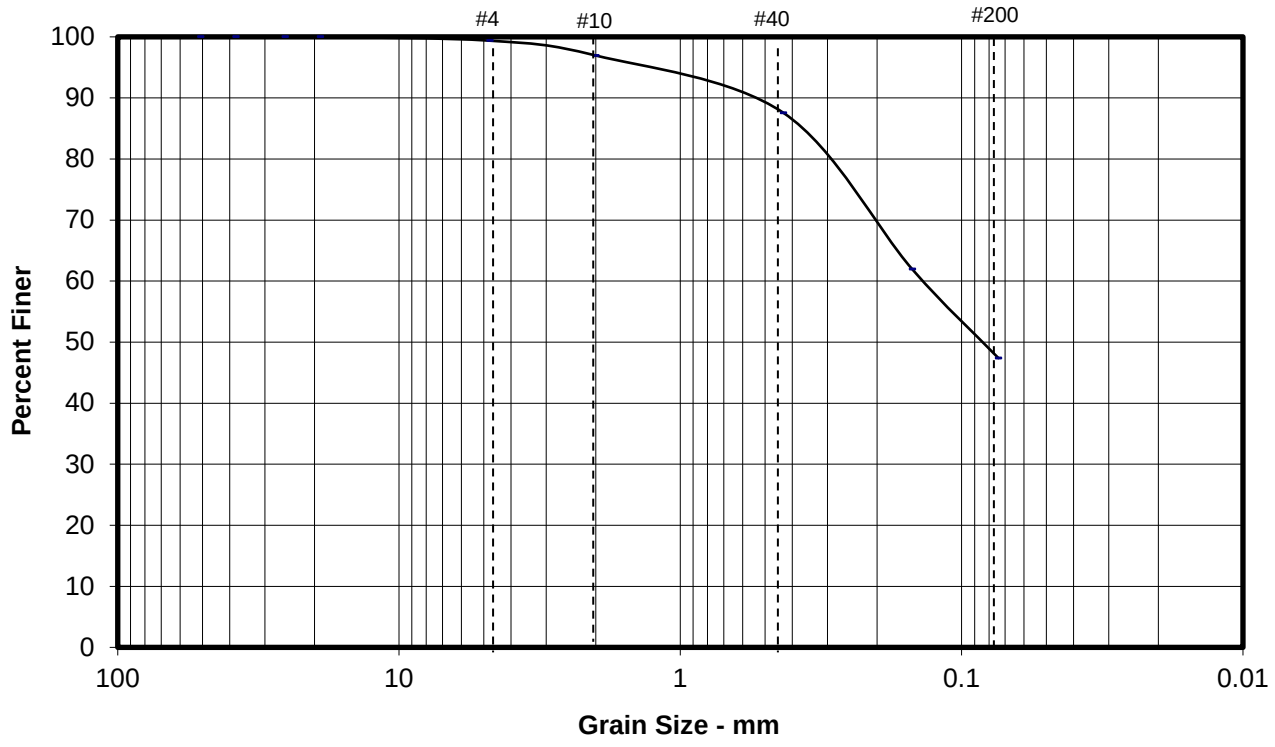
Project Number	37385
Project Name	Powhatan Elevated Water Storage Tank
Location	B-3/ 14-15.5

Liquid Limit	Plastic Index	USCS	AASHTO
41	**9**	**SM**	**A-5 (0.0)**

Percent Gravel	Percent Sand	Percent Silt and Clay
0.6%	**52.0%**	**47.4%**

Material Description	Silty SAND
Natural Moisture	20.8%
SPT Blow Counts	11-13-15

Grain Size Distribution



DATE 12/22/16

FIGURE NUMBER GS4

POWHATAN ELEVATED TANK
500,000 GALLON

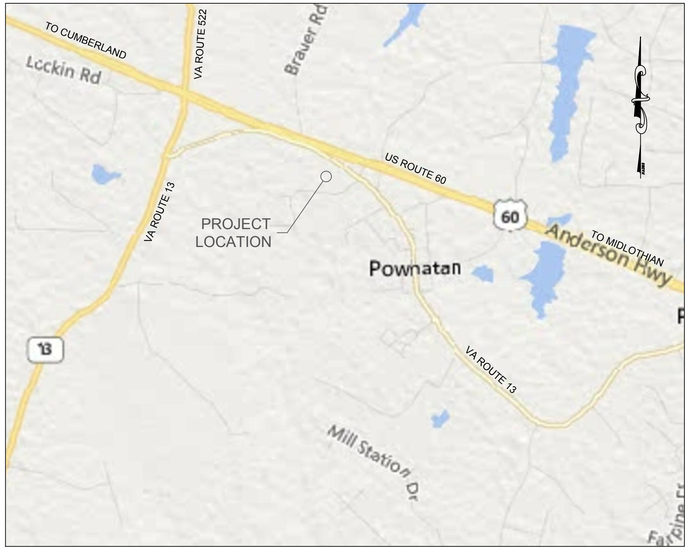
SPENCER DISTRICT
POWHATAN COUNTY, VIRGINIA

SITE DATA

1. OWNER/OPERATOR
   COUNTY OF POWHATAN
   3834 OLD BUCKINGHAM RD, POWHATAN, VA 23139
   CONTACT: JOHNNY MELLIS, EIT
   PHONE: (804) 598-4821

2. ENGINEER
   TIMMONS GROUP
   1001 BOULDERS PARKWAY, SUITE 300
   RICHMOND, VA 23225
   CONTACT: WES HUNNIUS, P.E.
   PHONE: (804) 200-6385
   FAX: (804) 560-1438

3. SITE INFORMATION
   GPIN: 6742-93-0923
   T.M. NO. 26B2-1-9B
   1.249 ACRES
   PARCEL ADDRESS: 3977 OLD BUCKINGHAM ROAD (PARCEL 'B')
   ZONING: AGRICULTURAL-10



VICINITY MAP
SCALE: 1" = 2,000'

NOVEMBER 17, 2016
REVISED: FEBRUARY 10, 2017

REVISIONS

DATE	SHEET NUMBERS	DATE	SHEET NUMBERS

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

SHEET INDEX

NOTE: POWHATAN COUNTY REQUIRES ALL UTILITY CONSTRUCTION METHODS AND MATERIALS TO BE IN ACCORDANCE WITH THE CHESTERFIELD COUNTY WATER AND SEWER STANDARDS AVAILABLE AT HTTP://WWW.CHESTERFIELD.GOV/UTILITIES.

COMMONWEALTH OF VIRGINIA
WESLEY G. HUNNIUS
Lic. No.040151
2/10/17
PROFESSIONAL ENGINEER

THIS DRAWING PREPARED AT THE
CORPORATE OFFICE
1001 Boulders Parkway, Suite 300 | Richmond, VA 23225
TEL. 804.200.6500 FAX 804.560.1016 www.timmons.com

YOUR VISION ACHIEVED THROUGH OURS.

REVISION DESCRIPTION	DATE
PER COUNTY AND VDH COMMENTS	2/10/17

DATE 11/17/16
DRAWN BY B. STRICKLAND
DESIGNED BY B. STRICKLAND
CHECKED BY W. HUNNIUS
SCALE AS SHOWN

TIMMONS GROUP

POWHATAN ELEVATED TANK
SPENCER DISTRICT - POWHATAN COUNTY - VIRGINIA
COVER

JOB NO. 37385
SHEET NO. G0.0

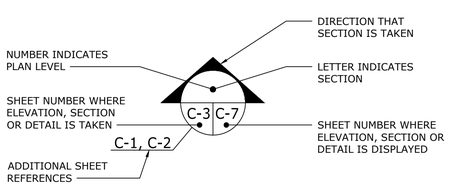
L:\2016\37385 - Powhatan Elevated Tank\DWG\Sheet\CD\TANK\37385C-G0-1 COVER.dwg | Plotted on 2/14/2017 8:42 AM | by Bruce Strickland

LEGEND

EXISTING		PROPOSED
	PROPERTY LINE	
	RIGHT-OF-WAY LINE	
	EASEMENT	
—— x ——	FENCE	—— X ——
	CURB	
	SIDEWALK	
	CONCRETE	
46.34 x	SPOT ELEVATION	46.34 x
	LIGHT	
50	CONTOUR	50
W	WATER LINE	
	DRAIN	
	STORM SEWER	
OHP	OVERHEAD ELECTRIC	
UGP	UNDERGROUND ELECTRIC	
UGT	UNDERGROUND TELECOM	
E	ELECTRICAL PEDESTAL	
	UTILITY POLE	
	FIRE HYDRANT	
	WATER VALVE	
	BUSH	
	CONIFEROUS TREE	
	DECIDUOUS TREE	

ABBREVIATIONS

°	DEGREES	HZ	HERTZ
Ø	DIAMETER	ID	INSIDE DIAMETER
±	PLUS OR MINUS	KW	KILOWATT
AC	ACRE	MAX	MAXIMUM
ADJ	ADJUSTABLE	MFGR	MANUFACTURER
AFF	ABOVE FINISHED FLOOR	MG	MILLION GALLON
APPROX	APPROXIMATE	MIN	MINIMUM
AVG	AVERAGE	No	NUMBER
BFF	BELOW FINISHED FLOOR	NO	NORMALLY OPEN
BFP	BACK FLOW PREVENTER	OA	OUTSIDE AIR
BFV	BUTTERFLY VALVE	OC	ON CENTER
BM	BENCHMARK	OCEW	ON CENTER EACH WAY
BOW	BOTTOM OF WALL	OD	OUTSIDE DIAMETER
C/C	CENTER TO CENTER	OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
CFM	CUBIC FEET PER MINUTE		
DIA	DIAMETER	PE	PLAIN END
DIP	DUCTILE IRON PIPE	PNL	PANEL
EA	EXHAUST AIR	PPM	PARTS PER MILLION
EF	EXHAUST FAN	PROP	PROPOSED
EG	EXISTING GRADE	PSI	POUNDS PER SQUARE INCH
ELEC	ELECTRIC/ELECTRICAL	REQ	RQUIRED
ELEV	ELEVATION	SCH	SCHEDULE
EX	EXISTING	SQ	SQUARE
F	FAHRENHEIT	SS	STAINLESS STEEL
FE	FLANGED END	STL	STEEL
FFE	FINISHED FLOOR ELEVATION	T	THERMOSTAT
FG	FINISHED GRADE	TYP	TYPICAL
GND	GROUND	UH	UNIT HEATER
GPM	GALLONS PER MINUTE	V	VOLT
GRVL	GRAVEL	VFD	VARIABLE FREQUENCY DRIVE
HP	HORSEPOWER	W/	WITH
HYD	HYDRANT		



SECTION, OR PLAN LEVEL SYMBOL KEY

NOTE:
CONTRACTOR SHALL NOTIFY ENGINEER WITHIN 5 DAYS OF THE TANK REACHING ITS GREATEST HEIGHT.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2016-AEA-8482-OE

Issued Date: 10/03/2016

Johnny Melis
Powhatan County Department of Public Works
3834 Old Buckingham Road
Suite A
Powhatan, VA 23139

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Water Tank Powhatan Tank
Location:	Richmond, VA
Latitude:	37-32-57.24N NAD 83
Longitude:	77-55-38.62W
Heights:	375 feet site elevation (SE)
	185 feet above ground level (AGL)
	560 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 L.

This determination expires on 04/03/2018 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

Page 1 of 2

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

If we can be of further assistance, please contact our office at (817) 222-5922. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2016-AEA-8482-OE.

Signature Control No: 304263856-306358074 (DNE)
Debbie Cardenas
Technician

Page 2 of 2

GENERAL CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS IN THE FIELD PRIOR TO BEGINNING CONSTRUCTION, AND IMMEDIATELY NOTIFY THE ENGINEER OF ANY DIFFERENCES FOUND.
2. THE CONTRACTOR SHALL SCHEDULE AND ATTEND A PRE-CONSTRUCTION MEETING WITH THE COUNTY AND ENGINEER PRIOR TO BEGINNING CONSTRUCTION.
3. THE CONTRACTOR WILL FURNISH ALL SURVEYING AND STAKING FOR CONSTRUCTION TO ASSURE PROPER LOCATION OF PROJECT COMPONENTS. ALL SURVEYING AND STAKING SHALL BE PERFORMED BY A CERTIFIED LAND SURVEYOR.
4. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PRESERVE ALL EXISTING PROPERTY MARKERS. IF DISTURBED, REPLACEMENT MUST BE BY A CERTIFIED LAND SURVEYOR AT THE CONTRACTOR'S EXPENSE.
5. THE CONTRACTOR SHALL KEEP WORK AREAS FREE OF DEBRIS AND HAZARDOUS MATERIAL TO THE SATISFACTION OF THE COUNTY AND ENGINEER.
6. THE CONTRACTOR SHALL COORDINATE STORAGE OF MATERIALS, PARKING OF VEHICLES, AND RESTRICTIONS OF WORK WITH THE COUNTY AND ENGINEER.
7. THE CONTRACTOR SHALL COORDINATE WITH THE LOCAL UTILITY COMPANIES PRIOR TO CONSTRUCTING PORTIONS OF WORK IMMEDIATELY ADJACENT TO UTILITY STRUCTURES. THE COSTS OF POLE AND/OR OTHER STRUCTURE STABILIZATION DURING WORK SHALL BE BORNE BY THE CONTRACTOR.
8. ALL WORK SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY THE COUNTY AND ENGINEER AS WELL AS STATE AND LOCAL INSPECTORS.
9. ITEMS DESIGNATED TO BE DEMOLISHED SHALL BE REMOVED COMPLETELY.
10. THE CONTRACTOR SHALL CALL "MISS UTILITY" OF CENTRAL VIRGINIA AT (800) 552-7001 AT LEAST 48 HOURS PRIOR TO THE START OF ANY EXCAVATION. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL VERIFY LOCATION AND ELEVATIONS OF ALL UNDERGROUND UTILITIES SHOWN ON PLANS IN AREA OF CONSTRUCTION. IF THERE APPEARS TO BE A CONFLICT, AND UPON DISCOVERY OF ANY UTILITY NOT SHOWN ON THE PLAN, IMMEDIATELY NOTIFY THE ENGINEER. CONTRACTOR SHALL PROVIDE ENGINEER WITH COPY OF CLEARED "MISS UTILITY" TICKET.
11. THE CONTRACTOR SHALL PAY FOR AND OBTAIN ALL NECESSARY CONSTRUCTION PERMITS AND DELIVER COPIES TO THE ENGINEER AT THE PRE-CONSTRUCTION MEETING.
12. ALL STRUCTURAL FILL OR EMBANKMENT MATERIAL SHALL HAVE A MINIMUM CBR VALUE OF TEN (10).
13. PREVIOUSLY ARRANGED ACCESS EASEMENTS, STAGING AREAS, STORAGE AREAS, ETC., IF ANY, ARE SHOWN ON THE DRAWINGS. ADDITIONAL LAND USE RIGHTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
14. CONTRACTOR IS RESPONSIBLE FOR RESTORATION OF ALL EXISTING FEATURES, SUCH AS GUARDRAIL, SIDEWALKS, BRICKWORK, CULVERTS, FENCES, SHRUBS, PLANTERS, ETC. TO THEIR ORIGINAL LOCATION AND CONDITION WHICH EXISTED PRIOR TO CONSTRUCTION. TOTAL REPLACEMENT MAY BE NECESSARY.
15. FINAL ACCEPTANCE BY THE COUNTY AND STATE WILL NOT BE MADE UNTIL ALL WORK SHOWN ON THE APPROVED CONTRACT DOCUMENTS IS COMPLETED, INCLUDING PAVING, GRADING AND ALL ADJUSTMENTS.
16. CONTRACTOR SHALL PROVIDE A REGISTERED LAND DISTURBER (RLD) FOR THE DURATION OF THE PROJECT.
17. HORIZONTAL CONTROL IS NAD83. VERTICAL DATUM IS NGVD29.
18. THE OPERATION OF ALL EXISTING POWHATAN COUNTY VALVES, HYDRANTS, ETC. IS TO BE STRICTLY COORDINATED WITH UTILITIES PERSONNEL.
19. ONLY NO-LEAD BRASS VALVES AND FITTINGS SHALL BE USED.

COMMONWEALTH OF VIRGINIA
WESLEY G. HUNNIUS
Lic. No.040151
2/10/17
PROFESSIONAL ENGINEER

THIS DRAWING PREPARED AT THE
CORPORATE OFFICE
1001 Boulders Parkway, Suite 300 | Richmond, VA 23225
TEL 804.200.6500 FAX 804.560.1016 www.timmons.com

YOUR VISION ACHIEVED THROUGH OURS.

REVISION DESCRIPTION	DATE
PER COUNTY AND VDH COMMENTS	2/10/17

DATE 11/17/16
DRAWN BY B. STRICKLAND
DESIGNED BY B. STRICKLAND
CHECKED BY W. HUNNIUS
SCALE AS SHOWN

TIMMONS GROUP

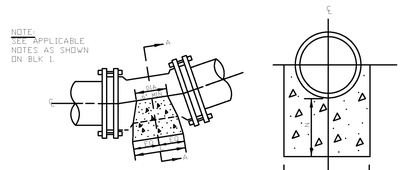
POWHATAN ELEVATED TANK
SPENCER DISTRICT - POWHATAN COUNTY - VIRGINIA
GENERAL NOTES

JOB NO. 37385
SHEET NO. G0.1

L:\20137385 - Powhatan Elevated Tank\DWG\Sheet\CD\TANK\37386C-G0.1 COVER.dwg | Plotted on 2/14/2017 8:05 AM | by Bruce Strickland

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

NOTE: SEE APPLICABLE NOTES AS SHOWN ON BLK 1.



ELEVATION

SECTION A-A

PIPE SIZE	11 1/4° BEND			22 1/2° BEND			45° BEND		
	L	M	N	L	M	N	L	M	N
6"	6"	1' 2"	8"	10"	1' 2"	8"	1' 2"	1' 2"	8"
8"	8"	1' 4"	8"	11"	1' 4"	8"	1' 9"	1' 4"	8"
10"	8"	1' 6"	8"	1' 3"	1' 6"	9"	2' 5"	1' 6"	1' 0"
12"	8"	2' 0"	8"	1' 4"	2' 0"	9"	2' 8"	2' 0"	1' 2"
16"	1' 1"	2' 4"	9"	2' 1"	2' 4"	1' 0"	4' 0"	2' 4"	1' 6"
18"	1' 5"	2' 8"	10"	2' 9"	2' 8"	1' 2"	5' 6"	2' 8"	2' 0"
20"	1' 5"	2' 8"	10"	2' 9"	2' 8"	1' 2"	5' 6"	2' 8"	2' 0"
24"	1' 10"	3' 0"	1' 0"	3' 7"	3' 0"	1' 4"	6' 0"	3' 6"	2' 6"
30"	2' 00"	3' 6"	1' 2"	3' 11"	3' 6"	1' 6"	6' 6"	3' 10"	2' 9"

NOTE: BLOCKING BASED ON PRESSURE OF 150 PSI AND ALLOWABLE SOIL BEARING CAPACITY OF 2000 PSF. CONCRETE TO BE 3000 PSI.

DATE	BLOCKING DETAIL	DRWG. NO.
JAN. 1996	LOWER VERTICAL BENDS	BLK-4
REVISIONS NOV. 2006		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

NOTES:

1. ALL MATERIALS FOR SEWER AND WATER SYSTEMS SHOWN SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH THE LATEST SPECIFICATIONS OF CHESTERFIELD COUNTY APPLICABLE AT THE TIME OF NOTICE TO PROCEED.

2. FOR SEWER AND WATER INSTALLATION WITHIN EXISTING VDOT R/W; UTILITY CONTRACTORS MUST NOTIFY VDOT WHEN INSTALLATION BEGINS SO THAT DENSITY CAN BE TESTED ON TRENCH BACKFILL (95% ASTM. D-698 @ OPTIMUM MOISTURE +/- 2%).

3. THE INSTALLATION OF A SEWER BACKFLOW DEVICE IS REQUIRED FOR ALL SERVICE CONNECTIONS WHERE THE MINIMUM FINISHED FLOOR ELEVATION OF THE HOUSE IS LOWER THAN THE NEAREST DOWNGRADE AND/OR UPGRADE MANHOLE TOP ELEVATIONS. THIS DEVICE WILL BE INSPECTED BY THE BUILDING INSPECTION DEPARTMENT.

4. ALL WATER SERVICE CONNECTIONS BELOW THE ELEVATION CONTOUR OR WHERE THE PRESSURE IS GREATER THAN 80 P.S.I. WILL REQUIRE INDIVIDUAL PRESSURE REGULATORS AS REQUIRED BY BOCA CODE.

5. VERTICAL DATUM IS BASED ON MEAN SEA LEVEL (USC & GS DATUM). HORIZONTAL CONTROLS ARE BASED ON VIRGINIA STATE PLANE COORDINATE GRID, SOUTH ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83).

6. CONTRACTOR SHALL PROPERLY NOTIFY ALL PROPERTY OWNERS TWO (2) WEEKS PRIOR TO THE START OF ANY CONSTRUCTION (INCLUDING LAND CLEARING). NOTIFICATION SHALL BE IN THE FORM OF A LETTER SIMILAR TO THE "SAMPLE" REFLECTED IN THE COUNTY'S LATEST WATER AND SEWER SPECIFICATIONS (NOT-1).

REQUIRED INFORMATION FOR TITLE PAGE

APPLICANTS NAME _____
ZONING AND CASE# _____
NUMBER OF LOTS _____
TAX MAP NUMBER _____
DATE OF PLANNING _____
COMMISSION APPROVAL _____

DATE	STANDARD SEWER AND WATER NOTES	DRWG. NO.
JAN. 1996		DES-2
REVISIONS OCT. 2012		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

MINIMUM TEST TIME TWO HOURS

WATER LINE TEST BASED ON 150 PSI	
SIZE	MAX. ALLOWABLE LEAKAGE
3/4"	.0138 (GAL/2 HRS)/100 L.F.
1"	.0100 (GAL/2 HRS)/100 L.F.
1 1/2"	.0200 (GAL/2 HRS)/100 L.F.
2"	.0300 (GAL/2 HRS)/100 L.F.
3"	.0500 (GAL/2 HRS)/100 L.F.
4"	.0700 (GAL/2 HRS)/100 L.F.
6"	.1000 (GAL/2 HRS)/100 L.F.
8"	.1300 (GAL/2 HRS)/100 L.F.
12"	.2000 (GAL/2 HRS)/100 L.F.

WATER LINE TEST BASED ON 150 PSI	
SIZE	MAX. ALLOWABLE LEAKAGE
16"	.2600 (GAL/2 HRS)/100 L.F.
20"	.3300 (GAL/2 HRS)/100 L.F.
24"	.4000 (GAL/2 HRS)/100 L.F.
30"	.5000 (GAL/2 HRS)/100 L.F.
36"	.6000 (GAL/2 HRS)/100 L.F.
42"	.7000 (GAL/2 HRS)/100 L.F.
48"	.8000 (GAL/2 HRS)/100 L.F.
54"	.9000 (GAL/2 HRS)/100 L.F.
60"	1.000 (GAL/2 HRS)/100 L.F.

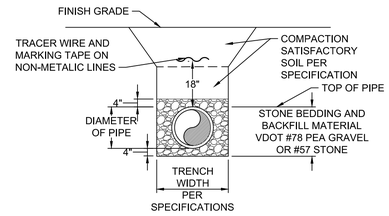
MAXIMUM ALLOWABLE LEAKAGE FOR THE WATER MAIN WILL BE CALCULATED USING THE FOLLOWING FORMULA:

$$L = \frac{SD\sqrt{P}}{148000}$$

WHERE:

L = MAXIMUM ALLOWABLE LEAKAGE, GALLONS/HOUR
S = LENGTH OF PIPE IN TEST SECTION, IN FEET
D = NOMINAL DIAMETER OF TESTED PIPE, IN INCHES
P = TEST PRESSURE, POUNDS PER SQUARE INCH 150 PSI OR 1 1/2 THE WORKING PRESSURE WHICHEVER IS GREATER MEASURED AT THE HIGH POINT OF THE TEST SYSTEM.

DATE	ALLOWABLE LEAKAGE TABLE - WATER LINES	DRWG. NO.
JAN. 1996	BASED ON FORMULAS FROM AWWA SPECIFICATIONS	TST-3
REVISIONS FEB. 2009		



NOTE:
INSURE STONE IS PROPERLY COMPACTED, ESPECIALLY UNDER THE HAUNCHES OF THE PIPE.

WATER LINE
BEDDING AND BACKFILL DETAIL
NO SCALE

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

DISCHARGE TABLE FOR HYDRANTS**
OUTLET PRESSURE MEASURED BY PITOT GAGE

FLOWING PRESSURE IN lbs/in²	OUTLET DIAMETER IN INCHES										
	2 3/8	2 1/2	2 5/8	2 3/4	2 7/8	3	3 1/8	3 7/8	4	4 3/8	4 1/2	4 5/8
	U.S. GALLONS PER MINUTE											
1	150	170	180	200	220	240	260	400	430	510	540	580
2	210	240	260	290	310	340	370	570	610	720	770	810
3	260	290	320	350	380	420	450	700	740	890	940	990
4	300	340	370	410	440	480	520	810	860	1030	1090	1150
5	340	380	410	450	500	540	590	900	960	1150	1220	1290
6	370	410	450	500	540	590	640	990	1050	1260	1340	1410
7	400	440	490	540	590	640	690	1070	1140	1360	1440	1520
8	430	480	520	570	630	680	740	1140	1220	1450	1540	1620
9	450	500	550	610	670	730	790	1210	1290	1540	1640	1720
10	480	530	580	640	700	760	830	1280	1360	1630	1730	1820
11	500	560	610	670	730	800	870	1340	1430	1710	1810	1910
12	520	580	640	700	770	840	910	1400	1490	1780	1890	1990
13	550	610	670	730	800	870	950	1450	1550	1850	1960	2070
14	570	630	690	760	830	900	980	1510	1610	1920	2040	2150
15	590	650	720	790	860	940	1020	1560	1660	1990	2110	2220
16	610	670	740	810	890	970	1050	1620	1720	2060	2180	2300
17	620	690	760	840	910	1000	1080	1660	1770	2120	2240	2370
18	640	710	780	860	940	1030	1110	1710	1820	2180	2310	2440
19	660	730	810	890	960	1050	1140	1760	1870	2240	2370	2510
20	680	750	830	910	990	1080	1170	1800	1920	2290	2430	2570
22	710	790	870	950	1040	1130	1230	1890	2020	2400	2550	2700
24	740	820	910	1000	1090	1180	1290	1970	2110	2510	2660	2810
26	770	860	940	1040	1130	1230	1340	2050	2190	2620	2770	2930
28	800	890	980	1070	1170	1280	1390	2130	2280	2720	2880	3040
30	830	920	1010	1110	1210	1320	1430	2210	2350	2820	2980	3150
32	860	950	1050	1150	1260	1370	1480	2280	2430	2910	3080	3250
34	880	980	1080	1180	1290	1410	1530	2350	2510	3000	3170	3350
36	910	1000	1110	1220	1330	1450	1580	2420	2580	3080	3260	3440
38	930	1040	1140	1250	1370	1490	1620	2480	2650	3170	3350	3540
40	960	1060	1170	1290	1400	1530	1660	2550	2720	3250	3440	3630

**Computed with coefficient, C = 0.90, to nearest 10 gals. per min.
*From Nat'l. Bd. of Fire Underwriters.

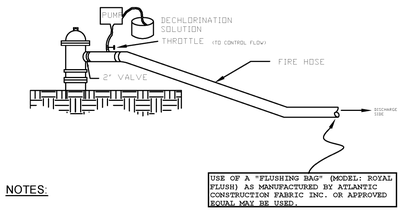
EQUIPMENT FOR APPROXIMATING HYDRANT FLOWS (per R.C. Bennett, Engr. Nat'l. Bd. of Fire Underwriters):

The equipment necessary consists of either a standard pitot tube or a hydrant cap tapped to take a pressure gage. If the hydrants used as a discharge point for flushing has two or more outlets a pressure gage on one outlet while another outlet is flowing will give approximately the same results as the use of a pitot tube.

DATE	DISCHARGE FLOW RATES FOR FLUSHING	DRWG. NO.
JAN. 1996		WAT-9
REVISIONS		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

PUMP HAS TO HAVE CAPABILITY OF PUMPING WITH A GREATER PSI THAN THE PSI OF THE EXISTING SYSTEM.



USE OF A "FLUSHING BAG" (MODEL: ROYAL FLUSH) AS MANUFACTURED BY ATLANTIC CONSTRUCTION FABRIC INC. OR APPROVED EQUAL MAY BE USED.

NOTES:

ALL FITTINGS USED MUST BE RESISTANT TO DECHLORINATION CHEMICALS.

THE FIRE HOSE NEEDS TO BE DISCHARGED INTO AN AREA THAT WILL CAUSE NO EVIRONMENTAL/EROSION PROBLEMS. THIS POINT WILL BE MONITORED TO MAKE SURE THAT THE DISCHARGING WATER IS DECHLORINATED.

THIS DETAIL IS A RECOMMENDED DESIGN CONCEPT. ALTERNATE METHOD(S) MAY BE SUBMITTED TO THE UTILITIES DEPARTMENT'S CONSTRUCTION SECTION FOR APPROVAL PRIOR TO SCHEDULED FLUSHING.

DATE	NEUTRALIZATION STATION (DECHLORINATION)	DRWG. NO.
JAN. 1996		WAT-10
REVISIONS NOV. 1999		

CHESTERFIELD COUNTY
DEPARTMENT OF PUBLIC UTILITIES

PIPE MATERIAL TYPE AND SIZE	MAXIMUM DEFLECTION AT EACH JOINT	DEFLECTIONS (INCHES EACH JOINT) 19' LAYING LENGTH	RADIUS (MINIMUM)
DUCTILE IRON (PUSH ON JOINT)			
6" TO 12"	2° 30'	9.5"	413'
14" TO 16"	2° 00'	7.5"	516'
18" +	1° 30'	5.5"	688'
DUCTILE IRON (MECHANICAL JOINT)			
6"	3° 30'	13.5"	291'
8" TO 12"	3° 00'	11.5"	344'
16"	2° 00'	7.5"	516'
24"	1° 30'	5.5"	688'

Note: Any deflection not listed for iron pipe may be derived by:

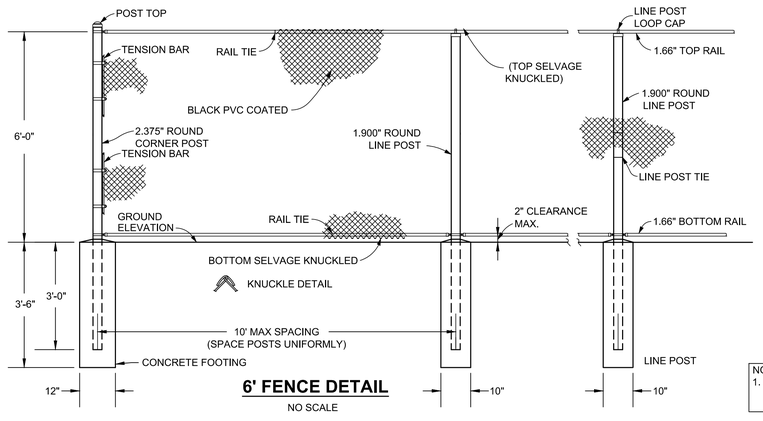
$D = \frac{90°}{1/2 \text{ Manufacturer's Min. Jt. Deflection}} \times \frac{18' \times 2}{\pi}$ Deflection = tan joint deflection X 18' X 12

PVC PIPE (C-900, C-905)				
PIPE NOM. DIA	PIPE O.D.	RADIUS (MIN.)	PRESSURE RATING - DIMENSION RATIO	
6"	6.9"	272.5'	150 psi	DR 18
8"	9.05"	326.3'	150 psi	DR 18
10"	11.10"	377.5'	150 psi	DR 18
12"	13.20"	430.0'	150 psi	DR 18
14"	15.30"	482.5'	165 psi	DR 26
16"	17.40"	535.0'	165 psi	DR 26
18"	19.50"	587.5'	165 psi	DR 26
20"	21.60"	640.0'	165 psi	DR 26
24"	25.80"	745.0'	165 psi	DR 26

Notes: 1. Any radius not listed for PVC pipe may be derived by: Do 300 + 100 (Do = outside diameter in feet)

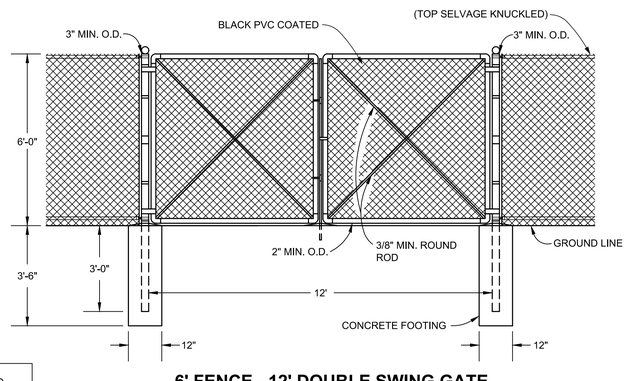
2. Due to the difficulty of measuring deflections on curved pipe, no deflections are given. It is expected that curved water lines will be properly shown on the plans and staked in the field.

DATE	ALLOWABLE DEFLECTIONS FOR WATER PIPE	DRWG. NO.
JAN. 1996		WAT-11
REVISIONS		



6' FENCE DETAIL
NO SCALE

NOTES:
1. ALL 6' CHAINLINK FENCING, POSTS, AND ACCESSORIES ARE TO BE BLACK PVC CLAD.



6' FENCE - 12' DOUBLE SWING GATE
NO SCALE

EROSION CONTROL (ONLY) SEEDING & FERTILIZING

1. THE AREA TO BE SEEDED SHALL FIRST BE FERTILIZED WITH COMMERCIAL 10-10-10 FERTILIZER AT THE RATE OF 30 LBS. PER THOUSAND SQUARE FEET AND TREATED WITH AGRICULTURAL LIME AT THE RATE OF 100 LBS. PER THOUSAND SQUARE FEET. THESE SHALL BE UNIFORMLY WORKED INTO SURFACE TO A MINIMUM DEPTH OF ONE INCH.

2. SEEDING SHALL BE DONE ONLY BETWEEN THE DATES OF FEB. 15 AND APRIL 15 OR BETWEEN SEPT. 15 AND NOV. 15, EXCEPT AS MAY BE OTHERWISE DIRECTED BY THE ENGINEER.

3. *SURFACE SHALL BE RAKED AND SMOOTHED TO ELIMINATE RIDGES AND DEPRESSIONS.*

4. AFTER PRELIMINARY RAKING, THE SEED SHALL BE SOWN AT THE RATE OF FOUR LBS. PER THOUSAND SQUARE FEET AS FOLLOWS: 20% PERENNIAL RYE 35% KENTUCKY 31 FESCUE 30% CREEPING RED FESCUE 15% REDTOP (ALL PERCENTAGES ARE BY WEIGHT)

5. SURFACE SHALL THEN BE LIGHTLY RAKED IN ORDER TO COVER SEED NO DEEPER THAN 1/4 INCH AND THEN SPRINKLE WITH WATER. THE SEEDED SURFACE SHALL BE COVERED WITH STRAW OR HAY TO PREVENT EROSION AND TO PROTECT SEEDING. THE ENTIRE SEEDED SURFACE SHALL BE ROLLED WITH A CORRUGATED ROLLER AFTER SEEDING AND BEFORE COVERING WITH STRAW. CONTRACTOR SHALL PROTECT SEEDED SURFACES UNTIL A GOOD STAND OF GRASS IS OBTAINED.

6. THE "HYDRO-SEEDING" METHOD OF SEED APPLICATION MAY BE USED, PROVIDED THE SEED RATE PER SQUARE FOOT IS THE SAME AS HEREIN BEFORE SPECIFIED. THE MULCH RATE SHALL BE SUCH AS TO PROVIDE PROPER SEED PROTECTION AND PREVENT EROSION. IF, IN THE OPINION OF THE INSPECTOR OR ENGINEER, THE MULCH RATE USED (AS EVIDENCED BY SLOPES AFTER SPRAYING) IS NOT SUFFICIENT, THE CONTRACTOR SHALL BE REQUIRED TO IN- CREASE THE AMOUNT OF MULCH IN THE MIX. NO EXTRA WILL BE ALLOWED FOR ANY REQUESTED INCREASE.

TABLE 3.32-D
(Revised June 2003)
PERMANENT SEEDING SPECIFICATIONS FOR PIEDMONT AREA

SEED[1]		
LAND USE	**SPECIES**	**APPLICATION PER ACRE**
Minimum Care Lawn (Commercial or Residential)	Tall Fescue[1] Perennial Ryegrass Kentucky Bluegrass[1]	95-100% 0-5% 0-5% TOTAL: 175-200 lbs.
High-Maintenance Lawn	Tall Fescue[1]	TOTAL: 200-250 lbs.
General Slope (3:1 or less)	Tall Fescue[1] Red Top Grass or Creeping Red Fescue Seasonal Nurse Crop[2]	128 lbs. 2 lbs. 20 lbs. TOTAL: 150 lbs.
Low-Maintenance Slope (Steeper than 3:1)	Tall Fescue[1] Red Top Grass or Creeping Red Fescue Seasonal Nurse Crop[2] Crownvetch[3]	108 lbs. 2 lbs. 20 lbs. 20 lbs. TOTAL: 150 lbs.

1 - When selecting varieties of turfgrass, use the Virginia Crop Improvement Association (VCIA) recommended turfgrass variety list. Quality seed will bear a label indicating that they are approved by VCIA. A current turfgrass variety list is available at the local County Extension office or through VCIA at 804-746-4884 or at http://sudan.cses.vt.edu/html/Turf/turfpublications/publications2.html

2 - Use seasonal nurse crop in accordance with seeding dates as stated below:

February 16th - April	Annual Rye
May 1st - August 15th	Foxtail Millet
August 16th - October	Annual Rye
November - February 15th	Winter Rye

3 - Substitute Sericea lespedeza for Crownvetch east of Farmville, VA (May through September use hulled seed, all other periods, use unhulled Sericea). If Flatpea is used, increase rate to 30 lbs./acre. If Weeping Lovegrass is used, include in any slope or low maintenance mixture during warmer seeding periods, increase to 30 -40

FERTILIZER & LIME

- Apply 10-20-10 **fertilizer** at a rate of **500** lbs. / acre (or 12 lbs. / 1,000 sq. ft.)
- Apply **Pulverized Agricultural Limestone** at a rate of 2 tons/acre (or 90 lbs. / 1,000 sq. ft.)

NOTE:
- A soil test is necessary to determine the actual amount of lime required to adjust the soil pH of site.
- Incorporate the lime and fertilizer into the top 4 – 6 inches of the soil by disking or by other means.
- When applying Slowly Available Nitrogen, use rates available in Erosion & Sediment Control Technical Bulletin # 4, 2003 Nutrient Management for Development Sites at http://www.dcr.state.va.us/sw/e&s.htm#pubs

COMMONWEALTH OF VIRGINIA
JASON WAYNE MULLINS
Lic. No. 044373
2/10/17
PROFESSIONAL ENGINEER

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1001 Boulders Parkway, Suite 300 | Richmond, VA 23225
TEL 804.200.6500 FAX 804.560.1016 www.timmons.com

YOUR VISION ACHIEVED THROUGH OURS.

REVISION DESCRIPTION	DATE
PER COUNTY AND VDH COMMENTS	2/10/17

DATE 11/09/16
DRAWN BY JB
DESIGNED BY JB
CHECKED BY JM
SCALE N/A

TIMMONS GROUP

POWHATAN ELEVATED TANK
SPENCER DISTRICT - POWHATAN COUNTY - VIRGINIA
TANK SITE PLAN - NOTES & DETAILS

JOB NO. 37385
SHEET NO. C1.0

S:\30\13\379-Powhatan_TMP\DWG\Sheet\Exhibit\Water Tank\37385-501-GRAD.dwg | Plotted on 2/14/2017 9:05 AM | by Jason Mullins

OLD BUCKINGHAM ROAD (MAJOR COLLECTOR)
STATE ROUTE 13 (35 mph)

ASPHALT DRIVE (BY OTHERS)

167.34'
N55°46'58"W

209.81'
N54°19'05"W

35'

24'

PROPOSED BUILDING (BY OTHERS)

EXISTING 50' ACCESS & UTILITY EASEMENT

GRAVEL AREA (BY OTHERS)

S54°29'49"E
49.36'

N36°12'54"E
286.26'

N36°20'18"E
259.39'

OLD HOUSE REMAINS

ASPHALT

FRAME SHED

281.04'
N54°39'30"W

S16°40'50"E
167.11'

6' WOOD FENCE

GATE

N36°34'17"E
48.39'

PROPANE TANK

6' FENCE

180.34'
N54°36'21"W

GRAVEL - SEE SECTION ON THIS SHEET

80.00'
S35°36'21"E

TANK BOWL (ABOVE)

12'

TANK CENTER
N: 3724078.84
E: 11648930.92

DOOR

REMOVE 12" PLUG

TANK OVERFLOW SPLASH BLOCK

3" CL52 DUCTILE IRON WATER LINE

NEW WELL
(SEE DETAIL SHEET M1.5)
N: 3724090.98
E: 11648876.40

FFE: 375.00

TANK BASE

18.35'

66.47'
N84°59'51"W

25.00'
N53°23'39"W
12" CL52 DUCTILE IRON WATER LINE

3" DRAIN W/ BIRD SCREEN TO DAYLIGHT

S15°10'09"E
229.89'

109.85'
S74°54'19"W

S15°10'09"E
43.94'

S10°58'09"E
211.00'

INV.=358.90'

18" RCP

GRAVEL LOT

FRAME SHED

WOOD FENCE

N35°40'55"E
600.00'

CONCRETE

VENT

GAS PUMP

U/G PROPANE LINE

40.7'

6" 21B AGGREGATE

FILTER FABRIC

SUBGRADE

GRAVEL SECTION

NO SCALE

DENOTES GRAVEL ON PLANS

MATERIALS LIST	LENGTH
3" CL52 DUCTILE IRON WATER LINE:	38.21'
12" CL52 DUCTILE IRON WATER LINE:	51.06'

TANK NOTES

- ESC AND SWM TO BE HANDLED BY THE POWHATAN TRANSPORTATION AND MAINTENANCE FACILITY SITE PLAN. PROJECT NUMBER 2015.40

NAD 83

SCALE 1"=30'
0 30' 60'

COMMONWEALTH OF VIRGINIA
JASON WAYNE MULLINS
Lic. No. 044373
2/10/17
PROFESSIONAL ENGINEER

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DATE 11/09/16
DRAWN BY JB
DESIGNED BY JB
CHECKED BY JM
SCALE 1"=30'

TIMMONS GROUP

POWHATAN ELEVATED TANK

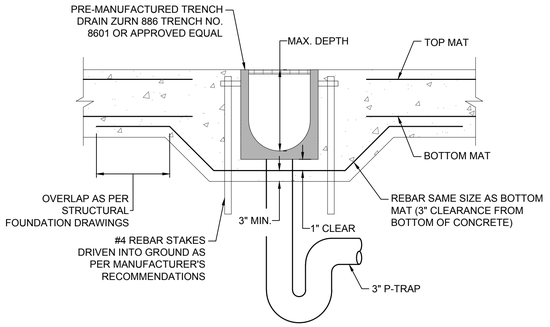
SPENCER DISTRICT - POWHATAN COUNTY - VIRGINIA

TANK SITE PLAN

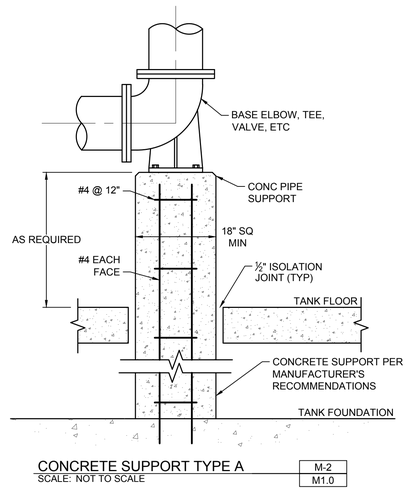
JOB NO. 37385

SHEET NO. C1.1

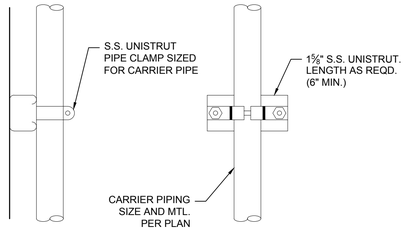
S:\30\137379-Powhatan_TMF\DWG\Sheet\Exhibit\Water Tank\37385-301-GRAD.dwg | Plotted on 2/14/2017 9:05 AM | by Jason Mullins



TRENCH DRAIN — M-1 / M1.0
SCALE: NOT TO SCALE



CONCRETE SUPPORT TYPE A — M-2 / M1.0
SCALE: NOT TO SCALE

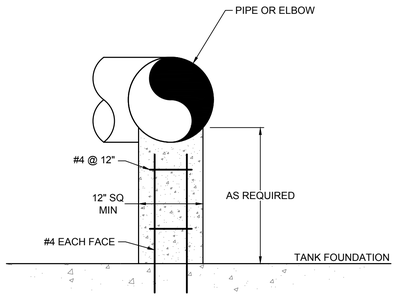


UNISTRUT PIPE/CONDUIT SUPPORT — M-3 / M1.0
SCALE: NOT TO SCALE

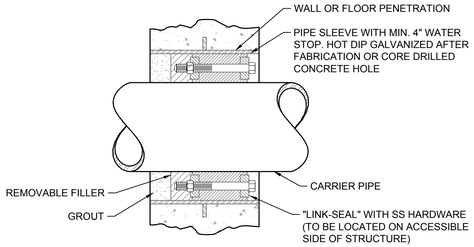
ADHESIVE ANCHOR BOLTS		
SIZE	MINIMUM EMBEDMENT LENGTH	CONCRETE STRENGTH
3/8"	3 1/2"	4,000 PSI
1/2"	4 1/4"	4,000 PSI
5/8"	5"	4,000 PSI
3/4"	6 5/8"	4,000 PSI

NOTES:
1. ADHESIVE ANCHORS BASED UPON HILTI HVA OR HIT SYSTEM.
2. ALL ANCHOR BOLTS, NUTS AND WASHERS TO BE A MINIMUM OF 304 STAINLESS STEEL.
3. ANCHOR BOLTS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

ADHESIVE ANCHOR BOLTS — M-4 / M1.0
SCALE: NOT TO SCALE

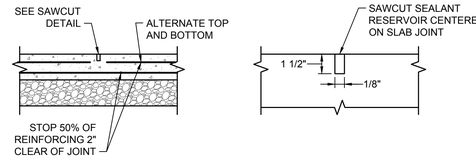


CONCRETE SUPPORT TYPE B — M-5 / M1.0
SCALE: NOT TO SCALE

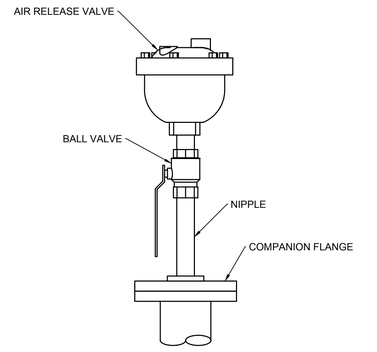


NOTE:
HOLE SIZE AND LINK SEAL SIZE TO BE COORDINATED AS PER MANUFACTURER'S REQUIREMENTS.

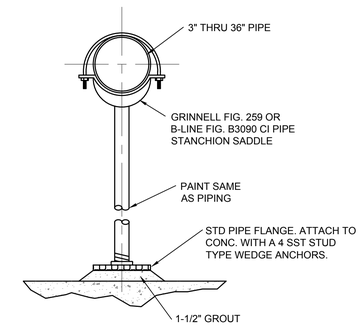
WALL/FLOOR SLEEVE — M-6 / M1.0
SCALE: NOT TO SCALE



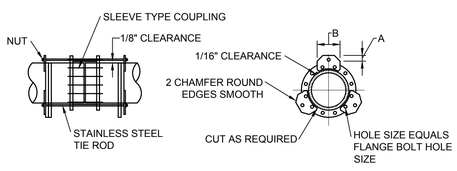
TYPICAL SLAB CONTROL JOINT — M-7 / M1.0
SCALE: NOT TO SCALE



AIR RELEASE VALVE ASSEMBLY — M-8 / M1.0
SCALE: NOT TO SCALE



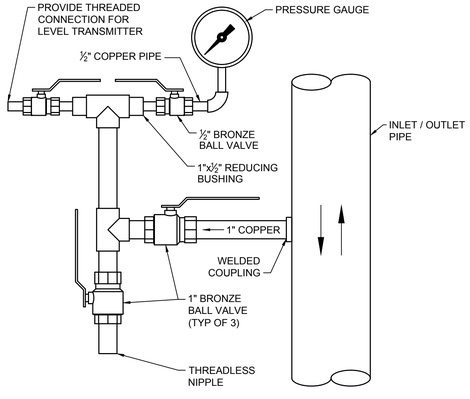
PIPE SUPPORT (3" THROUGH 36") — M-9 / M1.0
SCALE: NOT TO SCALE



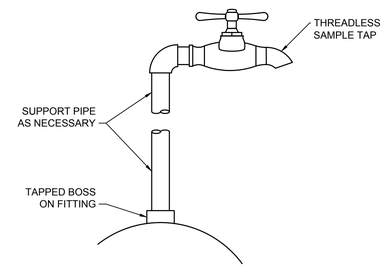
NOTE:
1. TIE RODS SHALL BE EQUALLY SPACED AROUND PIPE.
2. HOLE SIZE EQUALS TIE ROD DIA. + 1/8"

PIPE SIZE	TIERODS		FLANGE CLAMP			
	NO.	DIA.	THICKNESS	NO. OF FLANGE BOLTS PER CLAMP	"A"	"B"
6"	2	1/2"	1/2"	2	2"	7 3/4"
8"	2	5/8"	1/2"	2	2"	8 5/8"
10"	3	3/4"	1/2"	2	2"	7 3/4"
12"	3	1"	1/2"	2	2"	8 1/2"
ALL, PLATES, RODS, & NUTS TO BE STAINLESS STEEL						

SLEEVE COUPLING RESTRAINT — M-10 / M1.0
SCALE: NOT TO SCALE



PRESSURE GAUGE AND PRESSURE TRANSMITTER — M-11 / M1.0
SCALE: NOT TO SCALE



THREADLESS SAMPLE TAP — M-12 / M1.0
SCALE: NOT TO SCALE

COMMONWEALTH OF VIRGINIA
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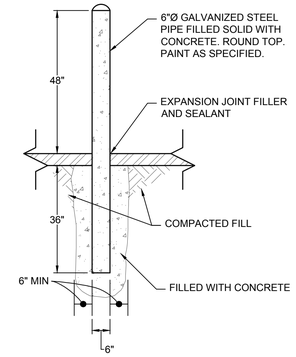
DESIGNED BY: B. STRICKLAND
CHECKED BY: W. HUNNIUS
SCALE: AS SHOWN

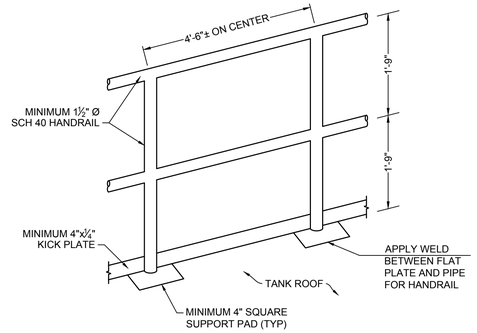
TIMMONS GROUP

POWHATAN ELEVATED TANK
SPENCER DISTRICT - POWHATAN COUNTY - VIRGINIA
TANK DETAILS

JOB NO. 37385
SHEET NO. M1.0

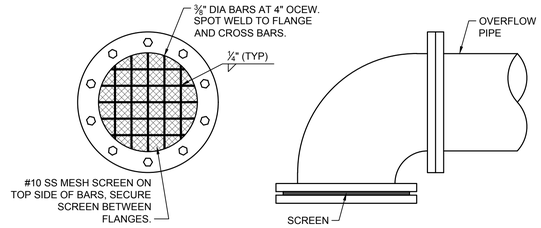


BOLLARD — M-13, M1.1
SCALE: NOT TO SCALE



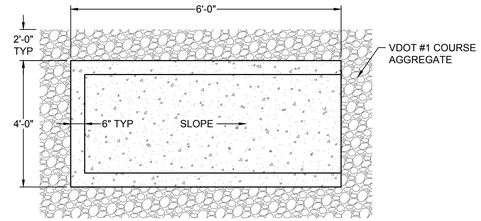
NOTES:
1. HANDRAIL SHALL BE DESIGNED BY TANK MANUFACTURER AND SHALL BE OSHA COMPLIANT.
2. HANDRAIL SHALL BE DESIGNED TO SUPPORT UP TO 12 CELL PHONE ANTENNAS SPREAD AROUND THE CIRCUMFERENCE OF THE HANDRAIL.
3. HANDRAIL SHALL HAVE A MINIMUM DIAMETER OF 16'.

TANK HANDRAIL — M-14, M1.1
SCALE: NOT TO SCALE

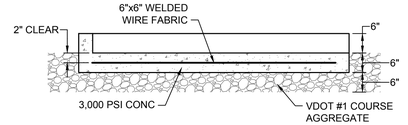


NOTE:
THE FLANGE AND CROSS BARS SHALL BE GALVANIZED AFTER FABRICATION.

OVERFLOW SCREEN — M-15, M1.1
SCALE: NOT TO SCALE

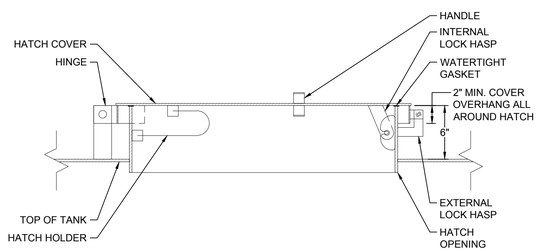


PLAN



SECTION

OVERFLOW SPLASH BLOCK — M-16, M1.1
SCALE: NOT TO SCALE



TANK TOP ACCESS HATCH — M-17, M1.1
SCALE: NOT TO SCALE

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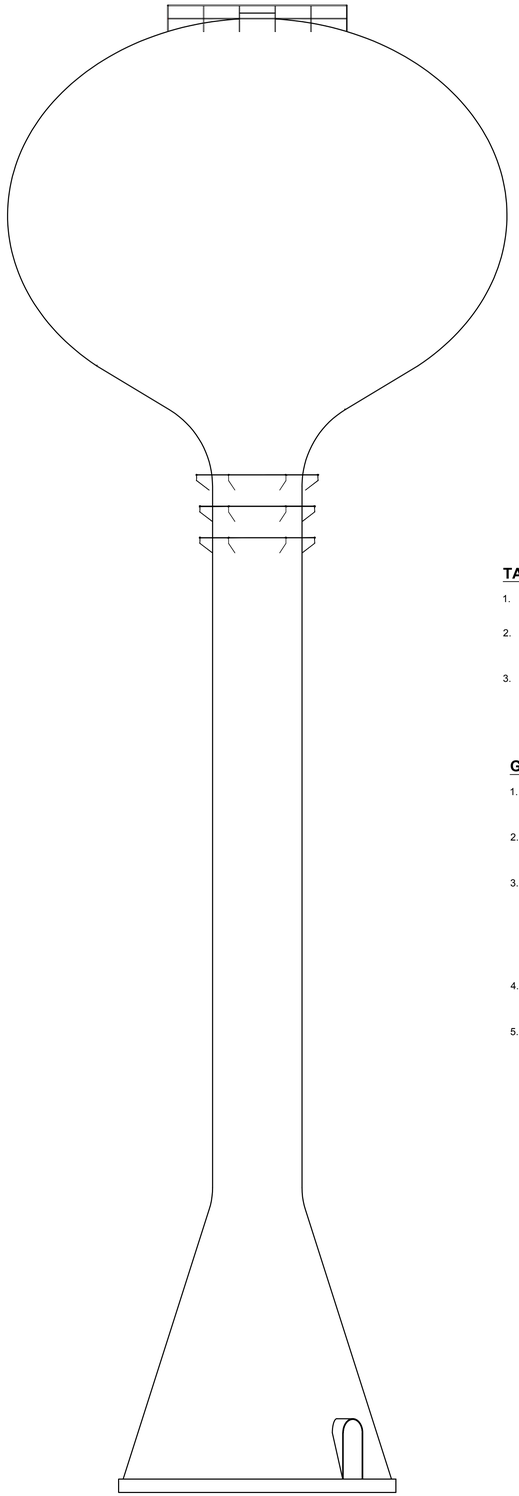
TIMMONS GROUP

POWHATAN ELEVATED TANK

SPENCER DISTRICT - POWHATAN COUNTY - VIRGINIA

TANK DETAILS

JOB NO. 37385
SHEET NO. M1.1



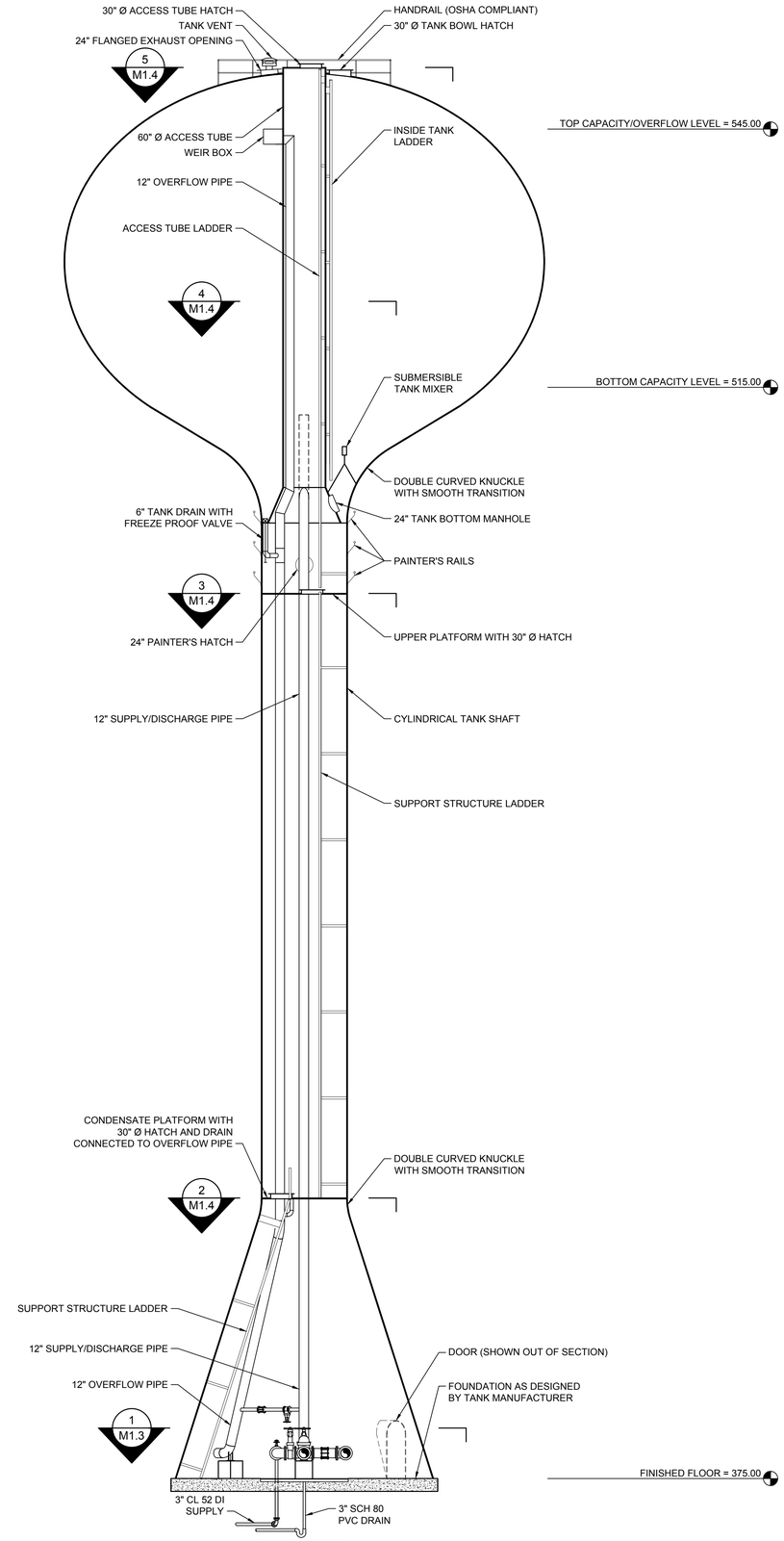
TANK ELEVATION
SCALE: NOT TO SCALE

TANK COLOR NOTES

1. SEE CONTRACT SPECIFICATIONS FOR STEEL TANK COATING REQUIREMENTS.
2. COLORS SHALL BE AS FOLLOWS:
   TANK — TANK WHITE
   DOORS — TANK WHITE
3. ALL EXTERIOR JUNCTION AND ACCESS BOXES SHALL BE PAINTED TO MATCH THE TANK.

GENERAL TANK NOTES

1. FINAL DESIGN BASE DIAMETER AND DIMENSIONS OF FOUNDATION SHALL BE DETERMINED BY THE TANK CONTRACTOR.
2. A LADDER SAFETY DEVICE WITH HARNESS MEETING OSHA STANDARDS SHALL BE PROVIDED. PROVIDE ALUMINUM SAFETY RAILS ON ALL LADDERS.
3. ALL MANHOLES AND SCUTTLES ABOVE THE WATERLINE SHALL BE FRAMED AT LEAST SIX INCHES ABOVE THE SURFACE OF THE ROOF AT THE OPENING, BE FITTED WITH A SOLID WATERTIGHT COVER WHICH OVERLAPS THE FRAMED OPENING AND EXTENDS VERTICALLY DOWN 2" MIN. AROUND THE FRAME (SHOEBOX TYPE), AND BE HINGED AT ONE SIDE AND FITTED WITH A LOCKING DEVICE.
4. ALL SUPPLY/DISCHARGE PIPING WITHIN THE TANK SUPPORT STRUCTURE SHALL BE CLAD WITH ALUMINUM JACKET AND HEAT TRACED FOR FREEZE PROTECTION.
5. PROVIDE HANGERS, BRACKETS, PIPE SUPPORTS AND THRUST RESTRAINT AS REQUIRED.



TANK SECTION
SCALE: NOT TO SCALE

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TIMMONS GROUP

POWHATAN ELEVATED TANK

SPENCER DISTRICT - POWHATAN COUNTY - VIRGINIA

TANK ELEVATION AND SECTION

JOB NO. 37385
SHEET NO. M1.2

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SPHEROID TANK INTERIOR NOTE:

1. PROVIDE 1/2" ISOLATION JOINT AT ALL FLOOR PENETRATIONS. CAP WITH SELF LEVELING SEALANT.
2. PROVIDE EXPANSION JOINT ON SUPPLY/DISCHARGE RISER TO ACCOMMODATE MAXIMUM POTENTIAL DIFFERENTIAL MOVEMENT
3. SAWCUT CONTROL JOINTS 1 1/2" DEEP AT 20 FEET MAXIMUM CENTERS.

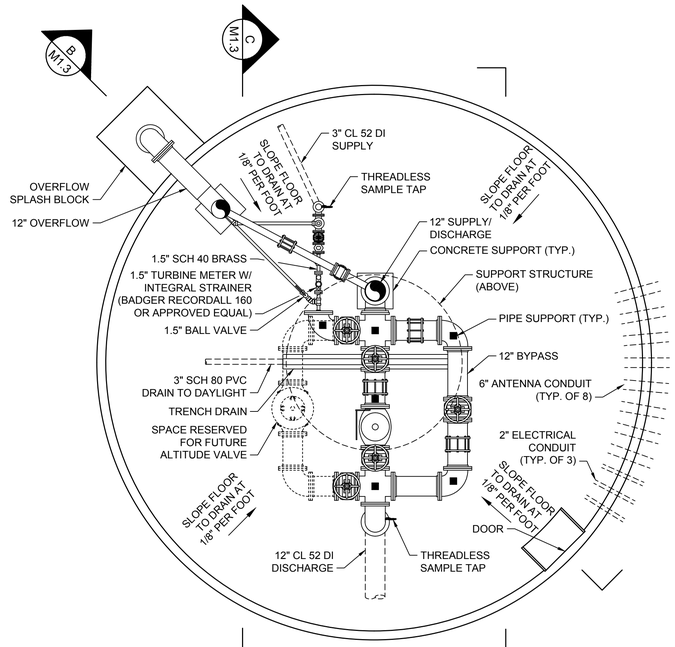
NOTE:
SECTIONS ARE INTENDED TO REPRESENT THE APPROXIMATE LOCATION FOR PIPING AND APPURTENANCES. SOME ITEMS MAY BE ROTATED OR OMITTED FOR CLARITY AND MAY NOT NECESSARILY BE DRAWN EXACTLY TO SCALE.

PIPING AND VALVE LEGEND

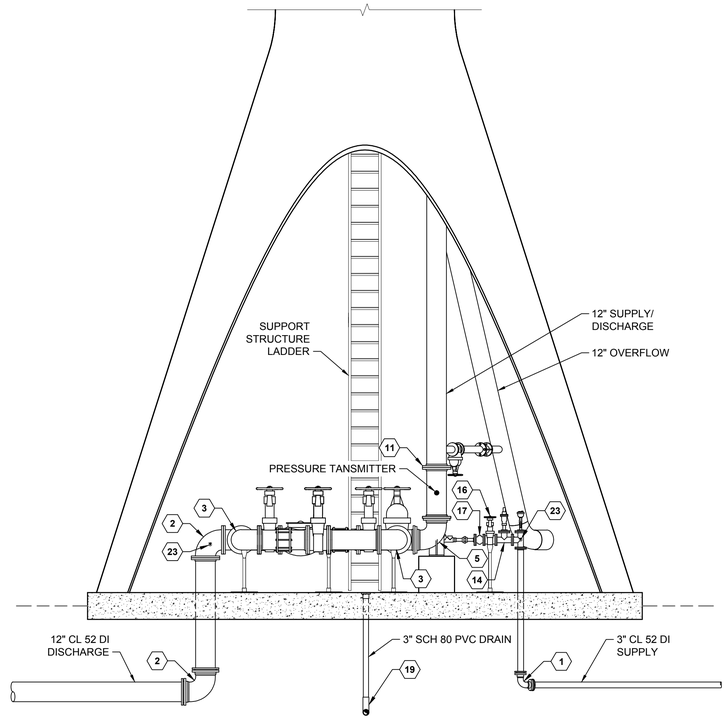
CALLOUT	DESCRIPTION	REMARKS
1	3" 90° BEND	RESTRAINED JOINT
2	12" 90° BEND	RESTRAINED JOINT
3	12" 90° BEND	
4	12" CROSS	
5	12" 90° BASE ELBOW	
6	12" CHECK VALVE	
7	12" GATE VALVE	
8	12" DRESSER COUPLING	
9	12" BLIND FLANGE	
10	12" THREADED FLANGE	1.5" NPT
11	12" EXPANSION JOINT	SS TO DIP TRANSITION
12	4" GATE VALVE	
13	4" DRESSER COUPLING	
14	3" TEE	
15	1.5"x1.5" PRESSURE RELIEF VALVE	KUNKLE MODEL 91, NPT (SET AT 125 PSI)
16	3" GATE VALVE	
17	3" CHECK VALVE	CLA-VAL SERIES 581
18	3" THREADED FLANGE	1.5" NPT
19	3" P-TRAP	SCHEDULE 80 PVC
20	12" BASE BEND	STEEL
21	AIR RELEASE VALVE	CLA-VAL SERIES 34 1" INLET, 3/32" ORIFICE
22	1.5" UNION	SCHEDULE 40 BRASS
23	THREADLESS SAMPLE TAP	SEE DETAIL SHEET M1.0
24	1.5" TEE	SCHEDULE 40 BRASS
25	1.5" 45° BEND	SCHEDULE 40 BRASS
26	1.5" BALL VALVE	

FITTINGS SHALL BE FLANGED DUCTILE IRON UNLESS OTHERWISE NOTED

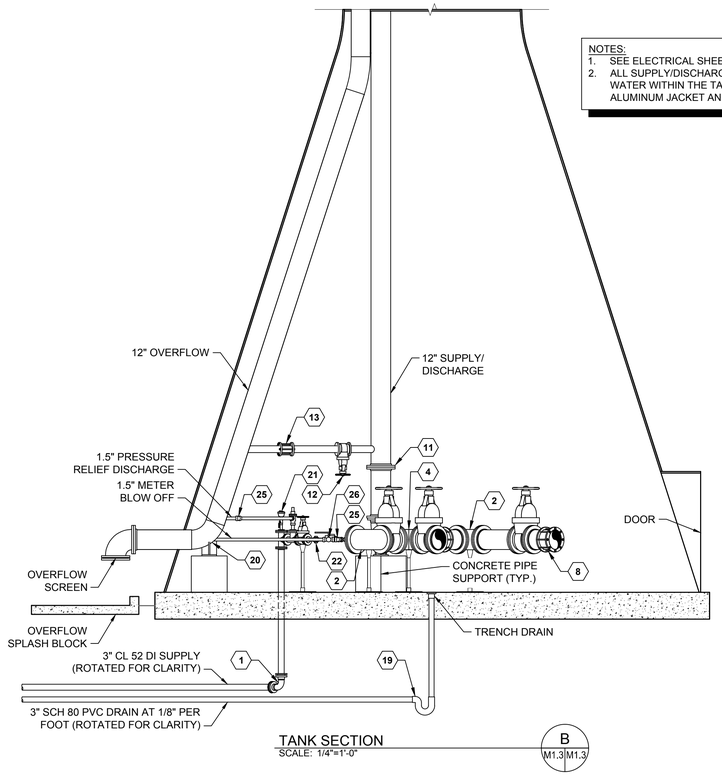
SCHEDULE NOT COMPREHENSIVE. FITTINGS AND PIPE NOT APPEARING ON THIS LIST MAY BE REQUIRED.



TANK FLOOR PLAN — SCALE: 1/4"=1'-0" — 1 (M1.2|M1.3)

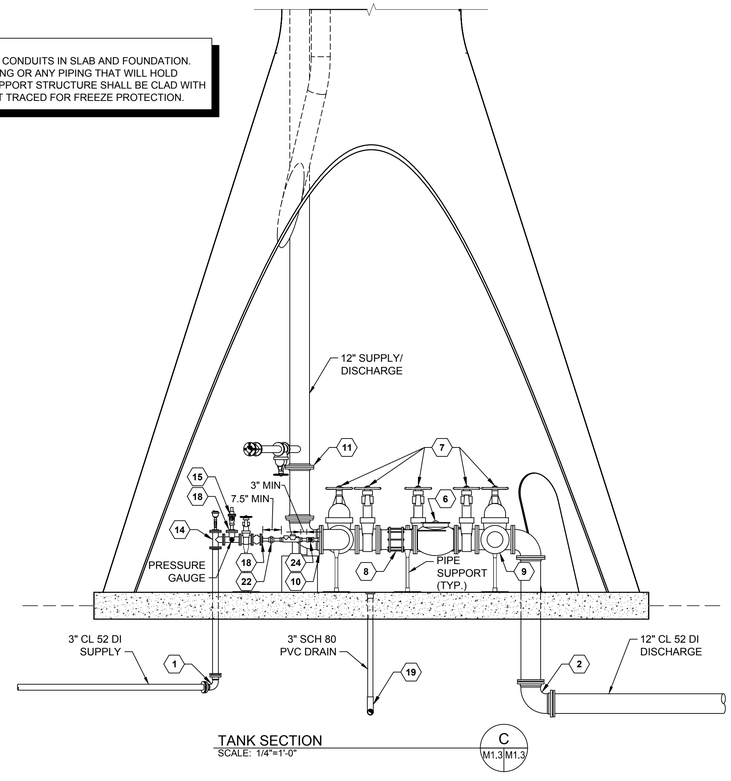


TANK SECTION — SCALE: 1/4"=1'-0" — A (M1.3|M1.3)



TANK SECTION — SCALE: 1/4"=1'-0" — B (M1.3|M1.3)

NOTES:
1. SEE ELECTRICAL SHEET FOR CONDUITS IN SLAB AND FOUNDATION.
2. ALL SUPPLY/DISCHARGE PIPING OR ANY PIPING THAT WILL HOLD WATER WITHIN THE TANK SUPPORT STRUCTURE SHALL BE CLAD WITH ALUMINUM JACKET AND HEAT TRACED FOR FREEZE PROTECTION.



TANK SECTION — SCALE: 1/4"=1'-0" — C (M1.3|M1.3)

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TIMMONS GROUP

POWHATAN ELEVATED TANK

SPENCER DISTRICT - POWHATAN COUNTY - VIRGINIA

TANK PLAN AND SECTION

JOB NO. 37385

SHEET NO. M1.3

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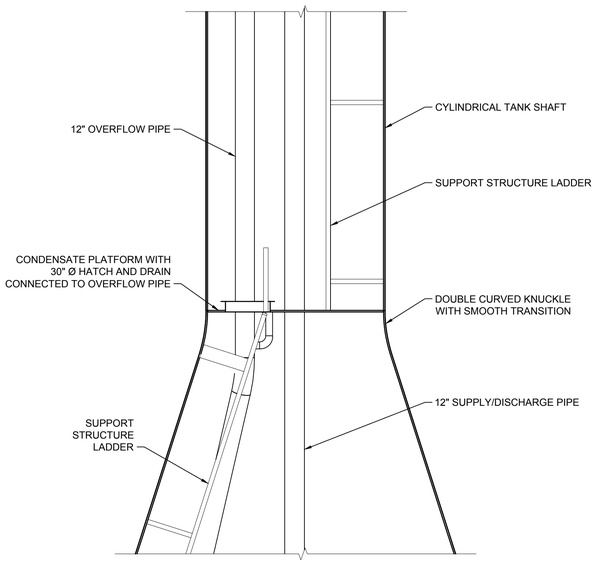
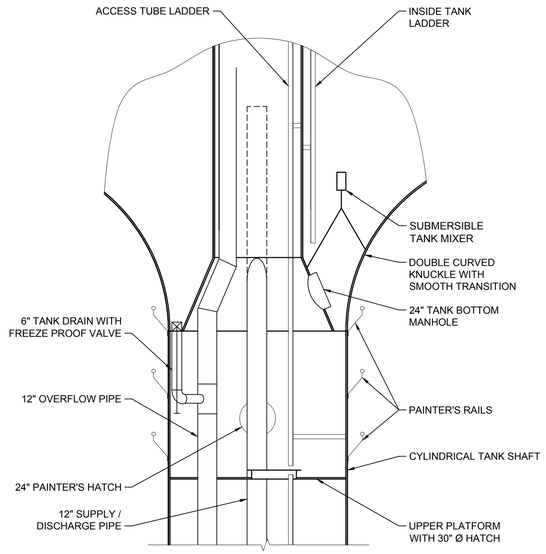
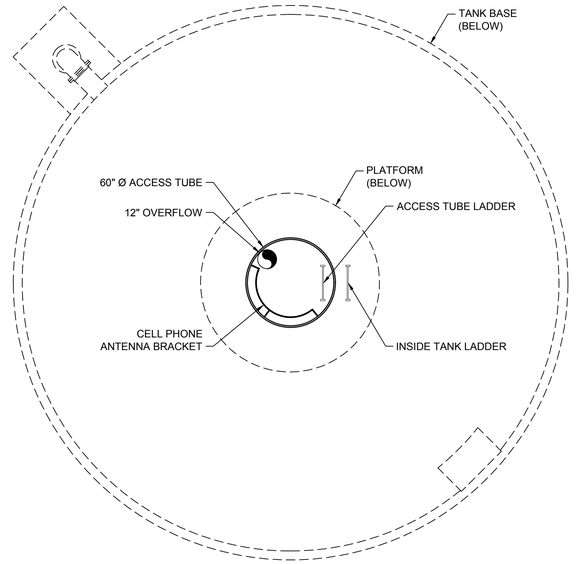


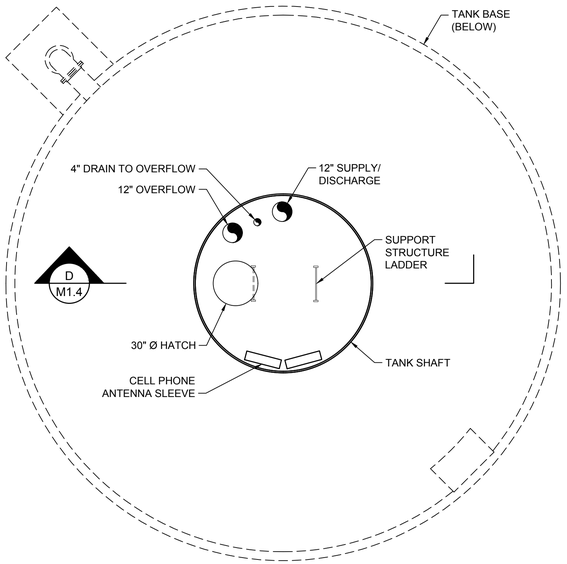
CONDENSATE CEILING SECTION
SCALE: 1/4"=1'-0"
D M1.4 | M1.4



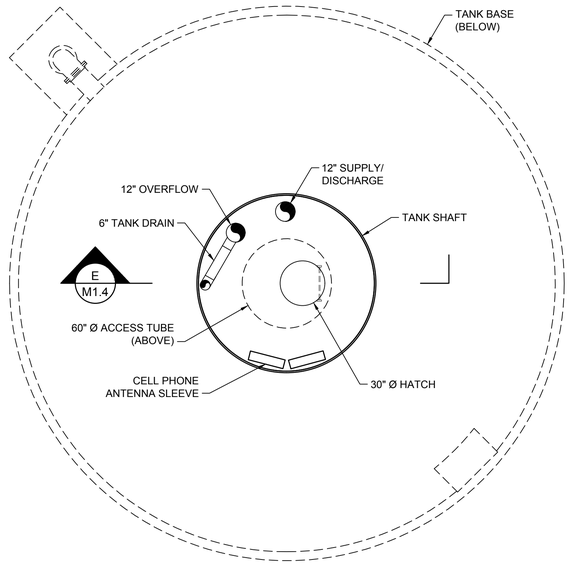
UPPER PLATFORM SECTION
SCALE: 1/4"=1'-0"
E M1.4 | M1.4



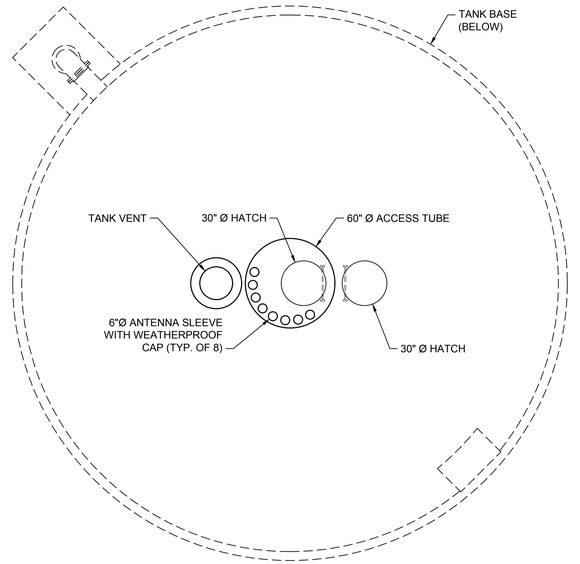
ACCESS TUBE PLAN
SCALE: 1/4"=1'-0"
4 M1.2 | M1.4



CONDENSATE CEILING PLAN
SCALE: 1/4"=1'-0"
2 M1.2 | M1.4



UPPER PLATFORM PLAN
SCALE: 1/4"=1'-0"
3 M1.2 | M1.4



TANK TOP PLAN
SCALE: 1/4"=1'-0"
5 M1.2 | M1.4

COMMONWEALTH OF VIRGINIA
WESLEY G. HUNNIUS
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2/10/17
PROFESSIONAL ENGINEER

THIS DRAWING PREPARED AT THE
CORPORATE OFFICE
1001 Boulders Parkway, Suite 300 | Richmond, VA 23225
TEL 804.200.6500 FAX 804.560.1016 www.timmons.com

YOUR VISION ACHIEVED THROUGH OURS.

DATE	REVISION DESCRIPTION
2/10/17	PER COUNTY AND VDH COMMENTS

DATE: 11/17/16
DRAWN BY: B. STRICKLAND
DESIGNED BY: B. STRICKLAND
CHECKED BY: W. HUNNIUS
SCALE: AS SHOWN

TIMMONS GROUP

POWHATAN ELEVATED TANK

SPENCER DISTRICT - POWHATAN COUNTY - VIRGINIA

TANK PLAN AND SECTION

JOB NO. 37385
SHEET NO. M1.4

GOULDS WATER TECHNOLOGY
a xylem brand

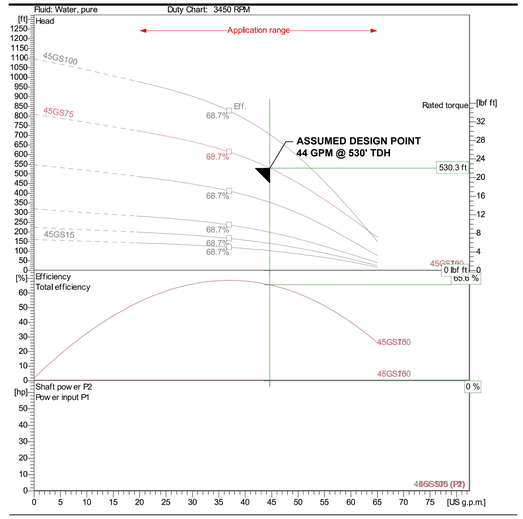
Performance Data

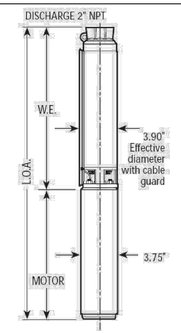
35-85GS Series
Submersible Pumps
MODEL : 45GS75

Hydraulic Data				Motor Data	4 Inch eGSHC GS Xtreme 35-85
Maximum Flow	Flow at Duty Point	Maximum TDH	TDH at Duty Point	Voltage / Phase / Enclosure	Model
65 US g.p.m.	44 US g.p.m.	808 ft	530 ft		45GS75

Submittal Prepared for:
Engineer:
Submittal Prepared by:
Submittal Date: 11/16/2016

Job:
Contractor:
Company:
Approved by: Date:

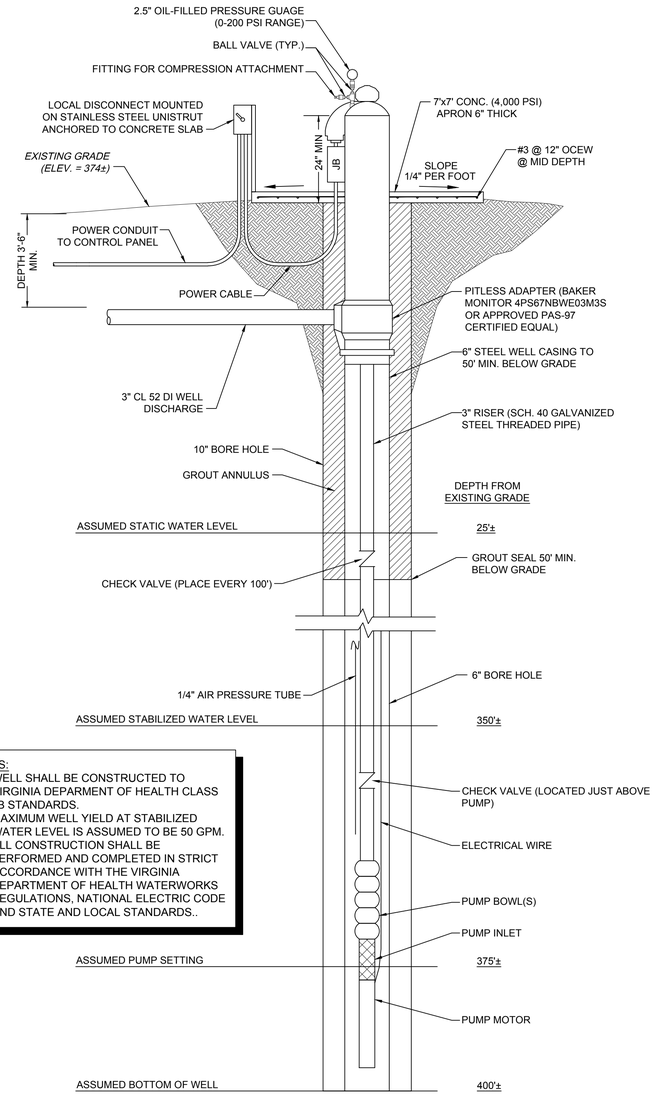




Dimension	Value
Discharge	2" NPT
W E Length	38⅞

NOTES:
1. PUMP SELECTION IS BASED ON ASSUMED WELL YIELD AND ASSUMED GROUNDWATER SURFACE ELEVATIONS (STATIC AND DYNAMIC). GIVEN THESE ASSUMPTIONS, IT IS ANTICIPATED THAT THE WELL PUMP MOTOR SHALL BE 4", 7.5 HP, 230V, 3Φ, 60 HZ.
2. CONTRACTOR SHALL PROVIDE SIGNED WELL DRILLING LOG AND WELL DRAWDOWN AND RECOVERY REPORT TO ENGINEER FOR REVIEW AND APPROVAL PRIOR TO ORDERING AND INSTALLING WELL PUMP.
3. WATER SUPPLY DESIGN, INCLUDING BUT NOT LIMITED TO WELL PUMP, PUMP MOTOR, AND APPURTENANCES, IS SUBJECT TO CHANGE UPON ENGINEER'S REVIEW OF ACTUAL PHYSICAL AND HYDRAULIC CHARACTERISTICS OBSERVED IN THE FIELD.
4. WELL PUMP, MOTOR, AND CONTROLS SHALL BE SUPPLIED BY A SINGLE MANUFACTURER (GOULDS, GRUNDFOS, OR APPROVED EQUAL).

TYPICAL 4" SUBMERSIBLE WELL PUMP PERFORMANCE CURVES
SCALE: NOT TO SCALE



NOTES:
1. WELL SHALL BE CONSTRUCTED TO VIRGINIA DEPARMENT OF HEALTH CLASS IIB STANDARDS.
2. MAXIMUM WELL YIELD AT STABILIZED WATER LEVEL IS ASSUMED TO BE 50 GPM.
3. ALL CONSTRUCTION SHALL BE PERFORMED AND COMPLETED IN STRICT ACCORDANCE WITH THE VIRGINIA DEPARTMENT OF HEALTH WATERWORKS REGULATIONS, NATIONAL ELECTRIC CODE AND STATE AND LOCAL STANDARDS..

TYPICAL WELL SECTION
SCALE: NOT TO SCALE

COMMONWEALTH OF VIRGINIA
WESLEY G. HUNNIUS
Lic. No.040151
2/10/17
PROFESSIONAL ENGINEER

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POWHATAN ELEVATED TANK
SPENCER DISTRICT - POWHATAN COUNTY - VIRGINIA
WELL DETAILS

JOB NO. 37385
SHEET NO. M1.5

L:\2015\37385 - Powhatan Elevated Tank\DWG\Sheet\CD\TANK\37385A-M1.3-PPTANK.dwg | Plotted on 2/14/2017 8:15 AM | by Bruce Strickland

KEYNOTES

APPLIES TO DRAWING E1.0
REPRESENTED BY n

1. LIGHTING FIXTURES AND RECEPTACLES SHALL BE ACCESSIBLE FROM LADDER OR FLOOR.

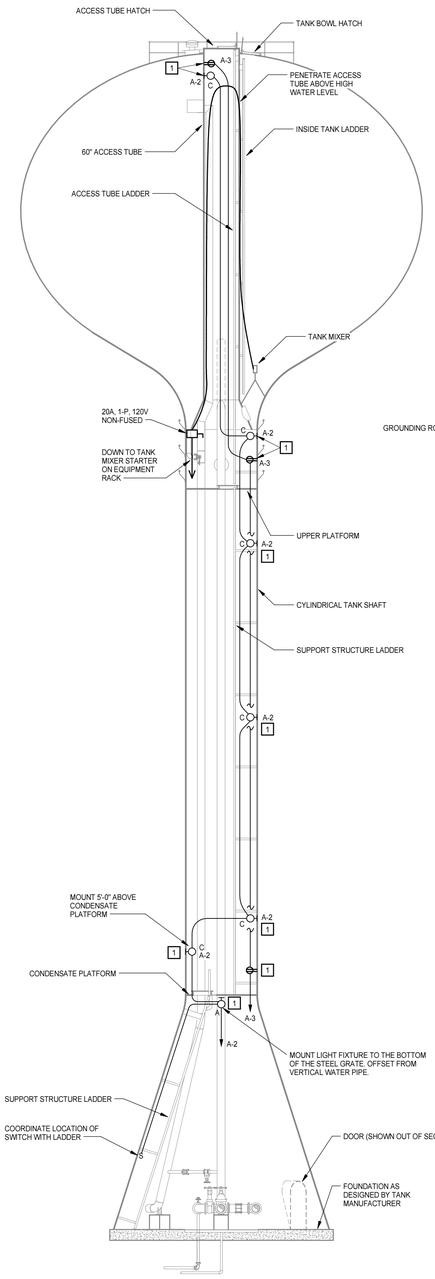
2. ALL UNDERGROUND CONDUITS SHALL BE A MINIMUM OF 24" BELOW GRADE.

3. ALL CONDUIT EXTENDING TO EQUIPMENT NOT LOCATED WITHIN 1' OF A WALL SHALL BE EXTENDED IN THE SLAB AND STUBBED UP ADJACENT TO THE EQUIPMENT.

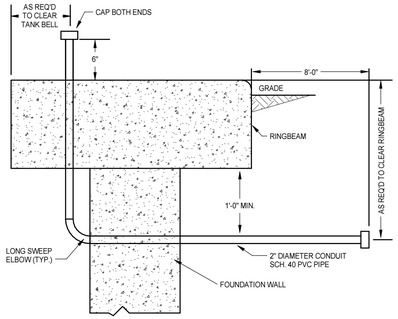
4. PROVIDE ELECTRICAL CONNECTION TO THE HEAT TAPE PROTECTING THE 12" VERTICAL SUPPLY/DISCHARGE PIPE.

5. PROVIDE ELECTRICAL CONNECTION TO THE HEAT TAPE PROTECTING THE VALVES IN THE BASE OF THE TANK.

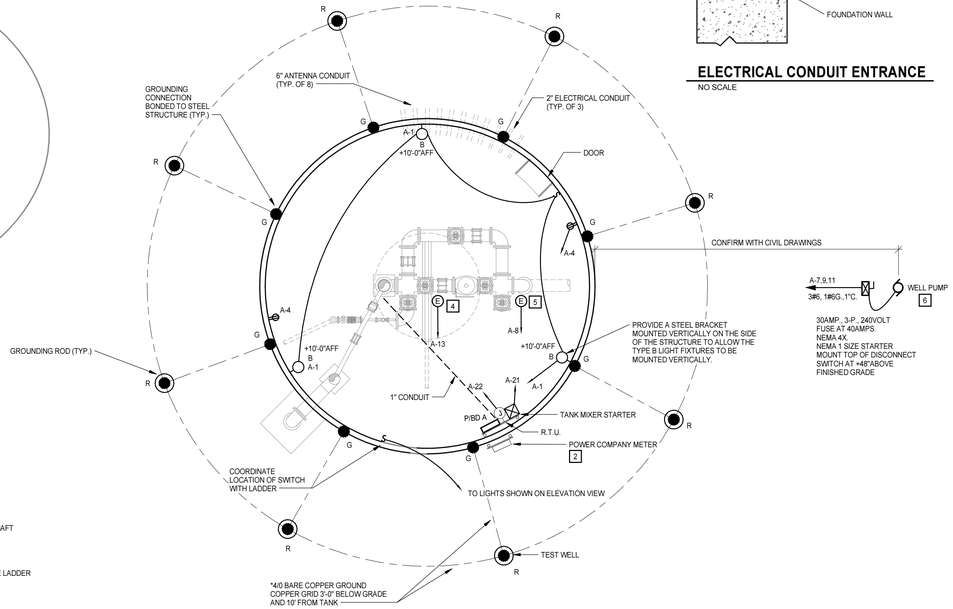
6. REFER TO THE CIVIL ENGINEERING DRAWINGS FOR THE WELL PUMP LOCATION. THE SUBMERSIBLE WELL PUMP IS LOCATED AT THE BOTTOM OF THE WELL. THE POWER CABLING FROM THE WELL PUMP TO THE TOP OF THE WELL IS PROVIDED BY THE MANUFACTURER. PROVIDE DISCONNECT SWITCH AS INDICATED AND MAKE FINAL CONNECTION. PROVIDE SUPPORT STRUCTURE FOR DISCONNECT SWITCH. ALL EXPOSED CONDUIT SHALL BE RIGID GALVANIZED STEEL.



ELECTRICAL - TANK PLAN
NO SCALE



ELECTRICAL CONDUIT ENTRANCE
NO SCALE



ELECTRICAL - TANK PLAN
NO SCALE

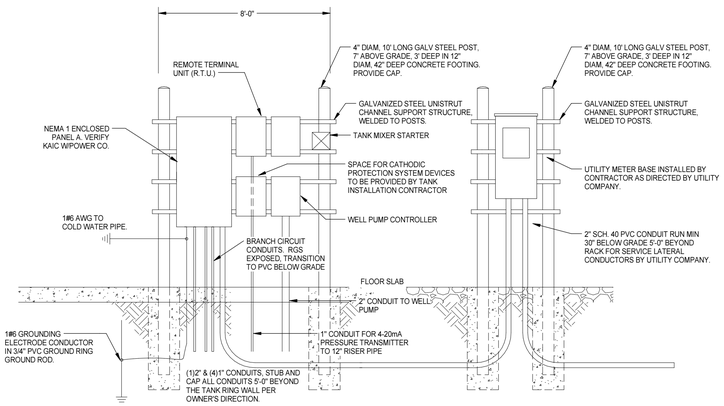
PANELBOARD SCHEDULE A

LOCATION: TANK BASE
FED FROM:
200 A MCB | 120/240 Wye | 3 PH 4 W | MOUNT: SURFACE | PANEL ASSEMBLY RATED (KAIC): 22 KAIC

CKT	BRKR	POLE	LOAD	A		B		C		LOAD	POLE	BRKR	CKT
1	20 A	1	LIGHTING - TANK BASE	0.2	0.3					LIGHTING - TANK CEILING & TUBE	1	20 A	2
3	20 A	1	RECEPTACLES - TANK TUBE			0.5	0.4			RECEPTACLES - TANK FLOOR	1	20 A	4
5	--	--	HIGH LEG					0.0	0.0	HIGH LEG	--	--	6
7	50 A	3	WELL PUMP	3.0	1.4					HEAT TAPE - GFI	1	20 A	8
9						3.0	0.0			SPACE ONLY	--	--	10
11								3.0	0.0	HIGH LEG	--	--	12
13	20 A	1	HEAT TAPE - GFI	1.4	0.0					SPACE ONLY	--	--	14
15	--	--	SPACE ONLY			0.0	0.0			SPACE ONLY	--	--	16
17	--	--	HIGH LEG					0.0	0.0	HIGH LEG	--	--	18
19	20 A	1	SPARE	0.0	0.0					SPARE	1	20 A	20
21	20 A	1	TANK MIXER			1.2	0.5			REMOTE TERMINAL UNIT	1	20 A	22
23	--	--	HIGH LEG					0.0	0.0	HIGH LEG	--	--	24
25	--	--	SPACE ONLY	0.0	0.0					SPACE ONLY	--	--	26
27	--	--	SPACE ONLY			0.0	0.0			SPACE ONLY	--	--	28
29	--	--	HIGH LEG					0.0	0.0	HIGH LEG	--	--	30
				6 KVA		6 KVA		3 KVA					
				52 A		47 A		25 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand
INTERIOR LIGHTING	442 VA	100.00%	442 VA
EXTERIOR LIGHTING	0 VA	0.00%	0 VA
RECEPTACLES	900 VA	100.00%	900 VA
ELECTRIC HEAT	2800 VA	100.00%	2800 VA
MISCELLANEOUS	9602 VA	100.00%	9602 VA

Panel Totals
Total Conn. Load: 13.7 kVA
Total Est. Demand: 13.7 kVA
Total Conn. Current: 33 A
Total Est. Demand... 33 A

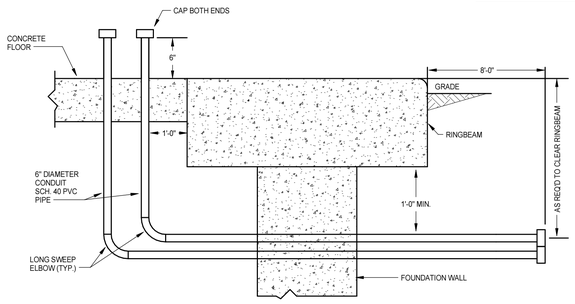


ELECTRICAL EQUIPMENT SUPPORT RACK ELEVATION

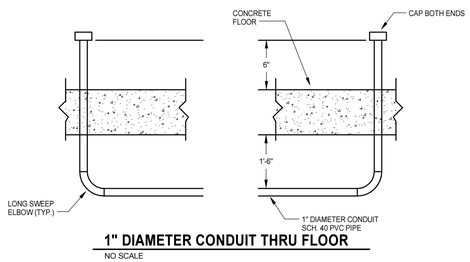
ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
	DUPLEX RECEPTACLE, NEMA 5-20R
J	JUNCTION BOX
	DISCONNECT SWITCH, FUSIBLE OR NON-FUSIBLE AS INDICATED. MOUNT W/HANDLE AT +4'-6"AFF, UNO.
	COMBINATION MAGNETIC STARTER AND DISCONNECT SWITCH. WITH OVERLOAD ELEMENTS AND FUSING AS REQUIRED TO SERVE MANUFACTURER REQUIREMENTS OF EQUIPMENT SERVED. PROVIDE WITH HAND-OFF-AUTOMATIC SELECTOR SWITCH AND INDICATOR LIGHTS., MOUNT W/HANDLE AT +4'-6"AFF, UNO.
	BRANCH CIRCUIT HOME RUN TO PANELBOARD AND CIRCUIT INDICATED.
	PANELBOARD.
M	METER BASE
R	GROUNDING ROD
G	GROUNDING CONNECTION BONDED TO STEEL STRUCTURE
X	WALL MOUNTED LIGHTING FIXTURE LETTER INDICATES FIXTURE TYPE
S	SINGLE POLE SWITCH
	MOTOR CONNECTION

KAIC - 1000 AMPERES INTERRUPTING CURRENT



ANTENNA CONDUIT ENTRANCE
NO SCALE



1" DIAMETER CONDUIT THRU FLOOR
NO SCALE

INTERIOR LIGHT FIXTURE SCHEDULE

TYPE	FIXTURE: DESCRIPTION	MANUFACTURER	SERIES NO.	WATTAGE	LUMENS	COLOR	LAMP: QUANTITY	TYPE	COLOR TEMP.	MOUNTING	OPTIONS: BI-LEVEL	DIMMING	INTEGRAL SWITCH	INTEGRAL OCC./VAC. SENSOR*	BAS	DAYLIGHTING	BATTERY PACK	REFERENCE NOTE	COMMENTS
A	LED HIGH BAY	METALUX	SS LED	162	18000 lm	WHITE	1	LED	4000 K	SURFACE MOUNT TO CEILING								2	
B	LED WALL FIXTURE	EVERGREEN LIGHTING	5600	60	8375 lm	WHITE	1	LED	4000 K	WALL MOUNT AT 10' AFF U.N.O.								2	
C	LED DOME FIXTURE	CANLET	LED VAPORPROOF	20	1832 lm	GRAY	1	LED	4000 K	WALL MOUNT								2	

* O = OCCUPANCY SENSOR; V = VACANCY SENSOR

GENERAL NOTES:

A. ALL FIXTURES SHALL BE CAPABLE OF 120V AND 277V INPUT (MVOLT), UNO.
B. REFER TO LIGHTING PLANS AND SPECIFICATIONS FOR ADDITIONAL FIXTURE INFORMATION.
C. WHERE BI-LEVEL IS INDICATED FOR FLUORESCENT FIXTURES, PROVIDE TWO BALLASTS.
D. "X" IN THE SCHEDULE INDICATES ITEM IS REQUIRED.
E. ALL LENS SHALL BE A MINIMUM 0.125" THICKNESS, UNO.

REFERENCE NOTES:

1. FIXTURE SHALL BE SUITABLE FOR DAMP LOCATIONS.
2. FIXTURE SHALL BE SUITABLE FOR WET LOCATIONS.

HAROLD A. LANNA
COMMONWEALTH OF VIRGINIA
PROFESSIONAL ENGINEER
Lic. No. 13231
3-10-2017

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SPENCER DISTRICT - POWHATAN COUNTY - VIRGINIA

ELECTRICAL PLAN AND DETAILS

JOB NO. 37385
SHEET NO. E1.0

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