

IFB # 159385

PROJECT MANUAL

**AIRPORT AHQ CHEMICAL STORAGE BUILDING
SALEM DISTRICT**

Commonwealth of Virginia
Department of Transportation

February 5, 2024

Commission No. 23027

Project Codes: 501-18130-077



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VIRGINIA DEPARTMENT OF TRANSPORTATION

Salem District
Airport AHQ Chemical Storage Building
Project Code: 501-18130-077
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**NOTICE OF
INVITATION FOR BIDS (IFB)
IFB No.: 159385**

Project Code No.: 501-18130-077

Salem District Airport AHQ 3,000 Ton (Building 2) Prototype Chemical Storage Building

Sealed bids are invited for Salem District Airport AHQ 3,000 Ton (Building 2) Prototype Chemical Storage Building located at 4330 Thirlane Road NW, Roanoke, VA 24019. The project is generally described as the construction of a 3,000 Ton (Building 2) Prototype Chemical Storage Building. Building is approximately 7,738 SF consisting of concrete exterior walls/foundation, pre-engineered steel framed roof structure and fabric membrane roof system. Associated work includes building demolition, site clearing, earthwork, stormwater management, underground saltwater storage tank, site utilities, asphalt paving and electrical work required for a complete and operational facility.

Sealed bids will be received electronically through eVA. To submit an online bid, please refer to the online bidding instructions at: <https://www.youtube.com/watch?v=KSxcAkOekW0>. If Bidder encounters any problem in entering responses into eVA, they must contact [eVA Customer Care](#) to place a ticket. eVA Customer Care Hours are from 8:15am to 5:00pm.

The deadline for submitting bids is 2:00 P.M. sharp, as determined by the Bid Officer, on (January 3, 2025).

A public bid opening via teleconference will be hosted by a VDOT representative. The bids will be opened publicly and read aloud **beginning 2:00 PM on (January 6, 2025)**. The conference can be accessed with the below dial-in information:

Microsoft Teams

[Join the meeting now](#)

Meeting ID: 254 541 791 335

Passcode: LF7Z7pU7

Dial in by phone

[+1 434-230-0065,,800973121#](#) United States, South Hill

[Find a local number](#)

Phone conference ID: 800 973 121#

Join on a video conferencing device

Tenant key: commonwealthofvirginia@m.webex.com

Video ID: 114 016 033 2

A five percent (5%) bid bond is required to accompany this bid. When required bid shall be accompanied by a **Commonwealth of Virginia Standard Bid Bond, Form CO-10.2**, payable to the Owner as obligee in an amount equal to five percent (5%) of the amount of the bid. **Failure to submit the bid bond on the Commonwealth of Virginia Standard Bid Bond, Form CO-10.2 will result in the bid being considered non-responsive.** (When bid bonds are requested, the awarded contractor will be required to furnish Performance and Payment Bond.)

DGS-30-256

(Rev. 07/21)

eVA Vendor Registration: The bidder or offeror shall be a registered vendor in eVA. See the attached **eVA Vendor Registration Requirements**.

Procedures for submitting a bid, claiming an error, withdrawal of bids and other pertinent information are contained in the Instructions to Bidders, which is part of the Invitation for Bids. Withdrawal due to error in bid shall be permitted in accord with Section 9 of the Instructions to Bidders and § 2.2-4330, Code of Virginia. The Owner reserves the right to reject any or all bids.

An OPTIONAL pre-bid conference will be held at the Salem District Airport AHQ facility located at **4330 Thirlane Road NW, Roanoke, VA 24019 at (2:00PM), on (December 20, 2025). Mr. Mike O'Malley, VDOT Salem District Facilities Manager and Mr. John Garrett (Project Manager/Architect) of Hughes Associates Architects & Engineers** will be conducting the showing. Attendance shall be optional for those submitting a bid. This is not a mandatory project showing, however, potential bidders are encouraged to visit the site of the proposed work. The submission of a bid will be considered as conclusive evidence that the bidder has made such examination and/or is satisfied as to the conditions to be encountered in performing the work.

The contract shall be awarded on a lump sum basis as follows: the Total Base Bid Amount including any properly submitted and received bid modifications plus such successive Additive Bid Items as the Owner in its discretion decides to award in the manner set forth in Paragraph 12 of the Instructions to Bidders. 'Notice of Award' or 'Notice of Intent to Award' will be posted on eVA, Virginia Department of General Services' central electronic procurement website, at <https://eva.virginia.gov>

Contractor registration is required in accordance with Section 54.1-1103 of the Code of Virginia. See the Invitation for Bids for additional qualification requirements.

All executive branch agencies are directed to advance Executive Order 35, dated July 3, 2019.

The Invitation for Bids for the above project, including the drawings and the specifications containing the information necessary for bidding, may be obtained from the following location.

<https://eva.virginia.gov>

Kareem Rahman
Authorized Official of Owner/Agency

Attachment: eVA Vendor Registration Requirements

Vendor eVA Registration Requirements

eVA Business-to-Government Vendor Registration, Contracts, and Order: *The eVA Internet electronic procurement solution, web site portal www.eVA.virginia.gov, streamlines and automates government purchasing activities in the Commonwealth. The eVA portal is the gateway for vendors to conduct business with state agencies and public bodies. All vendors desiring to provide construction and/or professional services to the Commonwealth shall participate in the eVA Internet e-procurement solution by completing the free eVA Vendor Registration. All bidders or offerors must register in eVA and pay the Vendor Transaction Fees specified below; failure to register will result in their bid/proposal being rejected.*

Vendor transaction fees are determined by the date the original purchase order is issued and the current fees can be found on the eVA website at <https://eva.virginia.gov/eva-billing.html>.

eVA Orders and Contracts: *The solicitation/contract will result in **(One (1))** purchase order(s) with the eVA applicable transaction fee assessed for each order.*

INSTRUCTIONS TO BIDDERS

The Invitation For Bids (“IFB”) consists of the Notice, these Instructions To Bidders, the Bid Form, the Pre-Bid Question Form, the General Conditions of the Construction Contract, the Supplemental General Conditions (if any), the Special Conditions (if any), the Forms to be used, and the Scope of Work as described by the Plans and Specifications, other documents listed in the Specifications, and any addenda which may be issued, all of which request qualified bidders to submit competitive prices or bids for providing the described work of the Contract.

As used herein, the terms “bidder” and “Contractor” both shall refer to the Person submitting a bid.

eVA Vendor Registration: The bidder shall be a registered vendor in eVA. See the attached **eVA Vendor Registration Requirements**.

1. **CONDITIONS AT SITE OR STRUCTURE:** Bidders shall visit the Site and shall be responsible for ascertaining pertinent local conditions such as location, accessibility, general character of the Site, structure or building, and the character and extent of existing conditions, improvements or work within or adjacent to the Site. No Claims shall be submitted as a result of Bidder’s failure to have done so, but shall be deemed waived and will not be considered by the Owner. See Section 7 of the General Conditions entitled "Conditions at Site."
2. **EXPLANATIONS TO BIDDERS:** No oral explanation in regard to the meaning of drawings and specifications will be made and no oral instructions will be given before the award of the Contract. The Owner shall not be responsible for any conclusions, assumptions or interpretations made by bidders during the preparation of bids that are contrary to the Drawings and Specifications and their clear intent. Discrepancies, conflicts, errors, omissions or doubts as to the meaning of the Contract Documents shall be communicated in writing to the A/E for interpretation. Bidders **must** use the "Prebid Question Form" provided in the bid documents. Bidders must so act to assure that questions reach the A/E at least six (6) days prior to the time set for the receipt of bids to allow a sufficient time for an addendum to reach **all bidders** before the submission of their bids. If, however, there are two (2) weeks or less between the first bid advertisement and the time set for receipt of bids, then bidders must submit questions so that they reach the A/E no later than three (3) days prior to the time set for receipt of bids. Any interpretation made will be in the form of an addendum to the Specifications which will be forwarded to all bidders, and its receipt shall be acknowledged by the bidder on Bid Forms. If such discrepancies, conflicts, errors, omissions or doubts are reasonably apparent or should have been reasonably apparent to the bidder, and the bidder failed to submit questions to the A/E in the time and manner required herein and the Contract is awarded to the bidder, then any claims shall be deemed waived and the bidder shall not be entitled to additional compensation or time, or entitled to sue the Owner based on such discrepancies, conflicts, errors, omissions, or doubts.
3. **TIME FOR COMPLETION:**
 - (a) "Time for Completion" shall be designated by the Owner on the Invitation for Bids or other prebid documents and shall mean the number of consecutive calendar days following the issuance of the Notice to Proceed which the Contractor has to substantially complete all Work required by the Contract. In some instances, the Time for Completion may be stated in the form of a Contract Completion Date based on a stipulated date of Notice to Proceed.

Unless otherwise specified, the Contractor shall achieve Final Completion within thirty (30) days after the date of Substantial Completion.
 - (b) When the Notice to Proceed is issued, it will state a Contract Completion Date, which has been set by the Owner based on date of the Notice to Proceed and the Time for Completion.

- (c) The Contractor, in preparing and submitting its bid, is required to take into consideration normal weather conditions. Normal weather does not mean statistically average weather, but rather means a range of weather patterns which might be anticipated based on weather conditions and events for the past ten (10) years. Normal weather conditions shall be determined from the public historical records available, including the U.S. Department of Commerce, Local Climatological Data Sheets, Oceanic and Atmospheric Administration/Environmental Data and Information Service, National Climatic Center and the National Weather Service. The data sheets to be used shall be for the locality or localities closest to the Site. No additional compensation, costs or damages will be paid to the Contractor because of normal weather conditions, including normal adverse weather to be anticipated during the Project. An extension of time for abnormal adverse weather conditions which directly impact the Work will be considered by the Owner as set forth in the General Conditions.
- (d) If the Owner designates the public historical climatological records to be used to establish normal weather patterns, the bidder shall use those records in estimating and preparing its bid. If the Owner requests each bidder to indicate the weather pattern records used in preparation of a bid, each bidder may select the public historical climatological records upon which it will rely in preparing its bid. In the latter situation, each bidder shall designate in the space provided which of such climatological data records were used in preparing the bid. A bidder's failure to designate climatological records when submitting a bid shall not disqualify a bid, but shall constitute a waiver of any claim or request for an extension of time as the result of abnormal adverse weather. In either case, the bid submitted and the Time for Completion shall be presumed to have been based upon normal weather patterns, including normal adverse weather, as derived from the climatological records used.

4. PREPARATION AND SUBMISSION OF BIDS:

- (a) Bids shall be submitted on the forms furnished, or copies thereof, and shall be signed in ink, or in the case of bids submitted electronically, signatures shall be in accordance with Code of Virginia § 59.1-479 *et seq.* The Owner's agreement to accept electronic bids, if made, will be indicated in the IFB. Erasures or other changes in a bid must be explained or noted over the signature of the bidder. Bids containing any conditions, omissions, unexplained erasures, alterations or items not called for in the proposal, or irregularities of any kind, may be rejected by the Owner as being incomplete or nonresponsive.
- (b) Each bid must give the complete legal name and full business address of the bidder and be signed by the bidder, or the bidder's authorized representative. Bids by partnerships must be signed in the partnership name by one of the general partners of the partnership or an authorized representative, followed by the designation/title of the person signing, and a list of the partners. Bids by joint ventures must be signed in the joint venture name by one of the joint venturers or an authorized representative of one of the joint venturers, followed by the designation/title of the person signing, and a list of the joint venturers. Bids by corporations must be signed with the legal name of the corporation followed by the name of the state in which it is incorporated and by the signature and title of the person authorized to bind it in this matter. The name of each person signing shall be typed or printed below the signature. A signature on a bid by a person who identifies their title as "President," "Secretary," "Agent" or other designation without disclosing the principal firm, shall be held to be the bid of the individual signing. When requested by the Owner, satisfactory evidence of the authority of the officer signing on behalf of the corporation shall be furnished. Trade or fictitious names may be referenced by using "t/a _ _ _," but bids shall be in the legal name of the person or entity submitting the bid.
- (c) Bids with the bid guarantee shall be enclosed in a sealed envelope which shall be marked and addressed as indicated by the advertisement. If a Contract is for one hundred twenty thousand

dollars (\$120,000) or more, or if the total value of all construction, removal, repair or improvements undertaken by the bidder within any twelve-month period is seven hundred fifty thousand dollars (\$750,000) or more, the bidder is required under Code of Virginia §§ 54.1-1100, *et seq.*, to be licensed in Virginia as a "Class A Contractor." If a Contract is for ten thousand dollars (\$10,000) or more, but less than one hundred twenty thousand dollars (\$120,000), or if the total value of all construction, removal, repair or improvements undertaken by the bidder within any twelve-month period is one hundred fifty thousand dollars (\$150,000) or more, but less than seven hundred fifty thousand dollars (\$750,000), the bidder is required to be licensed in Virginia as a "Class B Contractor." The bidder shall place on the outside of the envelope containing the bid and shall place in the bid over its signature whichever of the following notations is appropriate and insert its Contractor license/registration number:

Licensed Class A Virginia Contractor No. _____
or
Licensed Class B Virginia Contractor No. _____

If the bidder is not properly licensed in Virginia at the time the bid is submitted, or if the bidder fails to provide this information on its bid or on the envelope containing the bid and fails to promptly provide said Contractor license number to the Owner in writing when requested to do so before the opening of bids, the bidder shall be deemed to be in violation of Code of Virginia § 54.1-1115 and its bid will not be considered.

- (d) Following guidance from the Board for Contractors, the Owner may, as a part of determining whether the bidder is "responsible," require the apparent low bidder to submit a listing of its Subcontractors along with the license number and classification or specialty of each. *See* DEP'T OF PROF'L AND OCCUPATIONAL REGULATION, BD. FOR CONTRACTORS POLICIES & INTERPRETATIONS, No. 2959 (July 11, 2016) ("A licensed contractor may bid on work, or enter into a contract for work, which is outside the scope of [its] license classification(s) provided that [it] subcontracts that work, to properly licensed contractors, and the work of the subcontractors is incidental to the contract.").
- (e) The bidder must place its Employer Identification Number (SSN or FEIN) in the space provided on the Bid Form.
- (f) Every bidder organized as a stock or nonstock corporation, limited liability company, business trust, or limited partnership or registered as a registered limited liability partnership must 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 of the Code of Virginia, as amended, or as otherwise required by law. Any bidder organized or authorized to transact business in the Commonwealth pursuant to Title 13.1 or Title 50 must include in its bid the identification number issued to it by the State Corporation Commission. Any bidder that is not required to be authorized to transact business in the Commonwealth as a foreign business entity under Title 13.1 or Title 50 or as otherwise required by law shall include in its bid or proposal a statement describing why the bidder is not required to be so authorized. A bidder required to be authorized to transact business in Virginia that fails to provide the required information shall not receive an award unless a waiver of this requirement and of any administrative policies and procedures established to implement Code of Virginia § 2.2-4311.2 is granted by the chief executive of the Owner.

If awarded the Contract, the bidder 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 the Contract. Doing so shall be deemed to be a violation of Code of Virginia § 2.2-4311.2 and the bidder understands and agrees that the Owner may void the Contract if the bidder fails to comply with this provision.

- (g). *Code of Virginia, § 2.2-4376.2* shall be applicable to the Work of the Contract.

5. BID GUARANTEE:

- (a) Any bid (including the Total Base Bid plus all Additive Bid Items) which exceeds five hundred thousand dollars (\$500,000) shall be accompanied by a Commonwealth of Virginia Standard Bid Bond, Form CO-10.2, payable to the Owner as obligee in an amount equal to five percent (5%) of the amount of the bid (the "Bid Bond"). The Owner agrees to accept a Bid Bond on which the Surety has utilized electronic signatures and/or electronic notarization if the electronic notarization meets the requirements of *Virginia Code* §§ 47.1-6.1, -7, and -12, and the Commonwealth of Virginia State Corporation Commission Bureau of Insurance and the Bid Bond contains any SURETY BOND SEAL ADDENDUM established by the Commonwealth of Virginia State Corporation Commission Bureau of Insurance. For construction contracts up to \$500,000, where bid bond requirements have been waived by Owner as stated in the IFB, prospective Contractors may be prequalified in accordance with *Code of Virginia* § 2.2-4317.A Bid Bond may be required for Contracts having bids of up to five hundred thousand dollars (\$500,000) if such requirement is stated in the IFB. The Bid Bond must be issued by a surety company which is legally authorized by the Virginia State Corporation Commission to do surety business in the Commonwealth of Virginia. Such Bid Bond shall guarantee the following: that the bidder will not withdraw its bid during the thirty (30) day period following the date of the opening of bids; that if the bid is accepted, the bidder will enter into the Contract with the Owner described in the IFB; that the bidder can and will submit a properly executed and authorized Standard Performance Bond and Standard Labor and Material Payment Bond on the forms included in the IFB. If the bidder withdraws its bid within the thirty (day) period following bid opening, fails to enter into the Contract, or fails to provide the required Standard Performance Bond and Standard Labor and Material Payment Bond within ten (10) days after the bidder's receipt of notice of acceptance of its bid, the bidder and the bidder's surety shall be jointly and severally be liable to the Owner for the difference between the amount specified in the bidder's bid and such larger amount for which the Owner may contract with another party to perform the work covered by said bid, up to the amount of the bid guarantee of 5% of the bidder's total bid amount, as the damage to the Owner resulting from the bidder's default. See *Code of Virginia* §2.2-4336.
- (b) *Code of Virginia* § 2.2-4338 contains provisions allowing for alternative forms of bid security in lieu of a Bid Bond. A bidder's use of an alternative form of Security as listed in *Code of Virginia* § 2.2-4338.B must be approved by the Owner prior to the bidder's submission of its bid on the Bid Receipt date and time to be accepted in lieu of a Bid Bond.
- (c) The Bid Bond or other alternative bid security will be returned to all but the three lowest bidders after the formal opening of bids. The remaining Bid Bonds or bid security will be returned to the bidders after the Owner and the accepted bidder have executed the Contract and the required Standard Performance Bond and the Standard Labor and Material Payment Bond for the Contract have been received and approved by the Owner.
- (d) If the Contract and required bonds have not been executed by the accepted bidder within thirty (30) days after the date of the opening of the bids, then the Bid Bond or other bid security of any bidder will be returned upon a bidder's request, provided the bidder has not been notified of the acceptance of its bid prior to the date of such request.

6. WITHDRAWAL OR MODIFICATION OF BIDS: Bids may be withdrawn or modified by written or telefaxed notice received at the designated location from bidders prior to the deadline fixed for bid receipt. E-mail withdrawals and modifications are not acceptable. The withdrawal or modification may be made by the person who signed the bid or by an individual(s) who is authorized by the bidder on the face of the bid. Written modifications may be made on the bid form itself, on the envelope in which the bid is enclosed, or on a separate document. Written modifications, whether the original is delivered or telefaxed, must be

signed by the person making the modification or withdrawal. The modification must state specifically what is to be modified and by what amount or it must state the item to be modified and what the corrected amount should be.

7. RECEIPT OF BIDS:

- (a) **Bids will be received at or before the date and the hour and at the place stipulated in the IFB as may be modified by subsequent Addenda.**
- (b) **It is the responsibility of the bidder to assure that its bid and any bid modifications are delivered to the place designated for receipt of bids by the date and hour (deadline) set for receipt of bids. Therefore, it is the bidder's responsibility to take into account all factors which may impact on its bid deliverer / courier's ability to deliver the bid and to implement whatever actions are necessary to have the bid delivered to the proper bid receipt location prior to the bid receipt deadline.** No bids or bid modifications submitted or offered after the date and hour designated for receipt of bids will be accepted or considered.
- (c) The Bid Officer is the Owner's representative designated to receive bids at the time and place noted in the IFB and to open the bids received at the appointed time.
- (d) **The official time used for the receipt of responses is determined by reference to the clock designated by the Bid Officer.** The Bid Officer shall determine when the Bid Receipt Deadline has arrived and shall announce that the Deadline has arrived and that no further bids or bid modifications will be accepted. All bids and bid modifications in the possession of the Bid Officer and their assistants at the time the announcement is completed are deemed to be timely, whether or not the bid envelope has been physically date/time stamped or otherwise marked by the time the Bid Officer makes the deadline announcement.
- (e) In the event the bid receipt occurs during a period of suspended state business operations, the receipt and opening will be delayed one business day.

8. OPENING OF BIDS:

- (a) Bids will be opened at the time and place stated in the IFB or as modified by subsequent Addenda, and their contents publicly announced. The Bid Officer shall decide when the specified time for bid opening has arrived. No responsibility will be attached to any officer or agent for the premature opening of a bid not properly addressed and identified. Bid opening shall be no sooner than twenty-four (24) hours after the time set for receipt of bids.
- (b) The provisions of Code of Virginia § 2.2-4342, as amended, shall be applicable to the inspections of bids received.
- (c) In the event the bid opening occurs during a period of suspended state business operations, the opening will be delayed until the next business day.

9. ERRORS IN BIDS: A bidder may withdraw its bid from consideration 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 judgment 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 a bid, which unintentional arithmetic error or unintentional omission can 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.

In accordance with Code of Virginia § 2.2-4330(B)(2), the bidder must submit to the Owner its original work papers, documents and materials used in the preparation of the bid within one day after the date fixed for submission of bids. Such work papers must be submitted in an envelope or package separate and apart

from the envelope containing the bid and marked clearly as to the contents and shall be delivered to the Owner by the bidder in person or by registered mail prior to the time fixed for the opening of bids and may not be withdrawn until after the two-hour period (referred to later) has elapsed. The bids shall be opened at the time designated in the IFB, as amended by addendum. Bid opening is usually one day following the time fixed by the Owner for the submission of bids, but no sooner. Once the bids have been opened, the bidder shall have two (2) hours after the opening of bids within which to claim in writing any mistake as defined herein and withdraw its bid. The Contract shall not be awarded by the Owner until such two-hour period has elapsed. Such mistake shall be proved only from the original work papers, documents and materials delivered to the Owner prior to bid opening. This procedure in Code of Virginia § 2.2-4330(B)(2) shall not apply to when the entire bid is required to be submitted on a unit price basis.

Failure of a bidder to submit its original work papers, documents and materials used in the preparation of its bid on or before the time, date and place required shall constitute a waiver by that bidder of its right to withdraw its bid due to a mistake.

No bid may be withdrawn under this section when the result would be the awarding of the Contract on another bid of the same bidder or of another bidder in which the ownership of the withdrawing bidder is more than five (5%) percent.

No bidder who is permitted to withdraw a bid shall, for compensation, supply any material or labor to or perform any subcontract or other work agreement for the person or firm to whom the Contract is awarded or otherwise benefit, directly or indirectly, from the performance of the project for which the withdrawn bid was submitted. The person or firm to whom the Contract was awarded and the withdrawing bidder are jointly liable to the Owner in an amount equal to any compensation paid to or for the benefit of the withdrawing bidder without such approval.

If the apparent low bid is withdrawn under authority of this section, the lowest remaining bid shall be deemed to be the low bid on the project.

- 10. REJECTION OF BIDS:** The Owner reserves the right to cancel the IFB, to reject any and all bids at its sole discretion when such rejection is in the interest of the Owner, or to reject the bid of any bidder who is determined to be not responsive or not responsible. *See* Code of Virginia § 2.2-4319.

11. DETERMINATION OF RESPONSIBILITY

Each bidder shall be prepared, if so requested by the Owner, to present evidence of its experience, qualifications and financial ability to carry out the terms of the Contract.

Prior to award of the Contract, an evaluation will be made to determine if the low bidder has the capability, in all respects, to perform fully the contract requirements and the moral and business integrity and reliability which will assure good faith performance, and who has been prequalified, if required. Factors to be evaluated include, but are not limited to:

- (a) sufficient financial ability to perform the contract as evidenced by the bidder's ability to obtain payment and performance bonds from an acceptable surety;
- (b) appropriate experience to perform the Work described in the bid documents;
- (c) any judgments entered against the bidder, or any officers, directors, partners or owners for breach of a contract for construction;
- (d) any substantial noncompliance with the terms and conditions of prior construction contracts with a public body without good cause where the substantial noncompliance is documented; or
- (e) a conviction of the bidder or any officer, director, partner, project manager, procurement manager, chief financial officer, or owner in the last five years of a crime relating to governmental or nongovernmental construction or contracting; and/or

- (f) any current debarment of the contractor, any officer, director or owner, from bidding or contracting by any public body of any state, any state agency, or any agency of the federal government.

The Owner reserves the right to disqualify or refuse to accept the bid of any bidder who has been convicted, or entered a plea of guilty or nolo contendere, in any federal or state court to any charge involving any unlawful, corrupt or collusive practice involving a public contract whether federal, state, or local, or who has been determined in any judicial proceeding to have violated any antitrust, bid-rigging or collusive practice statute in connection with any public contract, or against whom such formal criminal prosecution or other judicial proceeding has been initiated.

A bidder who, despite being the apparent low bidder, is determined not to be a responsible bidder shall be notified in writing in conformance with the procedures in Code of Virginia § 2.2-4359.

12. AWARD OF CONTRACT

- (a) **Basis for Contract Award:** The Contract, if awarded, will be awarded to the lowest responsive and responsible bidder, if any, provided its bid is reasonable and it is in the best interest of the Owner to accept it and subject to the Owner's right to reject any and all bids and to waive informality in the bids and in the bidding. The Bid Form contains a multi-part Base Bid and may contain Additive Bid Items. Determination of the lowest responsible bidder, if any, will be based on the Total Base Bid Amount **entered on the Bid Form** including any properly submitted bid modifications plus as many Additive Bid Items taken in sequence as the Owner in its discretion chooses to Award. **Where the sum of the values entered in the multiple parts do not agree with the Total Base Bid amount, the Total Base Bid amount entered on the bid form, including any properly submitted bid modifications, shall take precedence.**

In the event that the Total Base Bid from the lowest responsible bidder exceeds available funds, the Owner may negotiate the Total Base Bid amount with the apparent low bidder to obtain a Contract Price within available funds, pursuant to Code § 2.2-4318 and Section 12(c) herein.

- (b) **Informalities:** The Owner reserves the right to waive any informality in the bids when such waiver is in the interest of the Owner.
- (c) **Negotiation With Lowest Responsible Bidder:** If award of the Contract to the lowest responsive and responsible bidder is precluded because of limitations on available funds, under the provisions of Code § 2.2-4318 the Owner reserves the right to negotiate the Total Base Bid amount with the lowest responsive, responsible bidder to obtain a Contract Price within the available funds. This may involve changes in either the features or scope of the work included in the Base Bid. Such negotiations with the apparent low bidder may include reducing the quantity, quality, or other cost saving mechanisms involving items in the Total Base Bid. Negotiations for Additive Bid Items are excluded. The Owner shall notify the lowest responsive and responsible bidder that such a situation exists and the Owner and bidder shall then conduct their negotiations in person, by mail, by telephone or by any means they find convenient. If an acceptable Contract can be negotiated, any changes to the IFB documents agreed upon in the negotiations shall be summarized in a "Post Bid Modification" and included in the Contract. If an acceptable Contract cannot be negotiated, the Owner shall terminate negotiations and reject all bids.
- (d) **Notice of Intent to Award or Notice of Award:** The Notice of Award or the Notice of Intent to Award will be posted at the Agency's standard location for posting notices **as shown on the "Notice of Invitation to Bid"**. In addition, the Agency may also post such notice on the Agency's Website and/or the DGS central electronic procurement Website. Any bidder who desires to protest the award or decision to award a contract shall submit the protest in writing to the public body no later than ten days after the posting of the Notice of Award or Notice of Intent to Award, whichever comes first. *See* Code of Virginia § 2.2-4360.

13. **CONTRACT SECURITY:** For contracts which exceed five hundred thousand dollars (\$500,000), the Standard Performance Bond (CO-10) and the Standard Labor and Material Payment Bond (CO-10.1) shall be required, as specified in the IFB. For construction contracts up to \$500,000, where Bid Bond requirements are waived, prospective contractors may be prequalified in accordance with Code of Virginia § 2.2-4317. See General Conditions and Code of Virginia § 2.2-4337 and § 2.2-4338. The Owner reserves the right to require such bonds for contracts up to five hundred thousand dollars (\$500,000). If the Owner so elects, the requirement shall be set forth in the IFB.
14. **CERTIFICATION:** The bidder, by its signature on the Bid Form, certifies that neither its organization nor any of its officers, directors, partners or owners is currently barred from bidding on contracts by any Agency of the Commonwealth of Virginia, or any public body or agency of another state, or any agency of the federal government. See "Disqualification of Contractors" in the Bid Form.
15. **ETHICS IN PUBLIC CONTRACTING:** The provisions, requirements and prohibitions as contained in Code of Virginia §2.2-4367 *et seq.*, pertaining to bidders, offerors, contractors, and subcontractors are applicable to this project.
16. **BUILDING PERMITS:** Because this is a Project of the Commonwealth of Virginia, codes or zoning ordinances of local political subdivisions do not apply. However, the Virginia Uniform Statewide Building Code shall apply to the Work and shall be administered by the Building Official for State-owned Buildings. The Building Permit will be obtained and paid for by the Owner. All other permits, local license fees, business fees, taxes, or similar assessments imposed by the appropriate political subdivision shall be obtained and paid for by the Contractor. See Section 25 of the General Conditions for utility connection fees and services.
17. **UTILIZATION OF SMALL BUSINESSES:** It is the policy of the Commonwealth of Virginia to maximize the participation of small businesses in state contracting. The participation of these businesses directly and through partnerships, joint ventures, subcontracts and other contractual opportunities may be encouraged for this Project based on the Owner's requirements (if applicable) on the Bid Form. Bidders shall provide a Small Business Procurement Plan in conjunction with their sealed bid. The Small Business Procurement Plan shall identify the bidder's proposed percentage of participation by small businesses in the Total Base Bid amount, and is indicated on the Bid Form. An entry on the line for "Contractor's Proposed Small Business Participation" is required for the bid to be considered responsive. If the bidder is a DSBSD certified small business, the proposed percentage of small business participation shall be entered as 100%. A bidder may enter a proposed percentage of small business participation of 0% and be considered responsive unless the Bid Form states that the Owner requires a specific percentage of small business participation, in which case the bidder shall enter a percentage equal to or greater than the Owner's required small business participation percentage for the bid to be considered responsive.
18. **BID DOCUMENTS:** Bid Documents are the property of the Owner and a deposit in an amount as stated in the Invitation for Bids is required for each paper set or for each set provided on removable electronic media as a guarantee of the safe return of the documents within ten (10) days of bid opening. This deposit will be refunded in full on not more than two paper sets or sets provided on removable electronic media to each bidder who submits a Contract bid and who returns the documents in good condition. Refund will be made on paper sets and sets provided on removable electronic media to non-bidders and Subcontractors in the amount of half of the deposit when the sets are returned in good condition within 10 days. A deposit is not required for downloading of electronic construction documents through an FTP site. A non-refundable shipping charge may be required for paper sets or sets provided on removable electronic media if stated in the Notice or the IFB.
19. **GENERAL CONDITIONS:** The General Conditions are incorporated in the bid documents. If a copy of the General Conditions is not included in the bid documents, the bidder may obtain a copy of the current edition of the General Conditions at no cost by written request to the A/E and/or the Agency where the bid

documents are obtained. Copies may also be obtained from the DGS Forms Center (available online at <http://forms.dgs.virginia.gov>).

20. **PREBID CONFERENCE:** See the IFB for requirements for a prebid conference and whether such conference is mandatory or optional.
21. **INSPECTION OF BID DOCUMENTS:** Copies of the IFB documents including Plans and Specifications and the General Conditions will be available for inspection at the Agency, at the A/E's office, and at the locations listed in the Notice of the IFB.
22. **DRUG-FREE WORKPLACE REQUIRED:** Bidders are reminded that Code of Virginia § 2.2-4312 requires that the during the performance of the Contract resulting from this solicitation, the Contractor agrees to: (i) provide a drug-free workplace for the Contractor's employees; (ii) 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; (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 foregoing clauses 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 section, "drug-free workplace" means a site for the performance of work done in connection with a specific Contract awarded to a Contractor in accordance with this solicitation, 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.

NOTE: These CO-7A, Instructions to Bidders, have been created specifically for the use of agencies of the Commonwealth of Virginia, which may not alter their provisions without the express written approval of the Virginia Department of General Services, Division of Engineering and Buildings. These Instructions to Bidders have significant legal implications and shall not be altered or modified. Nothing in the CO-7A, Instructions to Bidders, shall be amended or deleted or its intent changed, except by an approved and properly issued 'Supplemental Instruction to Bidders'. The Commonwealth makes no representation as to their suitability for any other purpose. Paragraphs which have been added or revised since prior edition are identified with a line to the left of the paragraph.



COMMONWEALTH of VIRGINIA
DEPARTMENT OF LABOR AND INDUSTRY

Gary G. Pan
COMMISSIONER

Main Street Centre
600 East Main Street, Suite 207
Richmond, Virginia 23219
PHONE (804) 371-2327
FAX (804) 371-6524

Virginia Department of Labor and Industry Wage Determination Decision

Project Name Salem District Airport AHQ 3,000
Ton Prototype Chemical Storage
Building

State Project Code 501-18130-077

DOLI Project Number VDOT-24-0239 UPDATE

County or Independent City Roanoke (City)

Publication Date 12/06/2024

Construction Type Building

Wage Determinations	Wage	Fringe
Asbestos Worker/Heat & Frost Insulator (Duct, Pipe & Mechanical System Insulation)*	\$40.02	\$19.67
Boilermaker	\$42.62	\$24.81
Bricklayer	\$23.87	\$6.81
Carpenter	\$13.49	\$1.10
Electrician	\$21.78	\$9.31
Glazier	\$16.95	\$2.48
Ironworker	\$37.86	\$25.86
Ironworker, Reinforcing	\$25.36	\$6.68
Laborer: Common or General, Including Mason Tender - Brick and Cement, and Pipelaying	\$15.15	\$1.58
Operator: Backhoe/Excavator/Trackhoe	\$16.24	\$0.87
Operator: Bobcat/Skid Steer/Skid Loader	\$18.95	\$4.03

Wage Determinations	Wage	Fringe
Operator: Bulldozer	\$16.00	
Operator: Forklift	\$19.40	\$7.00
Operator: Loader	\$21.28	\$3.17
Painter (Brush and Roller)	\$20.01	
Painter (Spray Only)	\$27.46	\$11.56
Pipefitter	\$24.98	\$9.14
Plumber	\$21.15	\$3.92
Power Equipment Operator: Cranes 90 Tons &Over capacity; Tower &Climbing Cranes with Controls 100 ft. Above Ground	\$34.17	\$15.21
Power Equipment Operator: Cranes Under 90 Tons	\$33.26	\$15.12
Roofer	\$16.17	\$3.73
Sheet Metal Worker, Includes HVAC Duct Installation	\$18.38	\$3.30
Tile Finisher	\$23.40	
Tile Setter	\$27.80	\$10.25
Truck Driver: Dump Truck	\$16.58	\$1.73

Additional Notes

* Asbestos Worker/Heat & Frost Insulator (Duct, Pipe & Mechanical System Insulation) * PAID HOLIDAYS: New Year's Day, Martin Luther King Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, the day after Thanksgiving and Christmas Day provided the employee works the regular work day before and after the paid holiday. *

All wage rates to be used on a contract will be set at the time the contract is awarded. While DOLI maintains a list of wage determinations online for reference purposes, only the wage determinations made in an official Wage Determination Decision, sent by DOLI to the contracting agency, can be used to ascertain the exact rates to be paid for a specific contract.

All rates are determined by DOLI and any appeals of specific classifications may be made through the Wage Determination Appeal form available at

<https://doli.virginia.gov/wp-content/uploads/2022/05/Appeal-for-Clarification-of-Wage-Determination.pdf>

Any additional classifications may be requested through the Additional Wage Classification form available at <https://doli.virginia.gov/wp-content/uploads/2022/05/Appeal-for-Clarification-of-Wage-Determination.pdf>

Understand your duties as a contractor under Virginia law by referencing our Contractor Responsibilities information sheet available at <http://www.doli.virginia.gov/wp-content/uploads/2021/04/PREVAILING-WAGE-CONTRACTOR-RESPONSIBILITIES.pdf>

Your employees have specific rights, which can be found on our List of Employee Rights information sheet available at <http://www.doli.virginia.gov/wp-content/uploads/2021/04/PREVAILING-WAGE-EMPLOYEE-RIGHTS.pdf>

Any further questions should be directed to PrevailingWage@doli.virginia.gov

DGS-30-272

(Rev. 04/15)

PREBID QUESTION FORM

(Use separate Form for each question submitted.)

Date: _____

Project Title: Salem District Airport AHQ 3,000 Ton (Building 2) Prototype Chemical Storage Building

Project Code No.: 501-18130-077

The following question concerns Drawing Sheet (number) _____:

The following question concerns Specifications Section (number) _____, page _____, paragraph _____:

All responses to questions will be made by Addendum.

Question submitted by: _____

Name

Organization

Bidders shall submit form to: Kareem Rahman

Name

VDOT

Organization

Email address: kareem.rahman@vdot.virginia.gov

BID FORM

DATE: , 2024

PROJECT: Salem District Airport AHQ 3,000

Ton (Building 2) Prototype Chemical Storage

Building

Project Code: 501-18130-077

IFB No: 159385

To: Commonwealth of Virginia
Virginia Department of Transportation (VDOT)

In compliance with and subject to your Invitation for Bids and the documents therein specified, all of which are incorporated herein by reference, the undersigned bidder proposes to furnish all labor, equipment, and materials and perform all work necessary for construction of this project, in accordance with the Plans and Specifications dated **February 5, 2024**, and the Addenda noted below, as prepared by **Hughes Associates Architects & Engineers**, for the consideration of the following amount:

BASE BID (including the following parts):

PART A.

Lump sum price for construction of the building within a perimeter extending 5 feet from the walls of the building, complete, except for the excavation of additional unsuitable material in PART C, excavation of rock material in PART D and excavation of trench rock material in PART E, and in accordance with the Plans and Specifications:

PART A = _____ Dollars (\$_____).

PART B.

Lump sum price for the sitework beyond the 5 feet building perimeter (except for work described in PARTS C, D and E) complete and in accordance with the Plans and Specifications:

PART B = _____ Dollars (\$_____).

Base Bids for PARTS C, D and E shall be based on the estimated quantities indicated to be provided complete and in accordance with the applicable portions of the plans and specifications. Payment amounts for each of these items will be based on the actual quantities authorized, provided and approved times the unit prices indicated by the bidder. The final contract amount shall be adjusted upward or downward based on the actual payment amounts versus the bid amounts for PARTS C, D and E.

PART C. EXCAVATION OF ADDITIONAL UNSUITABLE MATERIAL

Excavation of unsuitable material, where authorized or directed, below or in addition to the levels required for the Work in PARTS A and B, proper disposal off-site of unsuitable material and backfill with compacted VDOT No. 21-A stone. (Price per cubic yard) Final amount shall be adjusted upward or downward based on actual quantity authorized.

Estimated quantity of (800) cy @ \$ _____ per cy = _____

PART C = _____ Dollars (\$_____).

PART D. EXCAVATION OF ROCK MATERIAL

Excavation of ROCK material, where authorized or directed, proper disposal off-site of excess material and backfill with compacted VDOT No. 21-A stone. (Price per cubic yard) Final amount shall be adjusted upward or downward based on actual quantity authorized.

Estimated quantity of (100) cy @ \$ _____ per cy = _____

PART D = _____ Dollars (\$ _____).

PART E. EXCAVATION OF ROCK MATERIAL AT TRENCHES

Excavation of ROCK material at trenches, where authorized or directed, proper disposal off-site of excess material and backfill with compacted VDOT No. 21-A stone. (Price per cubic yard) Final amount shall be adjusted upward or downward based on actual quantity authorized.

Estimated quantity of (100) cy @ \$ _____ per cy = _____

PART E = _____ Dollars (\$ _____).

TOTAL BASE BID AMOUNT (Sum of PARTS A, B, C, D & E) IS:

_____ DOLLARS (\$ _____).

Contract award will be based on the **TOTAL BASE BID AMOUNT shown above** (including any properly submitted bid modifications). See **DGS-30-055 (CO-7A) Instructions to Bidders (Award of Contract)**.

The bidder has relied upon the following public historical climatological records:

National Oceanic and Atmospheric Administration (NOAA) National Weather Service Station ID (KROA) for Roanoke Regional Airport

Code of Virginia, § 2.2-4376.2 shall be applicable to the Work of the Contract.

The undersigned understands that time is of the essence and agrees that the time for Substantial Completion of the entire project shall be **240** consecutive calendar days from the date of commencement of the Work as specified in the Notice to Proceed. Normal working hours shall be **7:00 AM to 3:30 PM Monday through Friday**. Final Completion shall be achieved within 30 consecutive calendar days after the date of Substantial Completion as determined by the A/E.

Acknowledgment is made of receipt of the following Addenda

No. 1 Date: _____ Signature _____

No. 2 Date: _____ Signature _____

No. 3 Date: _____ Signature _____

No. 4 Date: _____ Signature _____

No. 5 Date: _____ Signature _____

No. 6 Date:_____ Signature _____
No. 7 Date:_____ Signature _____
No. 8 Date:_____ Signature _____
No. 9 Date:_____ Signature _____
No. 10 Date:_____ Signature _____

Questions Pertaining to This IFB:

Any questions pertaining to the IFB should be submitted to the Contract Officer using the contact information below:

Kareem Rahman
Senior Procurement Officer

Email:kareem.rahman@VDOT.Virginia.gov

If notice of acceptance of this bid is given to the undersigned within 30 days after the date of opening of bids, or any time thereafter before this bid is withdrawn, the undersigned will execute and deliver a contract in the prescribed form (Commonwealth of Virginia Contract Between Owner and Contractor, Form CO-9) within 10 days after the contract has been presented to him for signature. The required payment and performance bonds, on the forms prescribed, shall be delivered to the Owner along with the signed Contract.

Immigration Reform and Control Act of 1986: The undersigned certifies that it does not and shall not during the performance of the Contract for this project violate the provisions of the Federal Immigration Reform and Control Act of 1986, which prohibits employment of illegal aliens, or knowingly employ an unauthorized alien as defined in the Federal Immigration Reform and Control Act of 1986.

DISQUALIFICATION OF CONTRACTORS: By signing this bid or proposal, the undersigned certifies that this Bidder or any officer, director, partner or owner is not currently barred from bidding on contracts by any Agency of the Commonwealth of Virginia, or any public body or agency of another state, or any agency of the federal government, nor is this Bidder a subsidiary or affiliate of any firm/corporation that is currently barred from bidding on contracts by any of the same. We have attached an explanation of any previous disbarment(s) and copies of notice(s) of reinstatement(s).

Either the undersigned or one of the following individuals, if any, is authorized to modify this bid prior to the deadline for receipt of bids by writing the modification and signing his name on the face of the bid, on the envelope in which it is enclosed, on a separate document, or on a document which is telefaxed to the Owner.

I certify that the firm name given below is the true and complete name of the bidder and that the bidder is legally qualified and licensed by the Virginia Department of Professional and Occupational Regulation, Board for Contractors, to perform all Work included in the scope of the Contract.

Virginia License No.: _____

Bidder: _____
(Name of Firm)

Contractor Class: _____

By: _____
(Signature)

Specialty: _____

Valid until: _____

FEIN/SSN: _____

Title: _____

E-Mail Address _____

If General Partnership (List Partners' Names)

Business Address:

FAX # _____

Telephone # _____

If Corporation, affix Corporate Seal &
list State of Incorporation

State: _____

(Affix Seal)

Virginia State Corporation Commission ID No.: _____; or

If Contractor is a foreign business entity not required to be authorized to transact business in the Commonwealth under Titles 13.1 or 50 of the Code of Virginia, or as otherwise required by law, please provide an explanation as to why such entity is not required to be so authorized: _____

_____.

Contractor's Proposed Small Business Participation: % _____
Contractor insert percentage required

Evidence of compliance reporting for your Small Business Subcontracting Plan and any additional subcontracting shall be entered directly through the Subcontractor Payment Reporting tool accessible in your eVA Supplier Account. The Contract Officer will provide the Reporting Job Aid upon request from the awarded Contractor.

COMMONWEALTH OF VIRGINIA



GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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PLEASE NOTE: These General Conditions of the Construction Contract (CO-7) (“General Conditions”), have been created specifically for the use of agencies of the Commonwealth of Virginia, which may not alter any provisions without the express written approval of the Virginia Department of General Services, Division of Engineering and Buildings. The General Conditions have significant legal implications and shall not be altered or modified. Nothing in the General Conditions shall be amended or deleted or its intent changed, except by an approved and properly issued Supplemental General Conditions. The Commonwealth of Virginia makes no representation as to their suitability for any other purpose. Note: Governmental entities not subject to DGS purview intending to modify the General Conditions for their use should consult with their legal counsel.

1. DEFINITIONS

Whenever used in in the Contract Documents, the following terms have the meanings indicated, which are applicable to both the singular and plural variations thereof:

Agency: The Agency, institution or department which is a party to the Contract. For purposes of the Contract, the term Owner shall include such Agency, whether or not the Agency owns the site or the building.

A/E Services: The entirety of the services required of the A/E pursuant to the A/E's contract with the Owner for the Project.

As-Built Drawings: The As-Built Drawings is a set of all Drawings, Specifications, addenda, approved Shop and setting Drawings, Change Orders and other modifications which are updated by the Contractor throughout the performance of the Work to contemporaneously record all changes and variations made during construction. The representation of such variations shall be neatly and clearly marked in color and shall include such supplementary notes, symbols, legends, and details as may be necessary to clearly show the as-built construction of the Work.

Architect/Engineer ("A/E"): The Virginia licensed Architect or Engineer that contracts with the Owner to provide the A/E Services for the Project. The A/E is a separate contractor and not an agent of the Owner. The term includes any subcontractors, associates or consultants employed by the A/E to assist in providing the A/E Services.

Beneficial Occupancy: The time, following Substantial Completion, at which the Project or portion thereof, is sufficiently complete and systems operational such that the Owner 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 Owner accepts and occupies the Project, or a portion thereof, unless otherwise specified in the Supplemental General Conditions or by separate agreement.

Change Order: A document (CO-11) issued on or after the effective date of the Contract which is agreed to by the Contractor and approved by the Owner, and which authorizes an addition, deletion or revision in the Work, including any adjustment in the Contract Price and/or the Contract Completion Date. The term Change Order shall also include initiating and confirming change orders issued pursuant to Section 38(a)(3). A Change Order, once signed by all parties, is incorporated into and becomes a part of the Contract.

Code of Virginia: *Code of Virginia* (1950), as amended. Sections of the Code referred to herein are noted by § xx-xx.

Commissioner of Labor and Industry: The Commonwealth of Virginia Commissioner of Labor and Industry.

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.

Contract: The Contract between Owner and Contractor, (CO-9 series) and the Contract Documents incorporated therein.

Contract Completion Date: The date by which the Work must achieve Substantial Completion. The Contract Completion Date is established in the Notice to Proceed, based on the Time for Completion, or set forth as a specific date in the Contract.

Contract Documents: The Contract and any documents expressly incorporated therein. Such incorporated documents customarily include the bid submitted by the Contractor, the General Conditions, any Supplemental General Conditions, any Special Conditions, the Plans and the Specifications, and all modifications, including addenda and subsequent Change Orders.

Contract Price: The total compensation payable to the Contractor for performing the Work in accordance with the Contract Documents, subject to modification by Change Order.

Contractor: The person or entity with whom the Owner has entered into the Contract for the Work.

Critical Path: The longest continuous sequential duration of dependent activities from the Date of Commencement to the Contract Completion Date that defines the minimum overall time necessary to complete the Project, such that a delay of any activity along the Critical Path will result in a delay of the Contract Completion Date unless the duration of a subsequent activity on the Critical Path is reduced to offset the delay and maintain the Contract Completion Date.

Date of Commencement: The date as indicated in the written Notice to Proceed, the receipt of the earliest Building Permit, or a date mutually agreed to between the Owner and Contractor in writing, whichever is the latest.

Day: Calendar day unless otherwise noted.

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 does not meet the requirements of inspections, standards, tests or approvals required by the Contract Documents, or Work that has been damaged prior to the A/E's recommendation of Final Payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion or Beneficial Occupancy).

DGS: Virginia Department of General Services.

Drawing: A page or sheet of the 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.

DSBSD: Virginia Department of Small Business and Supplier Diversity.

Emergency: Any unforeseen situation, combination of circumstances, or a resulting state that poses imminent danger to health, life or property.

Field Order: A written order issued by the A/E which clarifies or explains the Plans or Specifications, or any portion or detail thereof, without changing the design, the Contract Price, the Time for Completion or the Contract Completion Date.

Final Completion: Completion and full performance of all Work in accordance with the terms and requirements of the Contract Documents, including the completion of all items identified on punch lists generated through the inspections set forth in Section 44(b) and submission of all information, manuals, warranties and documentation required by the Contract.

Final Completion Date: The date of the Owner's acceptance of the Work following Final Completion.

Final Compliance Report: A report where the Contractor shall certify and report on its compliance with the Small Business Procurement Plan, submitted by the Contractor in its Bid for the Contract, to the Owner through DGS' eVA system

Final Payment: The final payment that the Contractor receives pursuant to the applicable provisions of Section 36, except in the event no final payment is made due to termination of the Contract under either Sections 41 or 42. In the event of a termination for cause under Section 41, the Final Payment shall be when the termination became effective. In the event of a termination for convenience under Section 42, the Final Payment shall be either the payment of compensation for termination that the Contractor receives according to the provisions of Section 42(a), or the Owner's determination that no compensation for termination is due the Contractor under Section 42(a), as the case may be.

Float: The excess time included in a construction schedule to accommodate such items as inclement weather and associated delays, equipment failures, and other such unscheduled events. It is the contingency time associated with a path or chain of activities and represents the amount of time by which the early finish date of an activity may be delayed without impacting the Critical Path and delaying the Contract Completion Date. Any difference in time between the Contractor's approved early completion date and the Contract Completion Date shall be considered a part of the Float.

Float, Free: The time (in Days) by which an activity may be delayed or lengthened without impacting the start day of any successor activity.

Float, Total: The difference (in Days) between the maximum time available within which to perform an activity and the duration of an activity. It represents the time by which an activity may be delayed or lengthened without impacting the Contract Completion Date.

General Conditions: The General Conditions of the Construction Contract (CO-7 series).

Limited Renovation: Renovations that do not involve structural work (including, but not limited to, foundations, supports, beams, exterior roof supports, load bearing walls) and that do not involve Hot Work (as defined by the Virginia Statewide Fire Prevention Code) with the exception of brazing, soldering, and grinding.

Major Renovation: Renovations that do not meet the definition of Limited Renovation.

Notice: Notice required by the Contract shall be given in writing to the email address or physical delivery location identified in the Contract Documents for receipt of Notice by the receiving party. A Notice is deemed to have been properly given and effective at the time such Notice is: (i) deposited with a nationally recognized overnight delivery service using no more than two (2) business day delivery service for delivery to the Notice address; (ii) hand delivered to the Notice address; (iii) enclosed in a postage prepaid envelope addressed to the Notice address and delivered to a United States Postal Service for delivery by prepaid certified or registered mail; or (iv) sent via email to the email address identified for Notice in the Contract Documents.

Notice to Proceed: A written Notice given by the Owner to the Contractor fixing the date on which the Time for Completion will commence for the Contractor to begin the execution of the Work. The Notice to Proceed will identify the Contract Completion Date if not otherwise established by the Contract.

Owner: The public body with whom the Contractor has entered into the Contract for the Work. The term Owner shall also mean the Agency.

Person: This term 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.

Prevailing Wage Rate: Prevailing Wage Rate means that rate, amount, or level of wages, salaries, benefits and other remuneration prevailing for a classification of mechanics, laborers, or workers employed

for the same work in the same trade, craft or occupation in the locality of the Project as determined by the Commissioner of Labor and Industry.

Project: The term used instead of the specific or proper assigned title of the entire undertaking which includes, but is not limited to, the Work and the A/E Services.

Project Inspector: One or more persons employed by the Owner to inspect the Work for the Owner and/or to document and maintain records of activities at the Site to the extent required by the Owner. The scope of the Project Inspector's authority with respect to the Contractor is limited to that indicated in Section 16 (e) and (f) of the General Conditions and as supplemented by the Owner in writing to the Project Inspector and to the Contractor.

Project Manager: The Project Manager shall be the Owner's designated representative on the Project. The Project Manager shall be the person through whom the Owner generally conveys written decisions and instructions. All Notices to the Owner and all information required to be conveyed to the Owner shall be conveyed to the Project Manager unless otherwise stated in the Contract. The scope of the Project Manager's authority is limited to that authorized by the Owner. The Owner may change the Project Manager from time to time and may, in the event that the Project Manager is absent, disabled or otherwise temporarily unable to fulfill their duties, appoint an interim Project Manager.

Provide: Shall mean furnish and install ready for its intended use.

Record Drawings: Record Drawings are a final compilation set of drawings showing the "as built" condition of the Work, including all conditions, locations and dimensions based on the Contractor's As-Built Drawings. The Record Drawings shall contain the Plans, Specification, Addenda, approved shop drawings, and any other information needed to show the final condition of the work, actual location of piping and utilities, the depths of pilings or caissons if pilings or caissons were in the construction, and the integration of all Change Orders to the Work.

Recycled: Equipment, materials, and accessories which have been previously used and that have been processed to form a new product deemed an equal per Section 26.b.

Service Disabled Veteran-Owned Business: A business that meets the definition of "Service disabled veteran business" as set forth in *Code of Virginia*, § 2.2-4310.

Schedule of Values: That portion of Form CO-12 prepared by the Contractor and acceptable to the Owner which indicates the portion of the Contract Price to be paid for each trade or major component of the Work.

Shop Drawings: The drawings, diagrams, illustrations, schedules, installation descriptions and other data prepared by or for the Contractor to provide detailed information for the fabrication, location, erection, installation, connection and methodology associated with the Work. Shop Drawings are intended to aid in the preparation and installation of materials and to ascertain that the materials proposed by the Contractor conform to the requirements of the Contract Documents.

Site: The location at which the Work is performed or is to be performed.

Small Business: A business certified as a small business by the DSBSD.

Small Business Procurement Plan: The proposed type and percentage of small business participation in the Total Base Bid Amount submitted by the Contractor as part of its Bid.

Special Conditions: That part of the Contract Documents which describes special or additional requirements or procedures applicable to the Project. The Special Conditions do not amend or supersede the General Conditions.

Specifications: That part of the Contract Documents containing the written administrative requirements and the technical descriptions of materials, equipment, construction systems, standards, and workmanship for the Work.

Subcontractor: A person or firm having a direct contract with Contractor or with any other Subcontractor for the performance of the Work. Subcontractor includes any person or firm who provides on-Site labor but does not include a Supplier.

Submittals: All Shop, fabrication, setting and installation drawings, diagrams, illustrations, schedules, samples, and other data required by the Contract Documents which are specifically prepared by or for the Contractor to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a Supplier and submitted by the Contractor to illustrate material or equipment conformance of some portion of the Work with the requirements of the Contract Documents. Submittal as used herein includes Shop Drawings.

Substantial Completion: The stage in the progress of the Work at which the Owner agrees that the Work or a specific portion thereof, is sufficiently complete, in accordance with the Contract Documents, so that it can be utilized by the Owner for the purposes for which it was intended. The Owner at its sole discretion may, after obtaining the necessary approvals and certificates, take Beneficial Occupancy at this time or choose to wait to occupy until after Final Completion is achieved.

Supplemental General Conditions: An amendment or modification which amends or supplements the General Conditions.

Supplier: A manufacturer, fabricator, distributor, supplier or vendor who provides material or equipment for the Project but does not provide on-Site labor.

SWaM/SDV Business: All subcategories of Small Businesses certified by the DSBSD including Micro Business, Minority-Owned Business, Service-Disabled Veteran-Owned Business, Small Business, and/or Women-Owned Business together as a group.

Time for Completion: The number of consecutive Days following the Date of Commencement within which the Contractor must achieve Substantial Completion of the Work in accordance with the Contract Documents.

Total Contract Amount: The total compensation payable to the Contractor for performing the Contract, subject to modification by Change Order.

Underground Facilities: All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which are or have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

Work: The construction and services required by the Contract Documents, whether completed or partially completed, including, but not limited to, furnishing labor, furnishing and incorporating materials and equipment into the Construction. The Work includes the entire completed Construction, or the various separately identifiable parts thereof, required to be provided under the Contract Documents or which may reasonably be expected to be provided as part of a complete, code compliant and functioning system for those systems depicted in the Plans and Specifications.

2. CONTRACT DOCUMENTS

The Contract Documents consist of the Contract and all other documents identified therein as Contract Documents as more precisely defined above.

3. LAWS AND REGULATIONS

- a. The Contractor shall comply with the Virginia Uniform Statewide Building Code and all laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the performance of the Work and shall give all notices required thereby. The Contractor shall assure that all Subcontractors and tradespeople who perform Work on the Project are properly licensed by the Department of Professional and Occupational Regulation as required by Title 54.1, Chapter 11, and Article 1 of the *Code of Virginia* and by applicable regulations.
- b. This Contract and all other contracts and Subcontracts are subject to the provisions of Article 3, Chapter 4, Title 40.1, *Code of Virginia*, relating to labor unions and the “right to work.” The Contractor and its Subcontractors, whether residents or nonresidents of the Commonwealth, who perform any Work related to the Project shall comply with all of the said provisions.
- c. IMMIGRATION REFORM AND CONTROL ACT OF 1986: By signing this Contract, the Contractor certifies that it does not and shall not during the performance of this Contract knowingly employ an unauthorized alien as defined in the Federal Immigration Reform and Control Act of 1986, or otherwise violate its provisions.
- d. E-VERIFY PROGRAM: Pursuant to *Code of Virginia*, § 2.2-4308.2, any employer with more than an average of 50 employees for the previous 12 months entering into a contract in excess of \$50,000 with any agency of the Commonwealth to perform work or provide services pursuant to such contract shall register and participate in the E-Verify program to verify information and work authorization of its newly hired employees performing work pursuant to such public contract. Any such employer who fails to comply with these provisions may be debarred from contracting with any agency of the Commonwealth for a period up to one year. Such debarment may cease upon the employer’s registration and participation in the E-Verify program. If requested, the employer shall present a copy of their Maintain Company page from E-Verify to prove that they are enrolled in E-Verify.
- e. In performing the Work under this Contract, the Contractor shall comply with the provisions of all rules and regulations governing safety as adopted by the Safety Codes Commission of the Commonwealth of Virginia and as issued by the Department of Labor and Industry under Title 40.1 of the *Code of Virginia*. 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.
- f. Building Permit: Because this Project is on Commonwealth of Virginia property, codes or zoning ordinances of local political subdivisions do not apply to Work at the Site. The Virginia Uniform Statewide Building Code applies to the Work and is administered by the Building Official for State-owned buildings and real property. The Building Permit will be obtained and paid for by the Owner. All other permits, local license fees, business fees, taxes, or similar assessments imposed by the appropriate political subdivision and the Department of Environmental Quality shall be obtained and paid for by the Contractor. See Section 25 of these General Conditions for utility connection fees and services.
- g. The 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 in Subsections (a), (b), and (c) of Section 37 of these General Conditions with respect to each lower-tier Subcontractor and Supplier.
- h. The Contractor, if not licensed as an asbestos abatement contractor in accordance with *Code of Virginia*, § 54.1-514, shall have all asbestos-related Work performed by Subcontractors who are duly licensed as asbestos contractors for the Work required.

- i. Lead-Based Paint Activities: If the Contract Documents indicate that lead-based paint is present on existing materials, components, or surfaces, the Contractor shall conform to the following:
 - 1. The requirements set forth in 40 CFR 745.233 – Lead-Based Paint Activities Requirements in selecting and performing the means, methods and procedures for performing the Work. This includes, but is not limited to, training of personnel, lead abatement, encapsulation of lead-containing materials, removal and handling of lead-containing materials, and methods of disposal.
 - 2. The requirements for employee protection contained in 29 CFR Part 1926, Subpart D, and the requirements for record-keeping contained 29 CFR Part 1910.
 - 3. The Virginia Department of Labor and Industry’s (DLI) Regulation Concerning Certified Lead Contractors Notification, Lead Project Permits and Permit Fees published in the Virginia Administrative Code, 16 VAC25-35, requiring, among other things, that a permit be issued to the lead abatement contractor, or any subsequent regulation issued by DLI pertaining to lead-based paint abatement.
- j. If the Contractor violates laws or regulations that govern the Project, the Contractor shall take prompt action to correct or abate such violation and shall indemnify and hold the Owner harmless against any fines and/or penalties that result from such violation. The Contractor also shall indemnify and hold the Owner 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 arise or result from Contractor’s violation of laws or regulations.
- k. If the Work includes any land-disturbing activities, the Contractor shall have on-Site an individual certified by the Department of Environmental Quality as a Responsible Land Disturber in accordance with *Code of Virginia*, § 62.1-44.15:51.
- l. Unless otherwise specified in the Supplemental General Conditions, the Contractor is neither required nor prohibited from entering into or adhering to agreements with one or more labor organizations, or otherwise discriminating against Subcontractors for becoming or refusing to become, or remaining signatories to or otherwise adhering to, agreements with one or more labor organizations. This section does not prohibit Contractor or Subcontractors from voluntarily entering into agreements with one or more labor organizations. Both the Agency and Contractor are entitled to injunctive relief to prevent any violation of this section.

This section does not apply to any public-private agreement for any construction in which the private body, as a condition of its investment or partnership with the state agency, requires that the private body have the right to control its labor relations policy and perform all work associated with such investment or partnership in compliance with all collective bargaining agreements to which the private party is a signatory and is thus legally bound with its own employees and the employees of its contractors and subcontractors in any manner permitted by the National Labor Relations Act, 29 U.S.C. § 151 *et seq.*, or the Railway Labor Act, 45 U.S.C. § 151 *et seq.*

This section does not prohibit an employer or any other person covered by the National Labor Relations Act or the Railway Labor Act from entering into agreements or engaging in any other activity protected by law.

This section shall not be interpreted to interfere with the labor relations of persons covered by the National Labor Relations Act or the Railway Labor Act.

- m. Payment of Prevailing Wages Pursuant to Virginia Code 2.2-4321.3

Code of Virginia § 2.2-4321.3 and the following requirements shall be applicable to the Work of the Contract if the Contract Price is greater than \$250,000.00:

1. The Contractor agrees that all remuneration to any individual providing labor for the Project or the Work as a mechanic, laborer, worker or equivalent shall be paid at a rate not less than the Prevailing Wage Rate beginning upon the individual's first day of work at or for the Project.
 2. Upon award of the Contract, the Contractor shall certify, under oath, to the Commissioner of Labor and Industry the pay scale for each craft and trade to be employed for, or to provide labor for, the Project or the Work by the Contractor and any Subcontractors. The Contractor's certification shall include all information required by *Code of Virginia* § 2.2-4321.3(G). The Contractor shall provide a copy of this certification to the Owner at the time it is provided to the Commissioner of Labor and Industry.
 3. The Contractor shall ensure that each individual providing labor as a mechanic, laborer, worker or equivalent shall be accurately classified in conformance with the Prevailing Wage Rate determinations.
 4. The Contractor and all Subcontractors shall keep, maintain, and preserve all records relating to the occupation, work classification, wages paid to and hours worked for each individual providing labor for the Project or the Work as a mechanic, laborer, worker or equivalent in a manner which complies with the requirements of *Code of Virginia* § 2.2-4321.3(H). The Contractor and all Subcontractors shall retain these and any other required payroll records for the period required by *Code of Virginia* § 2.2-4321.3(H). The Contractor and its Subcontractors shall make available to the Owner all records required by *Code of Virginia* § 2.2-4321.3(H) for inspection and copying within five (5) days of Owner's request.
 5. The Contractor and all Subcontractors shall post all Prevailing Wage Rates applicable to the Project and the Work in a prominent and easily accessible place at the Site. The Contractor and all Subcontractors shall timely make all postings, updates to postings, and certification required by *Code of Virginia* § 2.2-4321.3(I). The Contractor shall provide the Owner with a copy of each certification made to the Commissioner of Labor and Industry pursuant to *Code of Virginia* § 2.2-4321.3(I) at the time the certification is provided to the Commissioner of Labor and Industry.
 6. The Contractor shall indemnify and hold harmless the Owner from any fines, demands, claims, suits and damages, including any attorney's fees incurred by the Owner, resulting from or relating to the Contractor's or any Subcontractor's failure to pay the Prevailing Wage to a mechanic, laborer, worker or equivalent individual or to comply with the requirements of *Code of Virginia* § 2.2-4321.3.
- n. *Code of Virginia*, § 2.2-4376.2 shall be applicable to the Work of the Contract.

4. NONDISCRIMINATION

- a. Contractor shall comply with the Federal Civil Rights Act of 1964, as amended, the Virginia Fair Employment Contracting Act of 1975, as amended, the Virginia Human Rights Act, as amended, and the laws of the Commonwealth of Virginia and all Executive Orders in effect at the time of the Work which safeguard individuals from unlawful discrimination in employment.
- b. *Code of Virginia* § 2.2-4311 and executive orders currently in effect shall be applicable to the Work of the Contract. During the performance of this Contract, the Contractor agrees as follows:

1. The Contractor shall not discriminate against any employee or applicant for employment, subcontracting, and delivery of goods and services because of race, religion, color, sex, national origin, age, disability, or other basis prohibited by state law or executive order relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of the contractor. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.
 2. The Contractor, in all solicitations or advertisements for employees placed by or on behalf of the contractor, will state that such Contractor is an equal opportunity employer.
 3. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.
 4. The Contractor shall include the provisions of the foregoing subparagraphs 1, 2 and 3 in every Subcontract or purchase order over \$10,000, so that the provisions will be binding upon each Subcontractor and Supplier.
- c. *Code of Virginia*, § 2.2-4201 shall be applicable to the Work of the Contract. During the performance of this Contract, the Contractor agrees as follows:
1. The Contractor shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin, except where religion, sex or national origin is a bona fide occupational qualification reasonably necessary to the normal operation of the Contractor. The Contractor shall post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause, including the names of all contracting agencies with which the Contractor has contracts over \$10,000.
 2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that Contractor is an equal opportunity employer. However, notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this chapter
 3. If the Contractor employs more than five (5) employees, the Contractor shall: (i) provide annual training on the Contractor's sexual harassment policy to all Contractor's supervisors and employees providing services in the Commonwealth of Virginia, except such supervisors or employees who are required to complete sexual harassment training provided by the Commonwealth of Virginia Department of Human Resource Management; and (ii) post the Contractor's sexual harassment policy in: (a) a conspicuous public place in each building located in the Commonwealth that the Contractor owns or leases for business purposes; and (b) the Contractor's employee handbook.
 4. The Contractor shall include the provisions of the foregoing subparagraph 1, 2 and 3 in every Subcontract and purchase order over \$10,000, so that the provisions will be binding upon each Subcontractor and Supplier.
- d. Where applicable, the Virginians with Disabilities Act and the federal Americans with Disabilities Act shall apply to the Contractor and all Subcontractors and Suppliers.
- e. The Owner does not discriminate against faith-based organizations as defined in *Code of Virginia* § 2.2-4343.1(B).

5. PROHIBITION OF ALCOHOL AND OTHER DRUGS

- a. The Contractor shall establish a written policy to maintain and enforce a drug-free workplace, to specify actions that will be taken against persons for violations of the policy, and to require that such policy be binding on each of its employees, Subcontractors, and Suppliers performing Work of the Contract.
- b. The Contractor's policy shall prohibit the following acts by all Contractor, Subcontractor, and Supplier personnel at the Site:
 1. The manufacture, distribution, dispensation, possession, or use of a controlled substance or marijuana, except possession and medically prescribed use of prescription drugs; and
 2. The impairment of judgment or physical abilities due to the use of a controlled substance or marijuana, including impairment from prescription drugs.
- c. The Contractor shall post a copy of this policy in a conspicuous place at the Site and assure that all personnel, including potential hires, are advised of the policy. A violation of this policy will be recognized as a breach of Contract and may result in termination of the Contract.
- d. The Contractor shall include in all solicitations or advertisements for employees placed by or on behalf of the Contractor that the Contractor maintains a drug-free workplace.
- e. The Contractor shall include the foregoing provisions as binding upon each Subcontractor and Supplier in every subcontract or purchase order over \$10,000.
- f. For the purposes of this section, "drug-free workplace" means a site for the performance of work done in connection with a specific contract awarded to a contractor in accordance with this chapter, 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.

6. TIME FOR COMPLETION

- a. The Contractor shall achieve Substantial Completion on or before the Contract Completion Date. Unless otherwise specified, the Contractor shall achieve Final Completion within thirty (30) Days after the Contract Completion Date.
- b. The Contractor acknowledges and agrees that the Owner is relying upon the Time for Completion and Contract Completion Date for planning the use and Beneficial Occupancy of the Work and for all other purposes. If the Contractor fails to achieve Substantial Completion by the Contract Completion Date, the Contractor shall be subject to payment of actual damages incurred by the Owner or liquidated damages, if provided for in the Contract.
- c. The Contractor, in submitting its bid or proposal, acknowledges that the Time for Completion is a reasonable duration and period for performing the Work and that it has taken into consideration normal weather conditions for the period of performance. Normal weather does not mean statistically average weather, but rather means a range of weather patterns which might be anticipated based on weather conditions and events for the past ten (10) years. Normal weather conditions shall be determined from the public historical records available, including the U.S. Department of Commerce, Local Climatological Data Sheets, National Oceanic and Atmospheric Administration / Environmental Data and Information Service, National Climatic Center and National Weather Service. The data sheets to be used shall be those for the locality or localities closest to the Site. No additional compensation, costs or damages will be paid to the Contractor

because of normal weather conditions, including normal adverse weather to be anticipated during the Project. An extension of time for abnormal adverse weather conditions which directly impact the Work will be considered by the Owner upon under the following conditions, all of which must be strictly complied with and demonstrated by the Contractor:

1. A request for extension of time-based on abnormal adverse weather conditions must be made in writing within fourteen (14) Days of the completion of the calendar month during which the abnormal adverse weather conditions impacted the Work at the Site. The request for additional time shall be substantiated by weather data collected during the period of delay at the Site. Said data must demonstrate an actual departure from weather conditions that could have been anticipated at the Site during the dates in question.
2. The abnormal adverse weather must have caused a delay to the Contract Completion Date as a result of a delay to the Critical Path as depicted on the accepted "critical path method" schedule or the approved bar graph schedule current at the time of the weather event. No extension will be considered for any portion of any delay which consumes only Float.
3. All of the evidence and data supporting the request (including both historical data and the recordings at the Site during the time of delay) must be furnished to the Owner before the end of the calendar month following the month for which the request is made.

Compliance with the requirements of this section is a condition precedent to the Contractor's entitlement to any change or adjustment to the Contract Completion Date for impacts from abnormal weather conditions.

- d. The Contractor's execution of the Contract is a representation and agreement that the Contractor has visited the Site and reviewed the requirements of the bid documents, the Contract Documents, local conditions, availability of materials, equipment, and labor, the reasonable time required for the Owner to respond to Submittals, and any other factors which may affect the performance of the Work, and has taken all these factors into consideration in submitting its bid and executing this Contract.

7. CONDITIONS AT SITE

- a. The Contractor shall have visited the Site prior to bidding or submitting its proposal and is totally responsible for having ascertained pertinent local conditions such as location, accessibility and general character of the Site, and the character and extent of existing conditions, improvements and work within or adjacent to the Site. The Contractor shall not submit any claims or any request for adjustments of the Contract Price or Contract Completion Date which result from its failure to consider such conditions.
- b. If in the performance of the Work the Contractor encounters (i) hidden physical conditions of a building being modified which are materially different from those ordinarily encountered or generally recognized as inherent in the activities being performed or (ii) subsurface or concealed latent conditions which are materially different from those frequently present in the locality or from those indicated in the Contract Documents, the Contractor shall promptly provide Notice to the Owner and A/E before the conditions are disturbed and not later than seven (7) Days after discovery. The A/E shall promptly review the conditions and propose such changes or adjustments, if any, in the Contract Documents that may be necessary to address the conditions. The Contractor must request any change in the Contract Price or Contract Completion Date for such conditions pursuant to the applicable requirements in Sections 38, 39, and 43 of these General Conditions. Compliance with the requirements of this section is a condition precedent to the Contractor's entitlement to any change or adjustment in the Contract Price or Contract Completion Date as a result of such Site conditions.

- c. If the Contractor, during the course of the Work, observes the existence of any material which he knows, should know, or has reason to believe is hazardous to human health, the Contractor shall promptly notify the Owner in writing before the material is disturbed further or the affected work is performed. The Owner will provide the Contractor with instructions regarding the disposition of the material. The Contractor shall not perform any Work involving the material or any Work causing the material to be less accessible prior to receipt of special instructions from the Owner. The Contractor must request any change in the Contract Price or Contract Completion Date for such conditions pursuant to the applicable requirements in Sections 38, 39 and 43 of these General Conditions. Compliance with the requirements of this section is a condition precedent to the Contractor's entitlement to any change or adjustment in the Contract Price or Contract Completion Date as a result of such Site conditions.

8. CONTRACT SECURITY

- a. For contracts with a value exceeding Five Hundred Thousand Dollars (\$500,000) or as required by the Owner on the CO-9, the Contractor shall deliver to the Owner or its designated representative, a Commonwealth of Virginia Standard Performance Bond, DGS-30-084 (CO-10) and a Commonwealth of Virginia Standard Labor and Material Payment Bond, DGS-30-088 (CO-10.1), each fully executed by the Contractor and one or more surety companies legally licensed to do business in Virginia and each in an amount equal to one hundred percent (100%) of the Contract Price. If more than one Surety executes a bond, each shall be jointly and severally liable to the Owner for the entire amount of the bond. Sureties shall be selected by the Contractor, subject to approval by the Owner. No payment on the Contract shall be due and payable to the Contractor until the bonds have been approved by the Owner and the Office of the Attorney General of Virginia. To facilitate review of the bonds by the Office of the Attorney General, the power of attorney from the surety company to its agent who executes the bond shall be attached to the bond, or, if not so attached, prior to the execution of the bonds by the surety, recorded in the Office of the Clerk of Court for the City of Richmond, Virginia, at the John Marshall Court Building, 400 North Ninth Street, Richmond, VA 23219.
- b. For the purposes of all Standard Labor and Material Payment Bonds entered into, the term "subcontractors" as used in § 2.2-4337(A)(2) of the *Code of Virginia* is interpreted to mean any Subcontractors at any tier who participated in the prosecution of the Work undertaken by the Contractor (referred to in § 2.2-4337(A)(2) of the *Code of Virginia* as the "prime contractor"), whether such Subcontractor had a direct contract with the Contractor (prime contractor) or another Subcontractor, regardless of whether there were one or more other intervening Subcontractors contractually positioned between it and the Contractor (prime contractor).
- c. *Code of Virginia* § 2.2-4338 allows for alternative forms of security in lieu of payment and/or performance bonds. No alternative forms of security shall be allowed unless approved in writing by Owner prior to Contractor's submission of its Bid or proposal.
- d. Mechanic's liens may not be filed or recorded on Owner, Agency, or Commonwealth property. The Contractor shall keep the Owner's property free and clear from all mechanic's liens. The Contractor shall, upon Notice from the Owner, cause any liens filed or recorded to be released within ten (10) Days from Notice at its cost and expense; and if the Contractor fails to do so, the Owner shall have the right, but not the obligation, to cause such lien to be released by bonding or otherwise, and the Contractor shall indemnify and hold harmless the Owner from all costs and expenses incurred or to be incurred as a result, including bond premiums, court costs and attorneys' fees arising from or related to such liens. At the Owner's option, it may withhold payment of any sums due the Contractor until any such liens are released, and may deduct such costs or expenses from any payment then due or thereafter becoming due from the Owner to the Contractor.

9. SUBCONTRACTS

- a. The Contractor shall, as soon as practicable after the signing of the Contract, notify the Owner and A/E in writing of the names of all Subcontractors proposed for the principal parts of the Work and of such others as the A/E may direct. Where the Specifications establish qualifications or criteria for Subcontractors, manufacturers, or individuals performing Work on the Project, the Contractor shall be responsible for ascertaining that those proposed meet the criteria or qualifications. The Contractor shall not employ any Subcontractor that the Owner may, within a reasonable time, object to as unsuitable. Neither the Owner nor the A/E shall direct the Contractor to contract with any particular Subcontractor unless provided in the Specifications or Invitation for Bids.
- b. The Owner may select a particular Subcontractor for a certain part of the Work and designate on the Invitation for Bids or Request for Proposal 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 or Proposal form. The Contractor shall include the stipulated amount plus its markups in the bid or Proposal. In such case, the Contractor shall be responsible for that Subcontractor and its work and the Subcontractor shall be responsible to the Contractor for its work just as if the Contractor had selected the Subcontractor. If the Contractor has a reasonable objection to the Subcontractor designated, then the Contractor shall note the exception in its bid or proposal and the reason for the exception and maintain appropriate provisions for coordinating the work of the Subcontractor. The Owner, at its sole discretion, may accept the Contractor's bid or proposal with the exception noted and contract separately with the Subcontractor under the provisions of Section 10 of the Contract or designate a different Subcontractor.
- c. The Owner shall, on request, furnish to any Subcontractor, if practicable, the amounts of payments made to the Contractor, the Schedule of Values and Requests for Payment submitted by the Contractor, and any other documentation submitted by the Contractor which would tend to show what amounts are due and payable by the Contractor to the Subcontractor.
- d. The Contractor shall be fully responsible to the Owner for all acts and omissions of its agents and employees and all tiers of Subcontractors and Suppliers performing or furnishing any of the Work. Nothing in the Contract Documents shall create any contractual relationship between Owner or A/E and any Subcontractor, Supplier or other Person, nor shall it create any obligation on the part of Owner or A/E to pay for or to see to the payment of any moneys due any Subcontractor, Supplier or other Person, except as may otherwise be required by law.
- e. The Contractor shall be fully responsible for its invitees at the Site and for those of its Subcontractors, Suppliers, and their employees, including any acts or omissions of such invitees.
- f. The Contractor agrees that it is responsible for all dealings and coordination with 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 the Contract or by statute.

10. SEPARATE CONTRACTS

- a. The Owner reserves the right to let other contracts in connection with the Project, the work under which may proceed simultaneously with the execution of this Contract. The Contractor shall afford separate contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work. The Contractor shall cooperate with them and shall take all reasonable action to coordinate its Work with that of separate contractors. If the Owner has listed other separate contracts in the Invitation for Bids or Requests for Proposal which it expects to proceed simultaneously with the Work of the Contractor, and has included the estimated timing of such other contracts in the Invitation for Bids or Requests for Proposal, the Contractor shall integrate the schedule of those separate contracts into its scheduling. The Contractor shall make

every reasonable effort to assist the Owner in maintaining the schedules for all separate contracts. If the work performed by a separate contractor is Defective or performed so as to prevent or threaten to prevent the Contractor from carrying out its Work according to the Contract, the Contractor shall immediately notify the Owner and the A/E upon discovering such conditions.

- b. If a dispute arises between the Contractor and any separate contractor(s) as to their responsibility for cleaning up the Site, the Owner may clean up and charge the cost thereof to the respective contractors in proportion to their responsibility. If the Contractor disputes the Owner's apportionment of clean-up costs, it shall be the Contractor's burden to demonstrate and prove the correct apportionment.

11. CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE

- a. The Contractor shall not commence Work under this Contract until all insurance required hereunder has been obtained from an insurer authorized to do business in Virginia and such insurance has been approved by the Owner. The Contractor shall provide to the Owner Certificates of Insurance for all required coverage and, upon request, shall provide full copies of the Contractor's insurance policies. Approval of insurance by the Owner shall not relieve or decrease the liability of the Contractor hereunder.
- b. The Contractor shall procure and maintain, as required herein, the following insurance coverages:
 - 1. Workers' Compensation and Employer's Liability Insurance to cover all employees engaged in the Work of a type and in an amount to meet all Commonwealth of Virginia statutory requirements and regulations to provide all benefits to which employees may be entitled, including Employers Liability, with limits no less than \$1,000,000 bodily injury by accident or disease, each employee. Where applicable, coverage shall be extended to cover any claims under the United States Longshoreman's Act and Harbor Workers Act and Jones Act as may be appropriate for the work.
 - 2. Comprehensive General Liability insurance, including coverage for Broad Form Contractual, Premises/Operations, Product and Completed Operations, Independent Contractor's Liability, and Personal Injury Liability, with limits of at least \$2,000,000 per occurrence and \$2,000,000 aggregate, applicable on a per-project basis. The policy shall not exclude or limit the amount of coverage for the Work of the Project or for explosion, collapse, underground operations, mold, or exterior insulation and finish system ("EIFS").
 - 3. Automobile Liability Insurance with a limit of not less than \$1 million combined single limit for bodily injury and property damage per occurrence, covering all owned, non-owned, hired and borrowed vehicles, whether on-Site or off-Site.
 - 4. Contractor or the Asbestos Subcontractor shall provide occurrence-based liability insurance with asbestos coverages in an amount not less than \$1,000,000. The following shall be named as additional insureds on this policy: the Commonwealth of Virginia, its officers, employees and agents; the A/E (if not the Asbestos Project Designer); and the Contractor (where the asbestos work is being performed by the Asbestos Subcontractor).
- c. Unless otherwise specified, Contractor shall ensure that all insurance required by Subsection (b) above contains the following provisions:
 - 1. With the exception of Workers' Compensation insurance, the Commonwealth of Virginia, the Owner, and their officers, employees and agents shall be named as additional insureds on all policies. The additional insureds as stated for the asbestos coverage shall be as stated in Section 11(b)(4).
 - 2. All insurance coverage shall be considered primary and non-contributory with respect to

other insurance that might be available to the Contractor, A/E, Owner, or Agency.

3. All insurers shall waive rights of subrogation against the Commonwealth of Virginia, Owner and Agency for any claims covered by the insurance required herein.
4. All deductibles or self-insured retentions shall be the sole responsibility of the Contractor.
- d. No insurance will be canceled, dropped, replaced, or materially changed without at least thirty (30) Days' prior written Notice to and consent of the Owner.
- e. Contractor shall require each Subcontractor to carry the same insurance, and in the same amounts, required by Section 11(b)(1)-(3) above. The Contractor shall not allow any Subcontractor to commence Work on the Project until all insurance required of the Subcontractor by this Contract has been obtained by the Subcontractor and approved by the Contractor.
- f. Prior to award of the Contract, the Contractor shall submit, on the form provided by the Owner, a Certificate of Coverage verifying Workers' Compensation insurance is in place. The Contractor shall likewise obtain a Certificate of Coverage for Workers' Compensation insurance from each Subcontractor and shall provide a copy to the Owner prior to the Subcontractor beginning Work at the Project.

12. "ALL-RISK" BUILDER'S RISK INSURANCE TO INCLUDE AN INSTALLATION FLOATER

- a. The Contractor shall procure and maintain, at its cost, "all-risk" Builder's Risk insurance with minimum coverage and limits as follows:
 1. **New Construction, Addition, or Major Renovation:** When the Work is new construction, addition, or Major Renovation, the Contractor shall maintain "all-risk" Builder's Risk insurance for the Work and the entire structure or structures, if any, on which the Work is to be done with a minimum limit of not less than the insurable value of the structure(s) plus one hundred percent (100%) of the Contract Price and the value of all Change Orders, to represent the total value of the structure(s) and the Work on a replacement cost basis.
 2. **Limited Renovation:** When the Work is Limited Renovation to an existing structure, the Contractor shall maintain "all risk" Builder's Risk insurance in an amount equal to one hundred percent (100%) of the Contract Price and the value of all Change Orders, to represent the total value of the Work on a replacement cost basis. .

When a project is an addition with Limited Renovation to an existing structure, then the insurable value of the existing structure shall not be included.

- b. Builder's risk insurance shall be provided on an "all risk" or equivalent policy form and shall include, without limitation, insurance against all perils. The insurance shall cover the costs of debris removal, temporary buildings, legal requirements, and compensation for A/E services and Contractor services required following an insured loss. The insurance shall cover portions of the Work stored off-Site, Work in transit, and all materials, supplies, equipment, machinery, and fixtures that are or will be part of the Project. The policy shall include coverage for mold resulting from a covered peril, property in transit or temporary storage, equipment breakdown/course of construction, and soft costs within the aggregate or blanket limit of the of the policy. If not otherwise covered by the Builder's Risk policy, Contractor also shall provide an installation floater to cover all equipment and materials intended for installation at the Project.

In the event the policy includes any coverages where the limit is less than the aggregate or blanket limit of the policy (sub limits), the coverage shall be no less than the stated minimum sub-limits for the following perils:

- Flood	\$2,000,000
- Earth Movement	\$2,000,000
- Debris Removal	\$2,000,000
- Extra or Expediting Expense	\$250,000
- Interior Water Damage	\$2,000,000
- Loss of Income/Extra Expense	12 Months
- Soft Costs	Blanket or Aggregate Limit/14 Day Waiting Period

The Certificate of Insurance provided to the Owner shall disclose all sub-limits, stating the peril and limit applying to each. In the event that the aggregate policy limit is less than the sub-limits identified above, coverage for all perils must be provided within the aggregate or blanket limit of the policy.

- c. Builder's risk insurance may include a deductible provision if the Owner so provides in the Supplemental General Conditions, in which case the Contractor will be liable for such deductible whenever a claim arises. Any loss payable under the Builder's Risk insurance shall be payable to the Owner, in accordance with its interests, as they may appear, and then to any other persons insured thereunder.

Written evidence of this insurance and a copy of the policy shall be provided to the Owner no later than thirty (30) Days following the award of the Contract. The policy shall not be canceled, dropped, replaced, or materially changed without at least thirty (30) Days' prior written Notice to and consent of the Owner.

- d. Builder's risk insurance shall include the interest of the Contractor, the Owner, the Commonwealth, and all Subcontractors and Sub-subcontractors. Contractor shall maintain the builder's risk insurance until Final Payment by the Owner or until no person other than the Owner has an insurable interest in the Work, whichever is later.
- e. Any insurance provided through the Department of Treasury, Division of Risk Management, on buildings, construction, additions or renovations will not extend to Contractor's nor Subcontractors' buildings, equipment, materials, tools or supplies unless these items are to become property of the Owner upon completion of the Project and the Owner has assumed responsibility for such items at the time of the loss.

13. TAXES, FEES AND ASSESSMENTS

The Contractor shall, without additional expense to the Owner, pay all applicable federal, state, and local taxes, fees, and assessments arising out of the Work, except the taxes, fees and assessments on the real property comprising the Site. If the State Building Official elects to have the local building official inspect the Work as provided by *Code of Virginia* § 36-98.1, the Owner shall pay the resulting fees to the local building official.

14. PATENTS

The 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. The Contractor shall indemnify and hold harmless the Owner, its officers, agents and employees, 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 the Contract, including its use by the Owner, unless such invention, process, technique, article or appliance is specifically named in the Specifications or Plans as 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 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 Contractor shall promptly advise the Owner and the A/E. The Owner may direct that some other invention, process, technique, article or appliance be used. Should the Contractor have reason to believe that the invention, process, technique, article or appliance so specified is an infringement of a patent, and fails to inform the Owner and the A/E, the Contractor shall be responsible for any loss or liability due to the infringement.

15. ARCHITECT/ENGINEER'S STATUS

- a. The A/E shall have authority to endeavor to secure the faithful performance of the Work by Contractor. The A/E shall review the Contractor's Submittals for conformance to the requirements of the Contract Documents and return copies to the Contractor with appropriate notations. The A/E shall interpret the requirements of the Plans and Specifications and issue Field Orders to the Contractor as may be required. The A/E shall recommend to the Owner suspension of the Work (in whole or in part) whenever such suspension may be necessary to ensure the proper execution of the Work or the requirements of the Contract. The A/E shall have authority to reject, in writing, Work, including material, installation or workmanship, which does not conform to the Contract Documents or is Defective. The A/E shall determine the progress and quality of the Work, subject to the right of the Owner to make an overriding decision to the contrary. Upon request by the Contractor, the A/E shall confirm, in writing within fourteen (14) Days, any verbal order or determination made by the A/E.
- b. The A/E shall have no authority to approve or order changes in the Work which alter the design concept or which call for an extension of the Contract Completion Date or Final Completion or a change in the Contract Price.
- c. The Owner shall have the right, but not the duty, to countermand any decision of the A/E and to follow or reject the advice of the A/E, including but not limited to acceptance of the Work, as it deems best in its sole discretion. In those instances where the A/E has been given authority to act, the A/E shall promptly do so, but in the case of disagreement between the A/E and the Owner, the decision of the Owner shall be final. The Contractor shall not be bound by any determination, interpretation or decision of the A/E contrary to the A/E's authority or that is not consistent with the Contract Documents. The party taking issue with the determination, interpretation or decision of the A/E shall give the other party written notice of such fact within fourteen (14) days after the determination, interpretation or decision is communicated by the A/E. In the actual performance of the Work, the Contractor shall proceed in accordance with instructions given by the A/E unless the Owner and the Contractor mutually agree in writing or by Change Order that the Contractor shall proceed otherwise.
- d. All orders from the Owner to the Contractor shall either be transmitted through the A/E or communicated directly to the Contractor and the A/E by the Owner.
- e. Should the Owner choose to employ another or different A/E, the status of the A/E so employed shall be the same as that of the former A/E.
- f. The A/E shall provide a progress report to the Owner and the Contractor after each A/E visit to the

Site. The report shall be in writing indicating the date, time of day, weather conditions and the names of the persons representing the A/E who participated in the visit. The report shall advise the Owner of any problems that were noted or observed and shall compare the A/E's observations of the actual progress of the Work with that reported by the Contractor. On the basis of its on-Site observations, the A/E will make every reasonable effort to guard the Owner against delays, defects, and deficiencies in the Work of the Contractor. The A/E shall have the authority to inspect the Work, to note and report Defective Work and deviations from the Contract Documents to the Owner, to reject Work, and to recommend to the Owner the suspension of the Work when necessary to prevent Defective Work from proceeding or being covered.

- g. The A/E shall not be responsible for construction means, methods, techniques, sequences or procedures (other than those expressly specified in the Contract Documents), or for safety precautions and programs in connection with the Work. The A/E shall not be responsible for the Contractor's failure to carry out the Contractor's own responsibilities.
- h. The A/E generally conveys written decisions and Notices to the Contractor through the Project Manager and shall generally receive information and Notices from the Contractor through the Project Manager unless otherwise agreed. The Owner may delegate from the A/E to the Project Manager certain inspection, verification, acceptance, rejection, and administrative duties and authority, but any such delegation shall be in writing and a copy thereof provided to the Contractor.
- i. The provisions of this Section are included as information only to describe the relationship between the Owner, A/E, and Contractor. No failure of the A/E to act in accordance with this Section shall relieve the Contractor from its obligations under the Contract or create any rights in favor of the Contractor against the Owner.

16. INSPECTION

- a. All material and workmanship shall be subject to inspection, examination and testing by the Owner, the A/E, the Project Inspector, authorized inspectors and authorized independent testing entities at any and all times during manufacture and/or construction. The A/E and the Owner shall have authority to reject Defective Work and non-conforming material and require its correction. Rejected workmanship shall be satisfactorily corrected and rejected material shall be satisfactorily replaced with proper material without charge therefore, and the Contractor shall promptly segregate and remove the rejected material from the Site. If the Contractor fails to proceed at once with replacement of rejected material and/or the correction of Defective Work, the Owner may replace such material and/or correct such Work and charge the cost to the Contractor, or may terminate the Contract as provided in Section 41 of these General Conditions, the Contractor and surety being liable for any damage to the same extent as provided in Section 41 for termination thereunder.
- b. Site inspections, tests conducted on Site and tests of materials gathered on Site which the Contract requires to be performed by independent testing entities shall be contracted and paid for by the Owner. Examples of such tests are the testing of cast-in-place concrete, foundation materials, soil compaction, pile installations, caisson bearings and steel framing connections. The Contractor shall promptly furnish, without additional charge, all reasonable facilities, labor and materials necessary and convenient for making such tests. Except as provided in (d) below, whenever such examination and testing finds Defective Work or non-conforming materials or equipment, the Contractor shall reimburse the Owner for the cost of reexamination and retesting. Although conducted by independent testing entities, the Owner will not contract and pay for tests or certifications of materials, manufactured products or assemblies which the Contract, codes, standards, etc., require to be tested and/or certified for compliance with industry standards such as Underwriters Laboratories, Factory Mutual or ASTM. If fees are charged for such tests and certifications, they shall be paid by the Contractor. The Contractor shall also pay for all inspections, tests, and certifications which the Contract specifically requires the Contractor to

perform or to pay, together with any inspections and tests which it chooses to perform for its own purposes, but which are not required by the Contract.

- c. Where Work is related to or dependent on Defective Work, the Contractor shall stop such related or dependent Work until the Defective Work is corrected or an alternative solution is presented that is satisfactory to the Owner. Where Work is rejected as Defective, the Contractor shall stop like Work in other areas or locations on the Project until the Owner has approved corrective measures.
- d. Should it be considered necessary or advisable by the Owner or the A/E at any time before the Final Completion Date to make an examination of any part of the Work already completed, by removing or tearing out portions of the Work, the Contractor shall promptly furnish all necessary facilities, labor and material to expose the Work to be tested to the extent required. If such Work is found to be Defective in any respect, the Contractor shall bear all the expenses of uncovering the Work, of examination and testing, and of satisfactory reconstruction and correction of the Defective Work. If, however, such Work is found to meet the requirements of the Contract, the actual cost of the Contractor's labor and material necessarily involved in uncovering the Work, the cost of examination and testing, and Contractor's cost of material and labor necessary for replacement of the examined Work including a markup of fifteen (15%) percent for overhead and profit, shall be paid to the Contractor and, if the Contract Completion Date was delayed thereby, a time extension equivalent to the impact on the Critical Path shall be issued by Change Order. Notwithstanding the foregoing, the Contractor shall be responsible for all costs and expenses in removing and replacing the Work if the Contractor had covered the Work prior to any inspection or test required by the Contract Documents or contrary to the instructions of the A/E, Owner, Project Inspector, or Building Official.

The Project Inspector has the authority to recommend to the A/E and the Owner that the Work be suspended when in his or her judgment the Contract Documents are not being followed. Any such suspension shall be continued only until the matter in question is resolved to the satisfaction of the Owner. The cost of any such Work stoppage shall be borne by the Contractor unless it is later determined that the Work in question was in full compliance with the Contract Documents.

- e. The Project Inspector has the right and the authority to:
 - 1. Inspect all construction materials, equipment, and supplies for quality and for compliance with the Contract Documents and/or approved shop drawings and Submittals.
 - 2. Inspect workmanship for compliance with the standards described in the Contract Documents.
 - 3. Observe and report on all tests and inspections performed by the Contractor.
 - 4. Recommend rejection of Work which does not conform to requirements of the Contract Documents or is Defective.
 - 5. Keep a record of construction activities, tests, inspections, and reports.
 - 6. Attend all Site construction meetings and inspections held by the Owner and/or the A/E with the Contractor.
 - 7. Check materials and equipment, together with documentation related thereto, delivered for conformance with approved Submittals and the Contract.
 - 8. Check installations for proper workmanship and conformance with shop drawings and installation instructions.

9. Assist in the review and verification of the Form CO-12, Schedule of Values and Certificate for Payment, submitted by the Contractor each month.
 10. Do all things for or on behalf of the Owner as the Owner may direct in writing.
- f. The Project Inspector has no authority to:
1. Authorize deviations from the Contract Documents;
 2. Enter into the area of responsibility of the Contractor's superintendent;
 3. Issue directions relative to any aspect of construction means, methods, techniques, sequences or procedures unless specifically required by the Contract Documents or in regard to safety precautions and programs in connection with the Work;
 4. Authorize or suggest that the Owner occupy the Project, in whole or in part; or
 5. Issue a certificate for payment.
- g. The duties of the Project Inspector are for the benefit of the Owner only and not for the Contractor. The Contractor may not rely upon any act, statement, or failure to act on the part of the Project Inspector, nor shall the failure of the Project Inspector to properly perform his or her duties in any way excuse Defective Work, improper performance of the Work, or noncompliance with the Contract Documents by the Contractor.

17. SUPERINTENDENCE BY CONTRACTOR

- a. The Contractor shall have a competent foreman or superintendent, satisfactory to the A/E and the Owner, on the Site at all times during the performance of the Work. The superintendent shall be familiar with and be able to read and understand the Contract Documents and be capable of communicating verbally and in writing with the Owner's representatives, the A/E, and the Contractor's workers. The Contractor shall be responsible for all construction means, methods, techniques, sequences and procedures, for coordinating all portions of the Work except where otherwise specified in the Contract Documents, and for all safety and worker health programs and practices. The Contractor shall notify the Owner, in writing, of any proposed change in foreman or superintendent, including the reason therefore, prior to making such change.
- b. The Contractor shall, at all times, enforce strict discipline and good order among the workers on the Project, and shall not employ on the Work, or contract with, any unfit person, anyone not skilled in the Work assigned to him or her, or anyone who will not work in harmony with those employed by the Contractor, the Subcontractors, the Owner or the Owner's separate contractors and their subcontractors or anyone who will not interact appropriately with the public.
- c. The Owner may, in writing, require the Contractor to remove from the Site any employee or Subcontractor's employee the Owner deems to be incompetent, careless, not working in harmony with others on the Site, not interacting appropriately with the public, or otherwise objectionable, but the Owner shall have no obligation to do so.

18. CONSTRUCTION SUPERVISION, METHODS AND PROCEDURES

- a. The Contractor shall be solely responsible for supervising and directing the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract. The Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction and for coordinating all portions of the Work, except where otherwise specified in the Contract Documents. The Contractor shall not be responsible for the negligence of others in the design or

selection of a specific means, method, technique, sequence or procedure of construction expressly required by the Contract. The Contractor is solely responsible to the Owner that the finished Work complies with the Contract Documents.

The Contractor shall be solely responsible for health and safety precautions and programs for workers and others in connection with the Work. No inspection by, knowledge on the part of, or acquiescence by the A/E, the Project Inspector, the Owner, the Owner's employees and agents, or any other Person shall relieve the Contractor from its sole responsibility for compliance with the requirements of the Contract and its sole responsibility for health and safety programs and precautions for the Work.

- b. If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, the Contractor may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to the A/E, subject to the Owner's right to disapprove. The Contractor must submit its written request for the substitution to the A/E with sufficient information to allow the A/E to determine that the substitute proposed is equivalent to that indicated or required by the Contract.
- c. The Plans and Specifications are divided into several parts, or sections, for convenience only and because the entirety of the Plans and Specifications must be considered and construed as a whole. The divisions of the Plans and Specifications are not intended to control the Contractor in dividing the Work among Subcontractors or to limit the Work performed by any trade. The Contractor shall be solely responsible for the coordination of the trades, Subcontractors and vendors engaged in the Work and for the compensation of the trades, Subcontractors and vendors for the Work performed.

19. SCHEDULE OF THE WORK

- a. **General:** The Contractor is responsible for the scheduling and sequencing of the Work, for coordinating the Work, for monitoring the progress of the Work, and for taking appropriate action to keep the Work on schedule to finish on or before the Contract Completion Date. The Contractor may attempt to achieve Substantial Completion before the Contract Completion Date and receive payment in accordance with Section 36 for the Work completed each period. However, the Contract Completion Date shall be used in all schedules and schedule updates as the deadline for which Substantial Completion is to be achieved. The time (in Days) between the Contractor's planned early completion and the Contract Completion Date is part of the Float. Extensions of time allowed pursuant to Sections 38, 39, and 43, the determination of any compensation for compensable delay, and all other matters between the Owner and the Contractor will be determined using the Contract Completion Date, not an earlier Substantial Completion date planned by the Contractor.

Within two (2) weeks after the Contractor signs the Contract, unless otherwise extended by the Owner at the time of the signing, the Contractor shall prepare and submit to the Owner, with a copy to the A/E, a schedule for achieving Substantial Completion by the Contract Completion Date. The preliminary schedule shall be in sufficient detail to show the sequencing of the various trades for each floor level, wing or work area. The Owner will notify the Contractor of any comments on the preliminary schedule within fifteen (15) Days of receipt by the Owner.

A fully complete Project schedule meeting the requirements set forth below in subparagraph (1) or (2), as applicable, must be submitted no later than sixty (60) Days after the Contract is signed by the Owner.

- 1. For Contracts with a Contract Price less than \$1,500,000, a "critical path method" or bar graph schedule may be utilized. The schedule shall indicate the estimated starting and completion dates for each major element of the work and satisfy the requirements of Section 19 (b) below.

2. For Contracts with a Contract Price of \$1,500,000 or more, a “critical path method” schedule shall be utilized to control the planning and scheduling of the Work. The “critical path method” schedule shall be the responsibility of the Contractor and shall be paid for by the Contractor and shall satisfy the requirements of Section 19(c) below.

It is the Contractor’s responsibility to submit a schedule that shows Substantial Completion of the Work by the Contract Completion Date and completion of any portions of the Work by any interim deadlines established by the Contract.

The Contractor shall allow sufficient time in the schedule for the A/E to conduct all reviews and inspections required under the A/E Contract with the Owner. If the A/E and the Contractor are unable to agree as to what constitutes sufficient time, the Owner shall determine the appropriate duration for such A/E activities.

The Owner and A/E review schedules and schedule-related submittals solely for compliance with the requirements of this Section. The Owner’s failure to reject or its acceptance of any schedule, graph, chart, recovery schedule, updated schedule, plan of action, monthly status report, or similar schedule-related submittals, shall not constitute a representation, admission, or warranty by the Owner, including but not limited to a representation, admission, or warranty that the schedule is feasible or practical or that contents therein are true or accurate, nor shall any such acceptance or failure to reject relieve the Contractor from sole responsibility for completing the Work by the Contract Completion Date.

No progress payments will be payable to the Contractor until after it has submitted a preliminary schedule which is acceptable to the Owner. Neither the second progress payment nor any subsequent payment shall be payable to the Contractor until it has submitted a fully complete Project schedule accepted by the Owner. No subsequent progress payments will be payable to the Contractor unless it submits each monthly Project report required by Section 19(d) in a form accepted by Owner and each recovery schedule required by Owner pursuant to Section 19(e).

Failure to provide a satisfactory preliminary schedule, fully complete Project schedule, or monthly Project report within the time limits stated above shall be a material breach for which the Owner may terminate the Contract in the manner provided in Section 41 of these General Conditions.

- b. **Bar Graph Schedule:** Where a bar graph schedule is allowed, it shall be time-scaled in weekly increments, shall indicate the estimated starting and completion dates for each major element of the Work by trade and by area, level, or zone, and shall schedule dates for all salient features and activities, including but not limited to the placing of orders for materials, submission of Shop Drawings and other Submittals for review, approval of Shop Drawings and Submittals by A/E, the manufacture and delivery of material, the testing and the installation of materials, supplies and equipment, and all Work activities to be performed by the Contractor. Each Work activity will be assigned a duration by the Contractor. One Day shall be the time unit used. The bar graph shall establish and show the Critical Path for the Work.
- c. **Critical Path Method Schedule:** Where a Critical Path method schedule is required, it shall be in the time-scaled precedence format using the Contractor’s logic and time estimates. The Critical Path method schedule shall be drawn or plotted with activities grouped or zoned by Work area or Subcontract rather than random (or scattered) format.

The Critical Path method schedule shall be time-scaled on a weekly basis and shall be drawn or plotted at a level of detail and logic which will schedule all salient features and activities of the Work, including not only the actual construction Work for each trade, but also the submission of Shop Drawings and Submittals for review, approval of Shop Drawings and Submittals by the A/E, placing of orders for materials, the manufacture and delivery of materials, the testing and installation of materials and equipment, and all Work activities to be performed by the Contractor.

The Critical Path method schedule shall have no line-item activities longer than thirty (30) Days in duration, and activities shall be included to provide sufficient detail for effectively managing the sequence of the Work. Failure to include any element of Work required for the performance of this Contract shall not excuse the Contractor from completing all Work required within the Time for Completion and by the Contract Completion Date and any interim deadlines established by the Contract. Each Work activity will be assigned a duration by the Contractor.

When completed, the Critical Path method schedule shall be submitted to the A/E and the Owner for review. The Critical Path method schedule will identify and describe each activity, state the duration of each activity, the calendar dates for the early and late start and the early and late finish of each activity, any constraints placed upon the activity, and clearly depict all activities on the Critical Path for the Work. Float and Free Float shall be indicated for all activities. Float, whether Free Float or Total Float, shall not be considered for the exclusive use or benefit of either the Owner or the Contractor, but must be allocated in the best interest of completing the Work by the Contract Completion Date.

On contracts with a price over \$5,000,000, each activity on the Critical Path method schedule shall also be attributable to, and correlate with, each activity on the Schedule of Values, the sum of which for all activities shall equal the Contract Price.

When accepted by the Owner and the A/E as compliant with the requirements of this Section, the schedule shall become the baseline Critical Path method schedule for the Project. Acceptance of the schedule by the Owner does not indicate agreement with, nor responsibility for, the proposed or actual duration of any activity or logic shown on the accepted schedule.

- d. **Monthly Project Reports:** The Contractor shall review progress of the Work not less than each month, but as often as necessary to properly manage the Project and stay on schedule to finish before the Contract Completion Date. The Contractor shall collect and preserve information on Change Orders, including extensions of time. The Contractor shall evaluate this information and update the latest accepted schedule as often as necessary to finish before the Contract Completion Date. The Contractor shall submit to the A/E along with each Certificate for Payment a copy of the bar graph schedule annotated to show the current progress or, for projects requiring a Critical Path method schedule, a monthly report of the status of all activities. The bar graph schedule or monthly status report submitted with each Certificate for Payment shall show the Work completed to date in comparison with the Work scheduled for completion, including but not limited to the dates for the beginning and completion of the placing of orders and the manufacture, testing and installation of materials, supplies and equipment. The form for these reports shall be approved by the A/E and the Owner prior to submission of the first Certificate for Payment. If any elements of the Work are behind schedule, regardless of whether they may prevent the Work from being completed on time, the Contractor must indicate in writing in the report what measures it is taking and plans to take to bring each such element back on schedule and to ensure that the Work is completed before the Contract Completion Date.
- e. **Progress Delay:** Should any of the following conditions exist, the Owner may require that the Contractor prepare, at no extra cost to the Owner, a plan of action and a recovery schedule for completing the Work by the Contract Completion Date:
 - 1. The Contractor's monthly project report indicates delays that, in the judgment of the A/E or the Owner, call into question the Contractor's ability to complete the Work by the Contract Completion Date;
 - 2. The Critical Path method schedule sorted by early finish dates shows the Contractor to be thirty (30) or more Days behind on the Critical Path schedule at any time during the Work, up to thirty (30) Days prior to the Contract Completion Date;
 - 3. The Contractor desires to make changes in the logic or sequencing of Work activities or

the planned duration of future activities of the Critical Path method schedule which, in the judgment of the A/E or the Owner, are of a significant departure from those of the baseline schedule or prior schedule updates.

The plan of action and recovery schedule, when required, shall contain a narrative explanation and display how the Contractor intends to regain compliance with the most current and Owner accepted Critical Path method schedule, as updated with approved Change Orders, if any.

The plan of action shall be submitted to the Owner for review within two (2) business days of the Contractor receiving the Owner's written request. The recovery schedule, when required, shall be submitted to the Owner within five (5) Days of the Contractor's receiving the Owner's written request.

- f. **Early Completion of Project:** The Contractor may attempt to achieve Substantial Completion before the Contract Completion Date. However, such planned early completion shall be for the Contractor's convenience only and shall not create any additional rights of the Contractor or obligations of the Owner under this Contract, nor shall it change the Time for Completion or the Contract Completion Date. The Contractor shall not be required to pay damages to the Owner because of the Contractor's failure to achieve Substantial Completion by any planned earlier date. Likewise, the Owner shall not pay the Contractor any additional compensation for achieving Substantial Completion prior to the Contract Completion Date nor will the Owner owe the Contractor any compensation should the Owner, its officers, employees, or agents cause the Contractor not to achieve Substantial Completion earlier than the Contract Completion Date.

Contractor may request or propose to change the Contract Completion Date to reflect an earlier Substantial Completion date. The Owner may, but is not required to, accept such proposal. However, a change in the Time for Completion or the Contract Completion Date shall be accomplished only by Change Order. If the Contractor's proposal to change the Time for Completion or the Contract Completion Date is accepted, a Change Order will be issued stating that all references in the Contract, including these General Conditions, to the Time for Completion or the Contract Completion Date shall thereafter refer to the date as modified, and all rights and obligations, including the Contractor's liability for actual damages, delay damages and/or liquidated damages, shall be determined in relation to the date, as modified.

20. SCHEDULE OF VALUES AND CERTIFICATE FOR PAYMENT

- a. Before submittal of the first Certificate for Payment, the Contractor shall prepare for review and approval of the A/E and the Owner the Schedule of Values listed by trades or by Specifications sections for the Work, the total for which equals the Contract Price. Where the Work has multiple parts or phases, the Contractor shall prepare appropriate Schedules of Values to facilitate reviews of Certificate for Payment submitted for each part or phase.

All Certificates for Payment shall be made in the ASTM Uniformat II structure on the Form CO-12, Schedule of Values and Certificate for Payment.

- b. If the Contractor requests, or intends to request, payment for materials stored in an approved and secure manner, the Schedule of Values must indicate the amount for labor and the amount for materials, and in a supplement thereto must include an itemized list of materials for that trade or Work section. The material breakdown shall be in sufficient detail to allow verification of the quantities required for the Project, the quantities delivered, the Work completed, and the quantities stored on or off-Site.
- c. The Contractor shall complete the "Value of Work Completed" portion of the Form CO-12, complete and sign the Contractor's certification, and attach all substantiating material each Certificate for Payment. Such substantiating material includes, but is not limited to, invoices for materials, delivery tickets, timesheets, payroll records, daily job logs/records, and similar materials

which, in the opinion of the Owner and the A/E, are necessary or sufficient to justify payment of the amount requested.

- d. The labor progress for any task or activity shall be calculated based upon the percentage of Work complete up to fifty percent (50%) of the completion of the task or activity. Thereafter, the evaluation of labor progress will be based upon the effort required to complete that task or activity. The material progress shall be calculated as the invoiced dollar cost of materials used in relation to the amount estimated as necessary to complete a particular element of Work. When calculating material progress, credit shall be given for installed material as well as that stored on the Site and any material stored off-Site which has been certified by the A/E in accordance with Section 36 of these General Conditions.
- e. Should Work included in previous Certificates for Payment, and for which payment has been made, subsequently be identified by tests, inspection, or other means, as Defective or not acceptable or not conforming to the Contract Documents, the "Value of Work Completed" portion of the first Certificate for Payment submitted after such identification shall be modified to reduce the "completed" value of that Work to a percentage reflecting only that work which is not Defective or nonconforming.

21. ACCESS TO WORK

The A/E, the Owner, the Project Manager, the Owner's inspectors and other testing personnel, the Building Official, inspectors from the Department of Labor and Industry, and others authorized by the Owner, shall have access to the Work at all times. The Contractor shall provide proper facilities for access and inspection.

22. SURVEYS AND LAYOUT

- a. The Owner shall furnish the Contractor documents showing property lines and the location of existing buildings and improvements at the Site. The Contractor shall provide competent surveying and engineering services to execute the Work and shall be responsible for the accuracy of those surveying and engineering services.
- b. The Owner shall provide the general reference points and benchmarks on the Site as required of it by the Plans and Specifications. If the Contractor finds that any previously established reference points have been lost or destroyed, it shall promptly notify the A/E.
- c. The Contractor shall protect and preserve the established benchmarks and monuments and shall make no changes in locations without prior written Notice to the A/E and prior written approval from the Owner. Benchmarks and monuments that are lost or destroyed or which require shifting because of necessary changes in grades or locations shall, subject to prior written approval of the Owner, be replaced and accurately located by the Contractor.

23. PLANS AND SPECIFICATIONS

- a. The general character and scope of the Work are illustrated and described by the Plans and the Specifications. If the Contractor deems additional detail or information to be needed, the Contractor shall request the same in writing from the A/E. The request shall precisely state the detail or information needed and shall explain why it is needed. The Contractor shall also indicate a date by which the requested information is required. The A/E shall provide by Field Order such further detail and information as is necessary by the date required so long as the date indicated is reasonable. Any additional drawings and instructions supplied to the Contractor shall be consistent with the Contract Documents, shall be true developments thereof, and shall be so prepared that they can be reasonably interpreted as a part thereof. The Contractor shall carry out the Work in accordance with the additional detail drawings and instructions at no additional cost to the Owner and with no time extension.

- b. If the Contractor finds a conflict, error, omission, or other discrepancy in the Plans or Specifications, he shall notify the A/E in writing as soon as possible, but before proceeding with any Work that is or may be impacted by the matter. The A/E shall issue a clarification by Field Order to the Contractor stating the correct requirements. If the Contractor deems the Field Order requires additional or extra Work, it shall provide Notice of its request for additional time and/or compensation to the Owner and A/E prior to proceeding with that Work. The Contractor also shall submit a request for Change Order along with a detailed substantiating cost proposal through the A/E to the Owner within fourteen (14) Days of the receipt of the Field Order or before proceeding with the Work, whichever is earlier.
- c. If a conflict, error, omission or other discrepancy in Plans or Specifications was reasonably apparent or with reasonable diligence should have been apparent to the Contractor prior to submitting its bid or Proposal, and the Contractor failed to submit a question to the A/E in the time and manner required by the Instructions to Bidders, then the Contractor shall not be entitled to additional compensation or time or entitled to bring a claim against the Owner based on such conflict, error, omission or other discrepancy. If the Contractor performs any Work, or is delayed in performing any Work, where such Work involves a conflict, error, omission, or other discrepancy in the Plans or Specifications that the Contractor knew about, or with reasonable diligence should have known about, for which the Contractor failed to provide Notice to the A/E and Owner as required, the Contractor shall assume full responsibility for the Work or delay and shall bear all costs attributable to correcting any Work requiring correction or to any delay, and such conflict, error, omission, or other discrepancy shall not be the basis for a claim against or any recovery from the Owner.
- d. In case of differences between a small and large scale Drawing, the large scale Drawing shall govern. Where on a Drawing a portion of the Work is drawn out and the remainder is indicated in outline, the parts drawn out shall apply also to all other like portions of the Work.
- e. Where the word “similar” appears on a Drawing, it shall be interpreted in its general sense and not as meaning “identical,” and all details shall be worked out in relation to their location and their connection with other parts of the Work.
- f. Measurements or dimensions shown on the Drawing for Site features, utilities, buildings, structures, or improvements shall be verified at the Site by the Contractor before commencing the Work. The Contractor shall not scale measurements or dimensions from a Drawing. If there are discrepancies among Drawings or the Plans, the Contractor shall notify and request clarification from the A/E before proceeding with the impacted Work. If new Work is to connect to, match with or be provided in existing facilities, buildings, or improvements, the Contractor shall verify the actual existing conditions and necessary dimensions prior to ordering or fabrication of materials or construction.
- g. As-Built Drawings: The Contractor shall maintain at the Site for the Owner one copy of the As-Built Drawings in good order and marked to record all changes as they occur during construction. These shall be available to the A/E, the Owner, the Project Inspector, the Owner’s other inspectors and to the Owner’s testing personnel
- h. Preparation of Record Drawings: Upon completion of the Work and prior to the final inspection, the Contractor shall deliver to the A/E, for preparation of the Record Drawings, one complete set of “As Built” Drawings depicting the Work in its as-built condition at Final Completion.

24. SUBMITTALS AND PROJECT RECORDS

- a. The Contractor shall submit a listing of all Submittals required by the A/E or which the Contractor identifies as necessary, stating the dates for the submission of each Submittal. The listing shall be in a format acceptable to the A/E. The Contractor shall identify all Submittals with the Owner’s

Project Code Number as required by Section 24(e).

- b. Submittals shall be forwarded to the A/E for approval if required by the Specifications or if requested by the A/E or the Owner. No part of the Work dealt with by a Submittal shall be ordered, fabricated or installed by the Contractor, except at its own risk, until the Submittal for that Work has been approved.

Working drawings, Shop Drawings and/or Submittals for fire protection, fire alarm, fire detection and security systems shall be submitted to, and approved by, first the A/E and then the Building Official prior to ordering, fabricating or installing such systems. The Contractor shall be solely responsible for obtaining such approvals. No part of the Work involving such systems shall be ordered, fabricated or installed by the Contractor until such approvals have been obtained.

- c. The Contractor shall furnish to the A/E for approval, the name of the manufacturer, the model number, and other identifying data and information respecting the performance, capacity, nature and rating of the machinery and mechanical and other equipment which the Contractor contemplates incorporating in the Work. When Submittals are required by this Contract for materials, the Contractor shall furnish full information concerning the material or articles which the Contractor intends to incorporate in the Work. When required, samples shall be submitted for approval at the Contractor's expense, with all shipping charges prepaid. Machinery, equipment, material and articles installed or used without required approval shall be at the risk of subsequent rejection.
- d. Unless otherwise indicated or required by the Specifications, Shop Drawings shall be submitted in the form of one reproducible tracing and three blue-line or black-line prints. Catalog cuts, product data and other non-reproducible literature, except certificates, shall be submitted in six (6) copies minimum, of which three (3) will be retained by the A/E and the remainder will be returned to the Contractor. The Contractor shall maintain one copy of all approved Shop Drawings and Submittals in the construction trailer for use by inspectors. If agreed by the Owner, A/E, and Contractor, Submittals may be provided in electronic format in lieu of hardcopy format.
- e. Submittals shall be accompanied by a letter of transmittal which shall list the Project Code Number, the Submittals included, and the date. Submittals shall be complete in every respect and bound in sets. Each Submittal shall be clearly marked to show each item, component and/or optional feature proposed to be incorporated into the Work. Each Submittal shall contain specific references to the sections of the Plans and Specifications to which the item or component that is the subject of the Submittal relates.
- f. The Contractor shall check Submittals for compliance with the requirements of the Contract Documents. The Contractor shall clearly note in writing any and all items which deviate from the requirements of the Contract Documents. Reasons for deviation shall be included with the Submittal. 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.

- g. After checking each Submittal, the Contractor shall stamp each sheet of the Submittal with the Contractor's review stamp. Data submitted in a bound volume or on one sheet printed on two sides, may be stamped on the front of the first sheet only. The Contractor's review stamp shall be worded as follows:

The equipment and material shown and marked in this Submittal is proposed to be incorporated into this Project, is in compliance with the Contract Plans and Specifications unless otherwise shown in bold-face type or lettering and listed on a page or pages captioned "**DEPARTURES FROM PLANS AND SPECIFICATIONS**", and can be installed in the allocated spaces.

Reviewed by _____ Date _____

The person signing the review stamp shall be the person designated in writing by the Contractor as having that authority. The identity of such individual shall be forwarded to the A/E prior to or with the first Submittal. The signature on the review stamp shall be handwritten in ink, or in the case of electronic submittals, electronically signed in accordance with *Code of Virginia* § 59.1-479 *et seq.* Stamped signatures are not acceptable.

- h. The Contractor shall forward all Submittals sufficiently in advance of construction activities and requirements to allow sufficient time for checking, correcting, resubmitting and rechecking each Submittal.
- i. If a Submittal indicates a departure from the Contract Documents, the A/E may reject the Submittal or recommend it to the Owner, who shall approve or reject it as the Owner, in its sole discretion, sees fit. Any departure from the Contract Documents must be authorized by a Change Order if it results in adjustment of the Contract Price or the Contract Completion Date.
- j. The A/E is responsible to the Owner, but not to the Contractor, to verify that the information, equipment and materials depicted in 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 Documents.
- k. The Work shall be in accordance with approved Submittals. Approval of the Contractor's Submittals by the A/E does not relieve the Contractor from responsibility for complying with the Contract Documents.
- l. The Plans and/or Specifications may indicate that the A/E designed or detailed a portion of the Work-around a particular product. Should a different product be proposed by the Contractor and accepted, all modifications, rerouting, relocations and variations required for proper installation and coordination to comply with the design concept and requirements of the Contract Documents shall be the responsibility of the Contractor and shall be made at no extra cost to the Owner. If the plans were noted as designed or detailed around a particular product and/or if a product is named when a "brand name or equal" requirement has been used, other products may be utilized following Section 26 of these General Conditions.
- m. Additional Submittal requirements are shown in the Specifications.
- n. Ownership of all materials and documentation including Shop Drawings, BIM models, copies of any calculations and analyses prepared and other Project-specific details of building components created during the Submittal process shall belong exclusively to the Owner. These materials and documentation, whether completed or not, shall be the property of the Commonwealth of Virginia, whether the Work for which they are made is executed or not. The Contractor shall not use these materials on any other work or release any information about these materials without the express written consent of the Owner.

Such material may be subject to public inspection in accordance with the Virginia Freedom of Information Act. Trade secrets or proprietary information submitted by a bidder, offeror, or contractor in connection with a procurement transaction shall not be subject to disclosure under the Virginia Freedom of Information Act, provided the bidder, offeror, or contractor timely invoked the protections of *Code of Virginia* § 2.2-4342(F).

- o. The Contractor shall maintain comprehensive records of all documentation produced in the performance of the Work and maintain a records management system to provide for document tracking, organization, storage and archiving of such documentation. The Contractor's records management system shall provide for the electronic storage and transmission of Project documents and information through one or more of the following methods: (1) web accessible project management software; (2) electronic files shared utilizing removable electronic media; (3) paper copies of documentation; or (4) in such manner agreed to by the Owner and Contractor. Such records shall be retained by the Contractor for a period of five (5) years following the Final Completion Date. The Contractor shall make the project documentation available to the Owner within five (5) Days of request in an orderly, indexed manner to allow individual documents to be easily located and reviewed. The Contractor shall ensure all documentation is kept current and stored in the records management system in a timely manner.
- p. The Contractor's Project documentation shall include regular construction photographs to show progress of the Work and items that are or may be the subject of Contractor or Subcontractor claims. The photographer shall label each photograph with, at a minimum, the Project name, building name/number, City, State, name of Contractor/Subcontractor(s) whose work is depicted, date and time the photograph was taken, description of weather conditions, subject matter and viewpoint of the photograph, name of the photographer, and the names of any observers.

25. FEES, SERVICES AND FACILITIES

- a. The Contractor shall obtain all permits, except the Building Permit, and pay for all fees and charges necessary for temporary access, public right-of-way blockage or use, temporary connections to utilities, and the use of property (other than the Site) for storage of materials and other purposes, unless otherwise specifically stated in the Contract Documents.
- b. Certain projects such as renovations and interior modifications of existing buildings will usually have water and electric service to the building. In those instances, water and electric power, if required for the Work under the Contract, will be furnished by the Owner subject to reasonable use by the Contractor, but only to the extent and capacity of present services. The Contractor shall be responsible for providing required connections, temporary wiring, piping, etc. to these services in a safe manner and in accordance with applicable codes. All temporary wire, pipe, etc. shall be removed before the Substantial Completion inspection. Acceptance by the Contractor of the use of Owner's water and electricity constitutes a release to the Owner of all claims and of all liability to the Contractor for any damages which may result from the use of such utilities and power and water outages or voltage variations.
- c. The Owner shall pay any connection charges for permanent utility connections directly to the utility Supplier. The Contractor shall coordinate such connections with the utility Supplier.
- d. It is understood that, except as otherwise specifically stated in the Contract Documents, the Contractor, either directly or through its Subcontractors, shall provide and pay for all material, labor, tools, equipment, water, light, power, telephone and other services or facilities of every nature whatsoever necessary to execute completely and deliver the Work before the Contract Completion Date.
- e. The Contractor shall provide all required temporary facilities, including Contractor's office space,

Owner's Project Inspector's office space (if required by the Specifications), sanitary facilities, and storage space, as required for the operations and the protection of the materials and the Work. Number, sizes and locations shall be subject to approval of the Owner. Sanitary facilities shall be plumbed into an approved waste treatment system or shall be an approved type of chemical toilet and shall be regularly serviced.

- f. Use and occupancy of the construction site as the Owner's Project Inspector's office or as a work or meeting space for other than contractor employees prior to receipt of a Certificate of Use and Occupancy is prohibited.

26. EQUALS

- a. **Brand names:** Unless otherwise stated in the Specifications, the identification of a certain brand, make or manufacturer denotes the characteristics, quality, workmanship, economy of operation and suitability for the intended purpose of the article to be supplied, but does not restrict the Contractor to the specific brand, make, or manufacturer indicated. Rather, the information conveys to the Contractor the general style, type, character and quality of the article to be supplied.
- b. **Equal materials, equipment or assemblies:** Whenever in these Contract Documents a particular brand, make of material, device or equipment is shown or specified, such brand, make of material, device or equipment shall be regarded merely as a standard. Any other brand, make or manufacturer of a product, assembly or equipment which in the opinion of the A/E is the equal of that specified, considering quality, capabilities, workmanship, configuration, economy of operation, useful life, compatibility with design of the Work, and suitability for the intended purpose, will be accepted unless rejected by the Owner as not being equal.
- c. **Substitute materials, equipment or assemblies:** The Contractor may propose to substitute a material, product, equipment, or assembly which deviates from the requirements of the Contract Documents but which the Contractor deems will perform the same function and have equal capabilities, service life, economy of operations, and suitability for the intended purpose. The proposal must include any cost differentials proposed. The Owner will have the A/E provide an initial evaluation of such proposed substitutes and provide a recommendation on acceptability and indicate the A/E's redesign fee to incorporate the substitution into the Contract Documents. The Owner shall have the right to limit or reject substitutions at its sole discretion.
- d. The Contractor shall be responsible for making all changes in the Work necessary to adapt and accommodate any equal or substitute product approved for use by Owner. The necessary changes shall be made at the Contractor's expense.

27. AVAILABILITY OF MATERIALS

If a brand name, material, product, or model number included in the Contract Documents is not available on the present market, alternate equal materials, products or model numbers may be proposed by the Contractor through the A/E for approval by the Owner through the process set forth in Section 26.

28. CONTRACTOR'S TITLE TO MATERIALS

No materials or supplies for the Work shall be purchased by the Contractor, or by any Subcontractor or Supplier, subject to any security interest, installment or sales contract or any other agreement or lien by which an interest in the materials or supplies is retained by the seller or is given to a secured party. The Contractor warrants that it has clear and good title to all materials and supplies used in the Work or for which the Contractor accepts payment in whole or in part.

29. STANDARDS FOR MATERIALS INSTALLATION & WORKMANSHIP

- a. Unless otherwise specifically provided in the Contract, all equipment, material, and accessories incorporated in the Work are to be new or Recycled and in first-class condition.
- b. Unless specifically approved by the Owner or required by the Contract, the Contractor shall not incorporate into the Work any materials containing asbestos or any material known by the industry to be hazardous to the health of building construction workers, maintenance workers, or occupants, or harmful to other building components, materials or products. If the Contractor becomes aware that a material required by the Contract contains asbestos or other hazardous or harmful materials, it shall notify the Owner and the A/E immediately and shall take no further steps to acquire or install any such material without first obtaining Owner approval.
- c. All workmanship shall be of the highest quality found in the building industry in every respect. All items of Work shall be done by Persons skilled in the particular task or activity to which they are assigned. In the acceptance or rejection of Work, no allowance will be made for lack of skill on the part of Persons performing the Work. Poor or inferior workmanship (as determined by the A/E, the Owner or other inspecting authorities) shall be removed and replaced at Contractor's expense such that the Work conforms to the highest quality standards of the trades concerned, or otherwise corrected to the satisfaction of the A/E, the Owner, and other inspecting authority, as applicable.
- d. Where materials, supplies or equipment are supplied with the manufacturer's printed instructions, recommendations, or directions for installation, or where such instructions, recommendations, or directions are available, installation of the items shall be in strict accordance with the manufacturer's printed instructions unless those instructions contradict the Plans or Specifications, in which case the Contractor shall notify the A/E of the inconsistency and obtain written guidance from the A/E before proceeding with any Work involving the item.
- e. Where the Specifications or Plans refer to specific codes or standards governing the installation of specified items, installation shall in all cases be in strict accordance with the referenced codes and standards. Where no reference is made to specific codes or standards, installation shall conform to the generally recognized applicable standards for first-class installation of the specific item to be installed. Contractors are expected to be proficient and skilled in their respective trades and knowledgeable of the Codes and Standards of the National Fire Protection Association ("NFPA"), National Electric Code ("NEC"), Occupational Safety and Health Act ("OSHA") and other codes and standards applicable to installations and associated work by trade.
- f. Where the manufacturer's printed instructions are not available for installation of specific items, where specific codes or standards are not referenced to govern the installation of specific items, or where there is uncertainty on the part of the Contractor concerning the installation procedures to be followed or the quality of workmanship to be maintained in the installation of specific items, the Contractor shall consult, in advance, with the A/E for approval of the installation procedures or the specific standards governing the quality of workmanship the Contractor proposes to follow or maintain during the installation of the items in question.
- g. During and/or at the completion of installation of any items, the tests designated in the Plans or Specifications necessary to assure proper and satisfactory functioning for its intended purpose shall be performed by the Contractor or by its Subcontractor responsible for the completed installation. All costs for such testing are to be included in the Contract Price. If required by the Contract Documents, the Contractor shall furnish prior to final inspection the manufacturers' certificates evidencing that products meet or exceed applicable performance, warranty and other requirements, and certificates that products have been properly installed and tested.

30. WARRANTY OF MATERIALS AND WORKMANSHIP

- a. The Contractor warrants that, unless otherwise specified, all materials and equipment incorporated in the Work shall be new or Recycled, in first-class condition, and in accordance with the Contract

Documents. The Contractor further warrants that the Work shall be of the highest quality and in accordance with the Contract Documents and shall be performed by Persons qualified at their respective trades.

- b. Work not conforming to these warranties shall be considered Defective.
- c. This warranty of materials and workmanship is separate and independent from and in addition to any of the Contractor's other guarantees and obligations in the Contract Documents and under Virginia law.

31. USE OF SITE AND REMOVAL OF DEBRIS

- a. The Contractor shall:
 - 1. Perform the Work in such a manner as not to interrupt or interfere with the operation of any existing activity on, or in proximity to, the Site or with the Work of any other separate contractor;
 - 2. Store its apparatus, materials, Supplies and equipment in such orderly fashion at the Site of the Work as will not unduly interfere with the progress of its Work or the work of any other separate contractor; and
 - 3. Place upon the Work or any part thereof only such loads as are consistent with the safety of that portion of the Work.
- b. The Contractor expressly undertakes, either directly or through its Subcontractor(s), to effect all cutting, filling or patching of the Work required to make the same conform to the Plans and Specifications, and, except with the consent of the A/E, not to cut or otherwise alter the work of any other separate contractor. The Contractor shall not damage or endanger any portion of the Work or Site, including existing improvements, unless called for by the Contract.
- c. The Contractor expressly undertakes, either directly or through its Subcontractor(s), to clean up frequently all refuse, rubbish, scrap materials and debris caused by its operations, to ensure that at all times the Site shall present a neat, orderly and workmanlike appearance. No refuse, rubbish, scrap material or debris shall be left within the completed Work nor buried on the Site, but shall be removed from the Site and properly disposed of in a licensed landfill or otherwise as required by law.
- d. The Contractor expressly undertakes, either directly or through its Subcontractor(s), before Final Payment or such prior time as the Owner may require: to remove all surplus material, false Work, temporary structures, including foundations thereof, plants of any description and debris of every nature resulting from its operations and to put the Site in a neat, orderly condition; to thoroughly clean and leave reasonably dust-free all finished surfaces, including all equipment, piping, etc., on the interior of all buildings; and to clean thoroughly all glass installed under the Contract, including the removal of all paint and mortar splatters and other defacements.

If the Contractor fails to clean up as required herein, the Owner may do so and charge the costs incurred thereby to the Contractor in accordance with Section 10 (b).

- e. The Contractor shall have, on-Site, an employee certified by the Department of Environmental Quality as a Responsible Land Disturber who shall be responsible for the installation, inspection and maintenance of erosion control and stormwater management measures and devices. The Contractor shall identify this employee to the Owner and the A/E in writing prior to any land disturbance on Site. The Contractor shall prevent Site soil erosion, the runoff of silt and/or debris carrying water from the Site, and the blowing of debris off the Site in accordance with the applicable requirements and standards of the Contract and the Virginia Department of

Environmental Quality's Erosion and Sediment Control Regulations and the Virginia Stormwater Management Regulations.

32. TEMPORARY ROADS

Temporary roads, if required, shall be established and maintained until permanent roads are accepted, then removed and the area restored to the conditions required by the Contract Documents. Crushed rock, paving and other road materials from temporary roads shall not be left on the Site unless written permission is received from the Owner to bury the same at a location and depth approved by the Owner.

33. SIGNS

The Contractor may, at its option and without cost to the Owner, erect signs acceptable to the Owner on the Site for the purpose of identifying and giving directions to the Project. No signs shall be erected without prior approval of the Owner as to design, content and location.

34. PROTECTION OF PERSONS AND PROPERTY

- a. The Contractor expressly undertakes both directly and through its Subcontractors, to take every reasonable precaution at all times for the protection of all Persons and property at or near the Site or which may be affected by the Contractor's Work.
- b. The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Any violation of safety requirements or duties or any potential safety hazard that is known to the Contractor or which is brought to the attention of the Contractor by the A/E, the Owner, or any other Persons shall be immediately abated.
- c. The provisions of all rules and regulations governing health and safety as adopted by the Safety Codes Commission of the Commonwealth of Virginia, 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.
- d. The Contractor shall continuously maintain adequate protection of all the Work and Site from damage and shall protect the Owner's property from injury or loss arising in connection with the Work. The Contractor shall make good any damage, injury or loss caused by its operations or the Work, except as may be directly and solely due to errors in the Contract Documents or caused by agents or employees of the Owner. The Contractor shall adequately protect adjacent property to prevent any damage to it or loss of use and enjoyment by its owners. The Contractor shall provide and maintain all passageways, guard fences, lights and other facilities for protection of Persons and the Site and the Work as required by public authority, local conditions, or the Contract.
- e. In an emergency affecting the health, safety, or life of Persons, or threatening loss or damage to the Work or adjoining property, the Contractor, without special instruction or authorization from the A/E or the Owner, shall act promptly, at its discretion, to prevent such threatened loss or injury. The Contractor shall carry out any instructions or directives issued by the A/E or Owner, to prevent threatened loss or injury, immediately, without appeal. Any additional compensation or extension of time claimed by the Contractor on account of any emergency actions or measures shall be submitted and determined as provided by Section 38.
- f. When necessary for the proper protection of the Work, temporary heating of a type compatible with the Work must be provided by the Contractor, at the Contractor's expense, unless otherwise specified.

35. CLIMATIC CONDITIONS

The Contractor shall suspend activity on and protect any portion of the Work that may be subject to damage by climatic conditions.

36. PAYMENTS TO CONTRACTOR

- a. Unless otherwise provided in the Contract, the Owner will make partial payments to the Contractor on the basis of a duly certified and approved Schedule of Values and Certificate for Payment (CO-12), showing the estimate of the Work performed during the preceding calendar month or work period, as recommended by the A/E. When evaluating the Contractor's Certificate for Payment, the A/E will consider the value of the Work in place, the value of approved and properly stored materials, the status of the Work in relation to the Contract Completion Date, and the estimated value of the Work remaining to achieve Final Completion. The A/E will schedule a monthly pay meeting to occur no earlier than the 25th day of the month represented by the Certificate for Payment and no later than the 5th day of the following month. The Contractor shall submit its Certificate for Payment so that it is received by the A/E and the Owner's Project Manager at least one work day prior to the date scheduled by the A/E for the monthly pay meeting. The Owner will review the estimate with the A/E and the Contractor at the monthly pay meeting, which shall be considered the receipt date, and may approve to pay any or all of the Certificate for Payment. In preparing estimates, the material delivered to the Site and preparatory Work done shall be taken into consideration, if properly documented as required by Section 20 of these General Conditions, or as may be required by the A/E, so that actual quantities supplied or performed may be verified. Materials or equipment purchased specifically for the Project, but stored off the Site within the Commonwealth of Virginia, may be considered for payment provided all of the following are accomplished prior to the submission of the Certificate for Payment in which payment for such item is requested:
 1. The Contractor must notify the Owner in writing, at least ten (10) Days prior to the submission of Certificate for Payment that specific items will be stored off-Site in a designated, secured place within the Commonwealth of Virginia. The Schedule of Values must be detailed to indicate separately both the value of the material and the labor/installation for trades requesting payment for stored materials. By giving such notification and by requesting payment for material stored off-Site, the Contractor warrants that the storage location is safe and suitable for the type of material stored and that the materials are identified as being the property of the Contractor, and agrees that loss of materials stored off the Site shall not relieve the Contractor of the obligation to timely furnish these materials for the Project and to achieve the Contract Completion Date. If the storage location is more than 20 miles from the Site, the Contractor may be required to reimburse the Owner for the cost incurred for travel to the storage location by Owner and/or the A/E to verify the Contractor's Certificate for Payment for materials stored off-Site. A supplementary agreement, acceptable to Owner, shall be required for payment for materials or equipment stored at a location that is not within the Commonwealth of Virginia.
 2. Contractor's notification and Certificate of Payment regarding stored materials shall:
 - a. Itemize the quantity of such materials and document with invoices showing the cost of said materials;
 - b. Indicate the identification markings used on the materials, which shall clearly reference the materials as for the Project;
 - c. Identify the specific location of the materials, which must be within reasonable proximity to the Site and within the Commonwealth of Virginia;

- d. Include a letter from the Contractor's Surety which confirms that the Surety on the Performance Bond and the Labor and Material Payment Bond has been notified of the request for payment of materials stored off the Site and agrees that the materials are covered by the bonds; and
 - e. Include documentation establishing that the stored materials are covered by all-risk builder's risk insurance in an amount not less than the fair market value of the materials, which insurance shall include the Owner as an additional insured.
 - 3. The A/E shall indicate, in writing, to the Owner that Submittals for materials stored off-Site have been reviewed and meet the requirements of the Contract Documents, that the stored materials meet the requirements of the Plans and Specifications, and that such materials conform to the approved Submittals. Should the A/E deem it necessary to visit the storage site to make such review, the Contractor shall bear the costs incurred therewith
 - 4. The Owner, through the A/E, shall notify the Contractor in writing of its decision whether to pay for materials stored off-Site.
 - 5. The Contractor shall notify the Owner in writing, through the A/E, when the materials are to be transferred to the Site and when the materials are received at the Site.
- b. Payment will not be made for materials or equipment stored on or off the Site which are not scheduled for incorporation into the Work within the six months next following submission of the Certificate for Payment without the prior written consent of the Owner, which consent may be withheld by the Owner if, in the Owner's sole discretion, it is not necessary to procure the materials more than six months in advance of use to assure their availability when needed.
- c. No payment shall be made to the Contractor until:
- 1. The Contractor furnishes to the Owner its Social Security Number (SSN), if an individual, or its Federal Employer Identification Number (FEIN), if a proprietorship, partnership, corporation or other legal entity.
 - 2. Certificates of Insurance and required evidence of compliance by the Contractor with all the requirements of Section 11 and Section 12, if applicable, have been delivered to the Owner.
 - 3. Certificates of Insurance and required evidence of compliance by each Subcontractor with the requirements of Section 11 and Section 12, if applicable, have been delivered to the Owner for payments based on Work performed by a Subcontractor.
 - 4. The Contractor has: (i) submitted a preliminary schedule which is acceptable to the Owner in accordance with Section 19(a); (ii) submitted a fully complete Project schedule accepted by the Owner in accordance with Section 19(a); (iii) submitted all monthly Project reports required by Section 19(d); and (iv) timely provided a recovery schedule pursuant to Section 19(e), if requested by the Owner.
- d. The Owner shall withhold five percent (5%) of each progress payment to the Contractor until the Final Payment, unless otherwise provided by any law, regulation or program of the federal government. Such retainage shall be held to assure faithful performance of the Contract and may also be used as a fund to deduct amounts due to or claimed by the Owner, including, but not limited to, payment to the Owner of all moneys due for deductive change orders, credits, uncorrected Defective Work, interest, damages, and the like. (*Code of Virginia* § 2.2-4333). The Owner may, at its sole discretion, agree on an item by item basis to release the retainage on items which are fully 100% complete and which have been accepted by the Owner as being tested and

complete and on which no further action or work will be required. Retainage which is released by the Owner shall be distributed by the Contractor in conformance with Section 37.

- e. All material and Work for which progress payments are made shall thereupon become the sole property of the Owner, but this provision shall not relieve the Contractor from the sole responsibility for all materials and Work, including those for which payment has been made, or for the restoration of any damaged materials or Defective Work. No payment shall waive any right of the Owner to require Contractor to fulfill all of the terms and conditions of the Contract Documents
- f. The Final Payment, which shall include the retainage, less any amounts due to or claimed by the Owner, shall not become due until the A/E and the Owner agree that Final Completion has been achieved and until the Contractor shall deliver to the Owner through the A/E a Certificate of Completion by the Contractor (CO-13.2) and an Affidavit of Payment of Claims (CO-13), stating that all Subcontractors and Suppliers of either labor or materials have been paid all sums claimed by them for Work performed and materials furnished in connection with this Project less retainage. Amounts due the Owner which may be withheld from the Final Payment may include, but are not limited to, amounts due pursuant to Section 3(i), Section 16(a)-(d), Section 31(d), costs incurred to repair or replace Defective Work, costs incurred as a result of the Contractor's negligent acts or omissions or omissions of those for whom the Contractor is responsible, delay damages under Section 43(h), and any liquidated or actual damages.

If all Subcontractors and Suppliers of labor and materials have not been paid the full amount claimed by them, the Contractor shall list each to which an agreed amount of money is due or which has a claim in dispute. With respect to all such Subcontractors and Suppliers, the Contractor shall provide to the Owner, along with the Affidavit of Payment of Claims (CO-13), an affidavit from each such Subcontractor and Supplier stating the amount of their Subcontract or supply contract, the percentage of completion, the amounts paid to them by the Contractor and the dates of payment, the amount of money still due if any, any interest due the Subcontractor or Supplier, and whether satisfactory arrangements have been made for the payment of said amounts. If no agreement can be reached between the Contractor and one or more Subcontractors or Suppliers as to the amounts owed to the Subcontractors or Suppliers, the Owner may, in its discretion, interplead such portion of the moneys due to the Contractor which is claimed by the Subcontractor or Supplier into a Virginia Court or Federal Court sitting in Virginia, in the manner provided by law. Said interpleader and payment into court shall be deemed a payment to the Contractor. Nothing in this Section shall be construed as creating any obligation or contractual relationship between the Owner and any Subcontractor or Supplier, and the Owner shall not be liable to any Subcontractor or Supplier on account of any failure or delay of the Owner in complying with the terms hereof.

- g. Upon successful completion of the final inspection and all Work required by the Contract, including but not limited to the delivery of Record Drawings, equipment manuals, written warranties, acceptance of the Work by the Owner and the delivery of the affidavits required in Section 36(f), the A/E shall deliver the written Certificate of Completion by the A/E (CO-13.1) to the Owner, with a copy to the Contractor, stating the entire amount of Work performed and compensation earned by the Contractor. The Owner may accept the Work for occupancy or use while asserting claims against the Contractor, disputing the amount of compensation due to the Contractor, disputing the quality of the Work, disputing Final Completion, disputing Contractor's compliance with the Contract Documents, or any other reason.
- h. Unless there is a dispute about the compensation due to the Contractor, Defective Work, quality of the Work, compliance with the Contract Documents, Final Completion, claims by the Owner, other matters in contention between the parties, or unless monies are withheld pursuant to the Comptroller's Debt Setoff Program, within thirty (30) Days after receipt and acceptance of the Certificate for Payment in proper form by the A/E at the monthly pay meeting, the Owner shall pay to the Contractor the amount approved by the A/E, less all prior payments and advances

whatsoever to or for the account of the Contractor. In the case of Final Payment, the completed Affidavit of Payment of Claims (CO-13), the Certificate of Completion by the Contractor (CO-13.2) and the Certificate of Completion by the A/E (CO-13.1) shall accompany the final Certificate for Payment which is forwarded to the Owner for payment. The date on which payment is due shall be referred to as the Payment Date. Payment shall be mailed on or before the Payment Date for amounts and Work not in dispute, subject to any set offs claimed by the Owner; provided, however in instances where further appropriations are required by the General Assembly or where the issuance of further bonds is required, in which case, payment shall be made within thirty (30) Days after the effective date of such appropriation or within thirty (30) Days after the receipt of bond proceeds by the Owner. All prior estimates and payments, including those relating to extra Work, may be corrected and adjusted in any payment and shall be corrected and adjusted in the Final Payment. In the event that any Certificate for Payment contains a defect or impropriety, the Owner shall notify the Contractor of any defect or impropriety which would prevent payment by the Payment Date within five (5) Days after receipt of the Certificate for Payment by the Owner from the A/E.

- i. Interest shall accrue on all amounts owed by the Owner to the Contractor which remain unpaid seven (7) Days following the Payment Date. Said interest shall accrue at the discounted ninety-day U.S. Treasury bill rate as established by the Weekly Auction and as reported in the publication entitled The Wall Street Journal on the weekday following each such Weekly Auction. During the period of time when the amounts due to the Contractor remain unpaid following the seventh (7) Day after the Payment Date, the interest accruing shall fluctuate on a weekly basis and shall be that established by the immediately prior Weekly Auction. It shall be the responsibility of the Contractor to gather and substantiate the applicable weekly interest rates to the satisfaction of the Owner and to calculate to the satisfaction of the Owner the interest due. In no event shall the rate of interest charge exceed the rate of interest charged pursuant to *Code of Virginia* § 58.1-1812. No interest shall accrue on retainage or when payment is delayed because of a dispute or disagreement between the Owner and the Contractor regarding the quantity, quality or timeliness of the Work, including, but not limited to, compliance with Contract Documents or the accuracy of any Certificate for Payment. This exception to the accrual of interest stated in the preceding sentence shall apply only to that portion of a payment which is withheld and shall apply only for the duration of the dispute. Nothing contained herein shall be interpreted to prevent the withholding of retainage to assure faithful performance of the Contract. These same provisions relating to payment of interest to the Contractor shall apply also to the computation and accrual of interest on any amounts due from the Contractor to the Owner for deductive change orders and to amounts due on any claims by the Owner. The date of mailing of any payment by the U.S. Mail is deemed to be the date of payment to the addressee. No interest penalty shall be paid to any debtor on any payment, or portion thereof, withheld pursuant to the Comptroller's Debt Setoff Program, as authorized by the Virginia Debt Collection Act (§ [2.2-4800](#) *et seq.*), commencing with the date the payment is withheld. If, as a result of an error, a payment or portion thereof is withheld, and it is determined that at the time of setoff no debt was owed to the Commonwealth, then interest shall accrue at the rate specified above on amounts withheld that remain unpaid after seven Days following the Payment Date.
- j. The acceptance by the Contractor of the Final Payment shall be and operate as a release to the Owner of all claims by the Contractor, its Subcontractors and Suppliers, and of all liability to the Contractor whatever, including liability for all things done or furnished in connection with the Work, except for things done or furnished which are the subject of unresolved claims for which the Contractor has filed a timely written Notice of intent and all other Notices and documentation required by the Contract Documents and provided a claim is submitted no later than sixty (60) Days after Final Payment. Acceptance of any interest paid by the Contractor shall be a release of the Owner from claims by the Contractor for late payment.
- k. No Certificate for Payment authorized by the A/E, and no payment, final or otherwise, no certificate of completion, nor partial or entire use or occupancy of the Work by the Owner, shall be an acceptance of any Work or materials not in accordance with the Contract, nor shall the same

relieve the Contractor of responsibility for nonconforming materials or Defective Work, or operate to release the Contractor or its Surety from any obligation under the Contract, the Standard Performance Bond and the Standard Labor and Material Payment Bond.

37. PAYMENTS BY CONTRACTOR (*Code of Virginia*, § 2.2-4354)

Under *Code of Virginia* § 2.2-4354, the Contractor is obligated to:

- a. Within seven (7) Days after receipt of amounts paid to the Contractor by the Owner for Work performed by the Subcontractor or Supplier under this Contract, the Contractor shall:
 1. Pay the Subcontractor or Supplier for the proportionate share of the total payment received from the Owner attributable to the Work performed by the Subcontractor or the materials furnished by the Supplier under this Contract; or
 2. Notify the Owner and the Subcontractor or Supplier, in writing, of the Contractor's intention to withhold all or a part of the Subcontractor or Supplier's payment with the reason for nonpayment.
- b. The Contractor shall pay interest to its Subcontractor or Supplier on all amounts owed by the Contractor that remain unpaid after seven (7) Days following receipt by the Contractor of payment from the Owner for Work performed by the Subcontractor or materials furnished by the Supplier, except for amounts withheld as allowed under subsection (a) (2) of this Section. Unless otherwise provided under the terms of this contract, interest shall accrue at the rate of one percent per month.
- c. The Contractor shall include in each subcontract a provision requiring the Subcontractor to include in each of its subcontracts a provision requiring each of its subcontractors to include or otherwise be subject to the same payment and interest requirements with respect to each lower-tier subcontractor. Each Subcontractor shall include with its invoice to, or request for payment from, the Contractor, a certification that that Subcontractor has paid each of its suppliers and lower-tier subcontractors their proportionate share of previous payments received from the Contractor attributable to the Work performed or the materials furnished by it under this Contract.

The Contractor's obligation to pay interest to the Subcontractor or Supplier pursuant to subsection (b) of this Section is not an obligation of the Owner. A modification to this Contract shall not be made for the purpose of providing reimbursement for such interest charge. A Contractor's cost reimbursement claim shall not include any amount for reimbursement of any interest charge.

38. CHANGES IN THE WORK

- a. The Owner may at any time, by written order utilizing the Change Order (CO-11) and without Notice to the sureties, make changes in the Work which are within the general scope of the Contract, except that no change will be made which alone will increase the total Contract Price to an amount more than twenty percent (20%) in excess of the original Contract Price without Notice to sureties. At the time of the Preconstruction Meeting described in Section 50(b), the Contractor and the Owner shall advise each other in writing of their designees authorized to accept and/or approve Change Orders and of any limits to each designee's authority. Should any designee change or the limits of their authority change, the party initiating such change in designee or authority shall give written Notice to the other Party and the A/E within seven (7) Days. The Contractor agrees and understands that the authority of the Owner's designee is limited by *Code of Virginia*, § 2.2-4309 and any other applicable statute.

Change Orders shall be effective when signed by both parties, unless Governor approval (or by his or her designee) is required, in which event the Change Order shall be effective when signed by the Governor or his or her designee.

In any Change Order adjusting the Contract Price, the increase or decrease in the Contract Price shall be determined by one of the following methods as selected by the Owner:

1. **Fixed Price:** By a mutually agreed fixed amount adjustment to the Contract Price. The Change Order shall be substantiated by documentation from the Contractor itemizing the estimated quantities and costs of all labor, materials, and equipment required as well as any mark-up used. Any increase in the Contract Price shall include the Contractor's reasonable overhead and profit, including overhead for any unreasonable delay arising from or related to the Change Order and/or the change in the Work. See Subsections (d), (e) and (f), below.
2. **Unit Price:** By using unit prices and calculating the number of net units of Work in each part of the Work which is changed, either as the Work progresses or before Work on the change commences, and by then multiplying the calculated number of units by the applicable unit price set forth in the Contract or multiplying by a mutually agreed unit price if none was provided in the Contract. No additional percentage markup for overhead or profit shall be added to the unit prices.
3. **Cost Reimbursement:** The Owner may require the Contractor to perform change in the Work on a cost-reimbursement basis by issuing two Change Orders citing this Subsection: (a) an initiating Change Order, authorizing the changed Work; and (b) a confirming Change Order approving any adjustment in the Contract Price or the Contract Completion Date as a result of the change in the Work. The initiating Change Order shall:
 - a. Describe the scope or parameters of the change in the Work;
 - b. Describe the cost items to be itemized and verified for payment and the method of measuring the quantity of work performed;
 - c. Address the impact on the Critical Path and any adjustment to the Contract Completion Date;
 - d. Order the Contractor to proceed with the change to the Work;
 - e. Order the Contractor to keep in a form acceptable to the Owner, an accurate, itemized account of the actual cost of the change in the Work, including, but not limited to, the actual costs of labor, materials, equipment, and supplies;
 - f. Order the Contractor to annotate a copy of the Project schedule to accurately show the status of the Work at the time the initiating Change Order is issued, to show the start and finish dates of the changed Work, and the status of the Work when the changed Work is completed; and
 - g. State that a confirming Change Order will be issued to reflect any increase or decrease to the Contract Price and any change in the Contract Completion Date directly resulting from the change in the Work.

The Contractor shall sign the initiating Change Order acknowledging it will proceed with the change in the Work. The Contractor's signature on an initiating Change Order citing this Subsection 38(a)(3) shall not constitute the Contractor's agreement on the cost or time impact of the change in the Work.

Except as otherwise may be agreed to in writing by the Owner, costs incurred due to a change in the Work pursuant to this subsection 38(a)(3) shall not exceed those prevailing for the trades or crafts (based upon rates established by the U.S. Department of Labor,

Bureau of Labor Statistics, or other generally recognized cost data publication), materials, and equipment in the locality of the Project, may include only those items listed as allowable in Subsection 38(e), and shall not include any of the costs listed as not allowable in Subsection 38(f). The Owner shall be permitted, on a daily basis, to verify the Contractor's cost records and may require such additional records as are necessary to determine the cost of the change to the Work.

Within fourteen (14) Days after the completion of the change in the Work, the Contractor and the Owner shall review and reconcile all cost records and schedule information regarding the change in the Work. The parties shall prepare a confirming Change Order addressing: (i) any change in the Contract Price resulting from the change in the Work, based on the records kept and the Contractor's allowance for overhead and profit determined in accordance with the provisions set forth in Subsections 38(d), (e), and (f) below; and (ii) any change in the Contract Completion Date as a result of the change in the Work's impact on the Critical Path. If agreement on the confirming Change Order is not reached within the fourteen (14) Day period following completion of the change in the Work, the Contractor may submit a claim for the disputed cost or time as provided for in Section 47.

4. The Owner may issue a unilateral Change Order for any change in the Work stating the change in the Contract Price and/or change in the Contract Completion Date deemed appropriate by the Owner for the Work. If the Contractor objects to adjustments reflected in the unilateral Change Order, the Contractor may submit a claim for the disputed costs or time as provided for in Section 47.
- b. The Contractor shall review any Owner proposed change in the Work and shall respond in writing within fourteen (14) calendar Days after receipt of the proposed change (or such other reasonable time as the Owner may direct), stating the effect of the proposed change upon its Work, including any increase or decrease in the Contract Price or Contract Completion Date that the Contractor requests as a result of the proposed change. The Contractor shall furnish to the Owner an itemized breakdown of the quantities and prices used in computing the proposed change in Contract Price. Any change in the Contract Completion Date shall be justified as set forth in Subsection 38(g).

The Owner shall review the Contractor's proposal and respond to the Contractor within thirty (30) days of receipt. If a change to the Contract Price and Contract Completion Date are agreed upon, both parties shall sign the Change Order. If a revised Contract Price and/or Contract Completion Date are not agreed upon, the Owner may direct the Contractor to proceed pursuant to Subsections 38(a)(3) or 38(a)(4).

- c. In figuring changes, any instructions for measurement of quantities set forth in the Contract shall be followed.
- d. Overhead and profit for both additive and deductive changes in the Work (other than changes covered by unit prices) shall be paid by applying the specified percentage markups only on the net cost of the changed Work (i.e. difference in cost between original and changed Work excluding overhead and profit). Said percentages for overhead and profit shall reasonably approximate the Contractor's overhead and profit, but shall not exceed the percentages for each category listed below:
 1. If a Subcontractor does all or part of the changed Work, the Subcontractor's mark-up for overhead and profit on the Work it performs shall be a maximum of fifteen percent (15%). The Contractor's mark-up for overhead and profit on the Subcontractor's price shall be a maximum of ten percent (10%).
 2. If the Contractor does all or part of the changed Work, its markup for overhead and profit on the changed Work it performs shall be a maximum of fifteen percent (15%).

3. If a Sub-subcontractor at any tier does all or part of the changed Work, the Sub-subcontractor's markup on that Work shall be a maximum of fifteen percent (15%). The markup for overhead and profit on a Sub-subcontractor's Work by the Contractor and all intervening tiers of Subcontractors shall not exceed a total of ten percent (10%).
 4. Where Work is deleted from the Contract prior to commencement of that Work without substitution of other similar Work, one hundred percent (100%) of the Contract Price attributable to that Work shall be deducted from the Contract Price. However, in the event that equipment, product or material Submittals have been approved and orders placed for said equipment, products or materials, a lesser amount, but in no case less than eighty percent (80%) of the Contract Price attributable to that Work, shall be deducted from the Contract Price. The credit to the Owner for reduced premiums on Standard Labor and Material Payment Bonds and Standard Performance Bonds shall in all cases be one hundred percent (100%).
- e. Allowable costs for changes in the Work may include but are not limited to the following:
1. 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 Owner.
 2. Materials incorporated into the change to the Work, including costs of transportation and storage, if applicable. If applicable, all cash discounts shall accrue to the Contractor, unless the Owner deposits funds with the Contractor to make such payments. All trade discounts, rebates, refunds, and returns from the sale of surplus materials shall accrue to the Owner.
 3. Equipment incorporated in the changed Work or equipment used directly in accomplishing the Work. If rented expressly for accomplishing the change in the Work, the cost shall be the rental rate according to the terms of the rental agreement, which the Owner shall have the right to approve. 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. If applicable, transportation costs may be included.
 4. 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 Owner'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. The cost of the increase in premium shall be an allowable cost but shall not be marked up.
 5. Contractor and Subcontractor overhead costs as set forth in Subsection (d) markups above.
 6. **Agreed Compensation for Overhead for Changes to Time for Completion or Contract Completion Date for Changes to the Work:** If the change in the Work also changes the Contract Completion Date by adding Days to complete the Work, an itemized accounting of the following direct Site overhead and home office overhead and other indirect overhead expenses set forth in subparagraphs (a) and (b) below may be considered as allowable costs for compensation in addition to those shown above:
 - a. **Direct Site Overhead Expenses:** The Contractor's per diem expenses, as shown by the itemized accounting, for the following allowable direct Site overhead expenses: The Site superintendent's pro-rata salary, temporary Site office trailer, and temporary Site utilities including basic telephone service,

electricity, heat, water, and sanitary / toilet facilities for each Day added. All other direct expenses are covered by and included in the Subsection 38(d) markups above.

- b. **Home Office and Other Indirect Overhead Expenses:** A five percent (5%) markup on the above direct Site overhead expenses will be allowed as compensation for the Contractor's home office overhead and all other direct or indirect overhead expenses for Days added to the Time for Completion or the Contract Completion Date for a change in the Work. All other overhead and other direct or indirect overhead expenses are covered by and included in this markup and the Subsection (d) markups above.

No direct Site, home office, or other indirect overhead shall be paid if the changed Work is done on a unit price basis unless the Contractor can demonstrate that the unit price does not include direct and indirect overhead costs.

7. Any other costs directly attributable to the change in the Work with the exception of those set forth in Subsection 38(f) below.

- f. Allowable costs for changes in the Work shall not include the following:

1. Costs due to the negligence of the Contractor, any Subcontractor, Supplier, their employees, or other persons for whom the Contractor is responsible, including, but not limited to, costs for the 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.
2. Home office expenses including payroll costs for the Contractor's officers, executives, administrators, accountants, counsel, timekeepers, 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 Subsections 38(d) above.
3. Home and field office expenses not itemized in Subsection 38(e) (6) above. Such items include, but are not limited to, expenses of Contractor's 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.
4. Other items reasonably determined by the Owner to not be allowed.

- g. All Change Orders, except initiating Change Orders authorizing work pursuant to Subsection 38(a)(3) procedures, must state that the Contract Completion Date is not changed or is either increased or decreased by a specific number of Days. The old Time for Completion and, if changed, the new Time for Completion also must be stated.

If the Contractor requests an extension to the Contract Completion Date, it must provide written justification for the extension to the A/E and to the Owner. No extension to the Contract Completion Date shall be allowed unless, and then only to the extent that, the additional or changed Work increases the length of the Critical Path beyond the Contract Completion Date. Extensions to the Contract Completion Date will be granted only when an excusable delay exceeds the Total Float in the activity or path of activities affected by the Change Order. If approved, the increase in time required to complete the Work shall be added to the Contract Completion Date.

The Owner may decrease, by Change Order, the Contract Completion Date when an Owner-requested deletion from the Work results in a decrease in the actual time required to achieve

Substantial Completion of the Work. The Contractor may submit a request for an earlier Contract Completion Date under the procedures and subject to the considerations set forth in Section 19(f). No request for an earlier Contract Completion Date shall be considered for approval unless the proposed shorter schedule is otherwise acceptable under Sections 19(b) or (c), whichever is applicable.

With the exception of Change Orders under Subsection 38(a) (3), which shall arrive at a change to the Contract Price and Contract Completion Date using the procedures set forth therein, each Change Order shall include all time and monetary impacts of the change, whether the Change Order is considered alone or with all other changes during the course of the Project. Change Orders issued without a change to the Contract Completion Date and/or Contract Price conclusively establish that the change in the Work reflected by that Change Order had no impact on the Contract Price and/or Contract Completion Date. The parties may mutually agree in writing to postpone a determination of the time-related impacts of a change in the Work for a period of not more than forty-five (45) Days following completion of the change in the Work to give the Contractor an opportunity to submit documentation substantiating any requested change in the Contract Completion Date or Contract Price. During any such postponement, all Work shall proceed, unless the Owner agrees otherwise. The Contractor's failure to submit all required substantiating documentation during a forty-five (45) Day postponement shall conclusively establish that the change in the Work did not impact nor require an adjustment of the Contract Price and Contract Completion Date.

If at any time there is a delay in the Critical Path of the Work due to a postponement, the Contractor's efforts to justify an extension of the Contract Completion Date or an increase in the Contract Price, or the Contractor's refusal to proceed with any of the Work, such delay and any Contractor costs resulting from it shall not serve as the basis for the extension of the Contract Completion Date or for an increase in the Contract Price.

- h. The acceptance by the Contractor of any payment made by the Owner under a Change Order shall be and operate as a release to the Owner of all demands and claims by the Contractor to additional compensation or an adjustment of the Contract Price or Contract Completion Date for all things done or furnished in connection with the Work described in the Change Order. The execution of any Change Order by the Owner 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, Defective Work or poor workmanship or operate to release the Contractor or its surety from any obligation arising under the Contract, the Standard Performance Bond, or the Standard Labor and Material Payment Bond.
- i. Payments will not be made for any Work, labor, or materials performed on a unit price or a Subsection 38(a)(3) basis until the Contractor has furnished the Owner documents, certified as true and correct by an authorized officer or agent of the Contractor, evidencing the cost of such Work, labor, and materials. The Owner may require any or all of the following documentation to be provided by the Contractor.

For Work performed on a Unit Price basis:

- 1. Certified measurements of authorized and approved excavations, over-excavations, fills and/or backfills, and similar work; and/or
- 2. Certified measurements of piling installed, caissons installed, and similar work; and/or
- 3. Daily records of waste materials removed from the Site and/or fill materials imported to the Site.
- 4. Other measurements as appropriate to establish the actual quantities of work being performed on a Unit Price basis.

For Work performed on a Subsection 38(a)(3) basis:

1. Certified payroll records showing the name, classification, date, daily hours, total hours, rate, and extension for each laborer, foreman, supervisor, or other worker;
2. Equipment type & model, dates, daily hours, total hours, rental rate, or other specified rate and extension for each unit of equipment;
3. Invoices for materials showing quantities, prices, and extensions;
4. Daily records of waste materials removed from the Site and/or fill materials imported to the Site;
5. Certified measurements of over-excavations, piling installed and similar work;
6. Transportation records for materials, including prices, loads, and extensions.

Requests for payment shall be accompanied and supported by invoices for all materials used and for all transportation charges claimed. If materials come from the Contractor's own stock, then an affidavit may be furnished, in lieu of invoices, certifying quantities, prices, etc. to support the actual cost.

39. EXTRAS

If the Contractor claims that any instructions given to him by the A/E or by the Owner, by drawings or otherwise, require extra work outside the scope of the Contract, then, except in emergencies endangering life or property, he shall give the A/E and the Owner written Notice thereof before proceeding to execute the extra work. Said Notice shall be given promptly enough to avoid delaying the Work and in no instance later than fourteen (14) Days after the receipt of such instructions. If it is not immediately clear to the Contractor that a request or instruction involves extra Work outside the scope of the Contract, then written Notice shall be sufficient if it's given as soon as possible after Contractor's realization that a request or instruction involves extra Work, but in no event later than fourteen (14) Days after the start of such extra Work. If the Owner agrees, a Change Order shall be issued as provided in Section 38 for the extra work and any additional compensation shall be determined by one of the methods provided in Subsection 38(a), as selected by the Owner. If the Owner does not agree, then the Contractor may submit a claim for the disputed cost or time as provided for in Section 47. No claim for additional compensation for extra work will be considered unless the Contractor timely has provided the required Notice.

40. CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE THE CONTRACT

If the Work should be stopped under an order of any court or other public authority for a period of ninety (90) Days through no fault of the Contractor or anyone employed by it, or if the Owner should fail to pay to the Contractor within thirty (30) Days any sum certified by the A/E when no dispute exists as to the sum due or any requirement of the Contract, then the Contractor may, upon ten (10) Days written Notice to the Owner and the A/E, stop Work or terminate the Contract and recover from the Owner payment for the cost of the Work actually performed, together with overhead and profit thereon, but profit on the Work performed shall be recovered only to the extent that the Contractor can demonstrate that it would have had profit on the entire Contract if it had completed the Work. The Contractor may not receive profit or any other type of compensation for parts of the Work not performed. The Contractor may recover the reasonable cost of physically closing down the Site, but no other costs of termination. The Owner may offset any claims it may have against the Contractor against the amounts due to the Contractor. In no event shall termination of the Contract by the Contractor terminate the obligations of the Contractor's surety on its payment and performance bonds.

41. OWNER'S RIGHT TO TERMINATE THE CONTRACT FOR CAUSE

- a. If the Contractor should be adjudged as bankrupt, or if it should make a general assignment for the benefit of its creditors, or if a receiver should be appointed on account of its insolvency, the Owner may terminate the Contract. If the Contractor should refuse or should repeatedly fail, except in cases for which extension of time is provided, to supply enough properly skilled tradespeople or laborers or proper materials and equipment, or if it should fail to perform the Work in a diligent, efficient, workmanlike, skillful, or careful manner, or if it should fail or refuse to perform the Work in accordance with the Contract Documents, or if it should fail to make prompt payment to Subcontractors or Suppliers of material or labor, or if it should disregard laws, ordinances, building codes or the written instructions of the A/E or the Owner, or otherwise be in substantial, willful or repeated violation of any provision of the Contract, then the Owner may terminate the Contract.
- b. Prior to termination of the Contract, the Owner shall give the Contractor and its surety ten (10) Days' Notice of such termination and allow ten (10) Days during which the Contractor and/or its surety may rectify the basis for the Notice. If rectified to the satisfaction of the Owner within said ten (10) Days, the Owner may rescind its notice of termination. If the basis for the termination is not rectified within said ten (10) Days, the termination for cause shall become effective at the end of the ten (10) Day period without further Notice to the Contractor. At any time, the Owner may, in writing, postpone the effective date of the termination for cause, at its sole discretion, if it should receive reassurances from the Contractor and/or its surety that the basis for the termination will be remedied in a time and manner which the Owner finds acceptable. If at any time after such a postponement, the Owner determines that Contractor and/or its surety has not or is not likely to rectify the causes of termination in an acceptable manner or to do so within the time allowed, then the Owner may immediately terminate the Contract for cause, without the necessity of further ten (10) Day Notice, by notifying the Contractor and its surety in writing of the termination. In no event shall termination for cause terminate the obligations of the Contractor's surety on its payment and performance bonds.
- c. Upon termination of the Contract becoming effective, the Owner shall take possession of the Site and of all materials, tools and equipment thereon and shall proceed as follows:
 1. **No Security or Bonds Provided:** If no security has been required pursuant to Section 8, the Owner shall finish the Work by whatever method the Owner deems reasonable or expedient. If the expense of finishing the Work, including compensation for additional managerial and administrative services, shall exceed the unpaid balance of the Contract Price, the Contractor shall pay the difference to the Owner, together with any other expenses of terminating the Contract and having it completed by others.
 2. **Security or Bonds Provided:** If security has been required and provided pursuant to Section 8 herein, the Owner shall provide Notice to the Surety that termination of the Contract became effective and proceed as set forth in the Standard Performance Bond (CO-10), and the Terms and Conditions therein. If the expense of finishing the Work, including compensation for additional managerial and administrative services, shall exceed the unpaid balance of the Contract Price and all amounts due under the Standard Performance Bond, the Contractor shall pay the difference to the Owner, together with any other expenses of terminating the Contract and having it completed by others.
- d. If it should be judicially determined that the Owner improperly terminated this Contract for cause, then the termination shall be deemed to be a termination for the convenience of the Owner and the Contractor's rights and remedies shall be solely limited to those provided by Section 42 of these General Conditions.
- e. Termination of the Contract for cause is in addition to and without prejudice to any other right or remedy of the Owner. Any actions by the Owner permitted herein shall not be deemed a waiver of

any other right or remedy of the Owner under the Contract or under the law. The Owner may offset any claims it may have against the Contractor against the amounts due to the Contractor. The provisions of this Section shall survive termination of the Contract.

- f. The provisions of Sections 3(j), 9(e), 14, 30 and 45 also shall survive termination of the Contract for cause.

42. TERMINATION BY OWNER FOR CONVENIENCE

- a. The Owner may terminate this Contract, in whole or in part, at any time without cause upon giving the Contractor written Notice of such termination. Upon Notice of termination for convenience, the Contractor shall immediately cease Work and remove from the Site all of its labor forces, equipment and such of its materials as Owner elects not to purchase or to assume in the manner hereinafter provided. The Contractor also shall take such steps as Owner may require to assign to the Owner the Contractor's interest in all Subcontracts and purchase orders designated by Owner. After all such steps have been taken to Owner's satisfaction, the Contractor shall receive as full compensation the following:
 - 1. Amounts due for Work performed in accordance with the Contract subsequent to the latest approved Schedule of Values and Certificate for Payment (CO-12) through the date of termination; and
 - 2. All amounts due under Contract for Work completed prior to the date of termination; and
 - 3. Reasonable compensation for the actual cost of demobilization incurred by the Contractor as a direct result of termination for convenience, plus overhead not to exceed 15 percent (15%) of the direct costs of demobilization.

The Contractor agrees it shall not be entitled to any additional compensation, including but not limited to loss of revenue, income, profit, business, reputation, or bonding capacity, consequential damages or lost profits, but shall only receive payment upon termination for convenience as stated in this Subsection 42(a). The Owner may offset any claims it may have against the Contractor against the amounts due to the Contractor. Upon payment of the amounts stated in this Subsection 42(a), Owner shall have no further obligations to Contractor of any nature.

- b. In no event shall termination for the convenience of the Owner terminate the obligations of the Contractor's surety on the payment and performance bonds. The provisions of Sections 3(j), 9(e), 14, 30 and 45 also shall survive termination of the Contract for convenience.
- c. Any actions by the Owner permitted herein shall not be deemed a waiver of any other right or remedy of the Owner under the Contract or under the law. The provisions of this Section shall survive termination of the Contract.

43. DAMAGES FOR DELAYS; EXTENSION OF TIME

- a. **Excusable Non-Compensable Delays:** If the Critical Path is delayed by strikes, fires, unusual delays in transportation, unavoidable casualties, or other causes outside the control of the Owner and the Contractor, with the exception of delays caused by weather which are addressed in Section 6, and the Contractor seeks an extension of the Contract Completion Date, then the Contractor shall give the Owner and A/E written Notice of the delay not later than fourteen (14) Days following the inception of the delay. The Contractor shall give written Notice to the Owner and A/E of the termination of the delay event not later than fourteen (14) Days after the delay has ceased. Within twenty (20) Days after the delay event has ceased, Contractor shall submit to the Owner and the A/E, the Contractors' written request for an extension of the Contract Completion Date, specifically stating the cause of the delay, the number of days of extension requested, and an analysis of the delay event's impact on the Critical Path. If the Owner agrees that the Critical Path

has been impacted by the delay event, the Owner shall extend the Contract Completion Date for the length of time that the Critical Path was delayed. The Contractor shall not be charged with liquidated or actual damages for such period of Critical Path delay nor shall the Contractor be due compensation or damages of any kind, under any theory of law, as a result of such Critical Path delay, the impact of such delay, or its acceleration of Work as a result of such delay.

- b. **Excusable Compensable Delays:** If the Critical Path unreasonably is delayed by acts or omissions of the Owner, or its agents, contractors, or employees due to causes within the Owner's control, and the Contractor seeks an extension of the Contract Completion Date and/or additional compensation due to the unreasonable delay, then the Contractor shall notify the Owner and the A/E immediately at the time of the occurrence giving rise to the delay by the fastest means available. The Contractor also shall give written Notice to the Owner and A/E no later than two (2) business days after inception of the delay. The Contractor's written Notice shall specify the nature of the delay claimed by the Contractor, the cause of the delay, and the impact of the delay on the Critical Path. The Owner shall have three (3) business days to respond to the Contractor's Notice with a resolution, remedy, direction to alleviate the delay, or rejection of the Contractor's requested relief. The Owner's failure to respond within the time required shall be deemed to be a denial of the Contractor's entitlement to an extension of the Contract Completion Date and additional compensation. The Contractor shall also give written Notice to the Owner and A/E of the termination of the delay event not later than fourteen (14) Days after the delay has ceased. Within twenty (20) Days after the delay event has ceased, Contractor shall submit to the Owner and the A/E, the Contractor's written request for an extension of the Contract Completion Date, specifically stating the cause of the delay, the number of days of extension requested, a calculation of the additional compensation sought, and an analysis of the delay event's impact on the Critical Path. Requests for additional compensation must be substantiated by itemized data and records demonstrating that the costs incurred by the Contractor are directly attributable to the delay and shall be calculated from the Contract Completion Date, not using any early completion planned or scheduled by the Contractor unless a Change Order has been executed pursuant to Section 19(f) changing the Contract Completion Date to reflect such early completion. If and to the extent that a delay is caused by or due to the Owner or A/E taking any actions permitted or required by the Contract, the Contractor shall be entitled to an extension of the Contract Completion Date or additional compensation only for the portion of the delay that is unreasonable, if any.
- c. **Non-Excusable Non-Compensable Delays:** The Contractor shall not be entitled to an extension of the Contract Completion Date or to any additional compensation if and to the extent a delay is: (1) caused by acts, omissions, fault, or negligence of the Contractor or its Subcontractors, agents or employees; (2) arises from foreseeable causes within the control of the Contractor or its Subcontractors, agents or employees, including, but not limited to, Defective Work, poor workmanship, improper or inferior materials, Defective Work which must be corrected before dependent work can proceed, Defective Work for which corrective action must be determined before like work can proceed, from incomplete, incorrect, or unacceptable Submittals or samples, or the failure to furnish enough or properly skilled workers, proper materials or necessary equipment to perform the work in a timely manner in accordance with the Project schedule; or (3) due to causes that would entitle the Owner to recover delay costs or other damages from Contractor.
- d. No extension of time or additional compensation will be allowed unless the Contractor demonstrates that the delay directly impacted the Critical Path of the most current approved Project schedule and that all Float has been consumed. No extension of time or additional compensation will be allowed if the Contractor failed to provide all Notice and information in the manner and within the time periods set forth in Subsections 43(a) or (b) above, whichever applies. Failure to timely provide all required information and Notices shall preclude an extension of the Contract Completion Date or payment of additional compensation based upon that cause.
- e. If the Contractor makes a claim against the Owner for costs or damages, the Contractor shall be liable to and shall pay to the Owner that percentage of all costs incurred by the Owner in

investigating, analyzing, negotiating, and litigating or arbitrating that percentage of the claim which is determined through litigation or arbitration to be false or to have no basis in law or in fact. (*Code of Virginia*, § 2.2-4335).

- f. Any change in the Time for Completion or Contract Completion Date shall be accomplished only by issuance of a Change Order.
- g. **Agreed Compensation/Liquidated Damages for Contractor Delay:** If liquidated damages are not established in the Supplemental General Conditions, the Contractor shall be liable for any and all actual damages sustained by Owner as a result of a delay for which Contractor is responsible. In addition to damages for delay, whether liquidated or actual, the Contractor shall also be liable for any and all actual damages sustained by the Owner as a result of any other breach of the Contract, including, but not limited to, Defective Work or abandonment of the Contract.

44. INSPECTION FOR SUBSTANTIAL COMPLETION & FINAL COMPLETION

- a. The Contractor shall advise the Owner using the Certificate of Partial or Substantial Completion by the Contractor (CO-13.2a) of the date when the Work or designated portion thereof will be substantially complete and ready for inspection and testing by Owner to determine if Substantial Completion has been achieved. Contractor shall deliver Form CO-13.2a to the A/E at least ten (10) Days in advance of the date identified on the Form CO-13.2a. The A/E shall then attach his or her written endorsement as to whether the Work will be ready for inspection and testing on the date identified on the Form CO-13.2a. The A/E's endorsement is a convenience to the Owner only and shall not relieve the Contractor of its responsibility nor shall the A/E's endorsement be deemed to evidence or establish that the Work was substantially complete or ready for inspection and testing. Inspection and testing shall take place at a time(s) mutually agreeable to the Contractor, Owner, A/E, and Building Official.

The inspection shall include a demonstration by the Contractor that all equipment, systems and operable components of the Project function properly and in accordance with the Contract Documents. The Contractor shall furnish access for the inspection and testing as provided in Section 21 of these General Conditions. The inspection and testing shall determine whether Substantial Completion has been accomplished and shall result in a written list of unfinished Work and Defective Work, commonly referred to as a "punch list", which must be completed and corrected prior to Final Completion.

If, after successful completion of all testing, the Architect/ Engineer determines that the Work, either in whole or in part, has achieved Substantial Completion, the A/E shall notify the Owner of such, in writing, using the Certificate of Partial or Substantial Completion by the A/E (CO-13.1a).

The Owner shall notify the Contractor, in writing, of the date the Owner accepts the Work, or the specified portion thereof, as having achieved Substantial Completion or, if it is not, shall notify the Contractor of the deficiencies to be corrected or completed before such Work will be accepted as substantially complete.

- b. The Contractor shall advise the Owner, in writing using the Certificate of Completion by the Contractor (CO-13.2) of the date when the Work has reached or will reach Final Completion and will be ready for final inspection and testing. Contractor shall deliver Form CO-13.2 to the A/E at least five (5) Days in advance of the date identified on the Form CO-13.2. The A/E shall then attach his or her written endorsement as to whether the Work will be ready for inspection and testing on the date identified on Form CO-13.2. The A/E's endorsement is a convenience to the Owner only and shall not relieve the Contractor of its responsibility nor shall the A/E's endorsement be deemed to evidence or establish that the Work achieved Final Completion. Final Completion inspection and any necessary testing shall be conducted in the same manner as the inspection for Substantial Completion. The Owner shall not establish the Final Completion Date until the Work is finally and totally complete, including the completion of punch list items,

submission of all required documentation, and elimination and correction of all Defective Work.

- c. Representatives of the Contractor, Owner, A/E, and Building Official will participate in the Substantial Completion and/or Final Completion inspections. The A/E shall conduct and document the inspections. The Owner may elect to have other persons of its choosing also participate in the inspections. If one or more Substantial or Final Completion re-inspections are required, the Contractor shall reimburse the Owner for all costs of re-inspection or, at the Owner's option, the costs may be deducted from payments due to the Contractor.
- d. A representative of the State Fire Marshal's Office will either be present at the Substantial and Final Completion inspections or otherwise inspect the completed Work and report any fire safety deficiencies to the Building Official. The State Fire Marshal will advise the Owner and Contractor of those deficiencies.
- e. Approval of Work at or as a result of any inspection required herein shall not release the Contractor or its surety from responsibility for complying with the Contract.

45. GUARANTEE OF WORK AND INDEMNIFICATION

- a. Except as otherwise specified or required, the Contractor guarantees all Work, materials, equipment, and workmanship conform to the requirements of the Contract Documents and are free from defects, imperfections, or non-conformities, normal wear and tear excepted, for a period of one (1) year from the Final Completion Date. Equipment and facilities which have seasonal limitations on their operation (e.g. heating or air conditioning units) shall be guaranteed for one (1) full year from the date of the equipment's first seasonally appropriate test and acceptance, in writing, by the Owner. Where the Owner agrees to take Beneficial Occupancy of a portion or phase of the Work which has been determined to be substantially complete before the entire Work achieves Final Completion, the guarantee for that portion or phase shall begin on the date that the Owner takes Beneficial Occupancy, unless otherwise specified in the Supplemental General Conditions, Special Conditions, or by separate agreement. This guarantee is separate and apart from any manufacturers' warranties and the warranty set forth in Section 30. At six (6) months and eleven (11) months after Substantial Completion, the Contractor shall meet with the Owner to review the status of and assign value to any unresolved warranty, guarantee, and punch list items.
- b. If, within any guarantee period, Work which is not in accordance with the Contract, Defective Work, or inferior material, equipment or workmanship is noted by the Owner or A/E which requires or renders necessary repairs or changes in connection with the guaranteed Work, the Contractor shall, promptly upon receipt of Notice from the Owner, such Notice being given not later than two weeks after the guarantee period expires, and without expense to the Owner:
 - 1. Correct, repair, replace or otherwise place in satisfactory condition all Defective Work, defects, nonconformity, inferior materials, equipment or workmanship;
 - 2. Make good all damage to the structure or Site or equipment or contents thereof, which, in the opinion of the Owner or the A/E, is the result of the use of materials, equipment or workmanship which are inferior, defective or not in accordance with the requirements of the Contract; and
 - 3. Make good any Work or materials or the equipment and contents of structures and/or Site disturbance that results from fulfilling the requirements of the guarantee.
- c. In any case when in fulfilling the requirements of the Contract and this guarantee or any other guarantee or warranty the Contractor disturbs any work performed by a separate contractor, the Contractor shall restore such work to a condition satisfactory to the A/E and Owner and guarantee such restored work to the same extent as if it was guaranteed under this Contract.

- d. If the Contractor, after Notice, fails to proceed promptly to comply with the obligations of this Section 45, and the surety, after Notice, fails to cure the Contractor's default as provided in Section 41, the Owner may undertake all needed corrections or repairs and the Contractor and its surety shall be liable for all expenses incurred.
- e. All special warranties and guarantees applicable to definite parts of the Work that may be stipulated in or required by the Contract Documents shall be subject to the terms of this Section during the first year of such special warranty or guarantee. The guarantee of this Section shall be in addition to and not in lieu of all other warranties, express or implied, applicable to or arising from this Contract or by law.
- f. Nothing contained in this Section shall be construed to establish a period of limitation with respect to any other obligation which the Contractor might have under the Contract Documents, including liability for Defective Work under Section 30, for indemnity or for breach of the Contract. This Section relates only to the specific obligation of the Contractor to correct the Work and does not limit the time within which its obligation to comply with the Contract Documents otherwise may be enforced, nor the time within which legal proceedings may be commenced to establish the Contractor's liability with respect to its obligations under the Contract Documents.
- g. In the event the Work of the Contractor is to be modified by another contractor, either before or after the Final Inspection, the Contractor shall remain responsible in all respects under this Section's Guarantee of Work and under any other warranties or guarantees, express or implied, applicable to or arising from this Contract or by law. However, the Contractor shall not be responsible for any defects in material or workmanship introduced by another Contractor modifying Contractor's Work. The Contractor and any contractor making modifications shall each be solely responsible for its respective work. A contractor modifying the Contractor's Work shall be responsible for any damage to or defect introduced into the Work by its modification.

If Contractor claims that a subsequent contractor has introduced defects of materials and/or workmanship into its Work, Contractor shall demonstrate clearly the nature and extent of such introduced defects and the other contractor's responsibility for those defects. Any contractor modifying the work of another shall have the same burden if it asserts that defects in its work were caused by the contractor whose work is modified.
- h. The Contractor shall indemnify and hold harmless the Commonwealth of Virginia, the Owner and the Owner's consultants, representatives, agents and employees from and against any and all claims, causes of action, losses, costs, expenses or damages, including but not limited to attorney's fees, of any kind or nature whatsoever, arising from or relating to any bodily injury, including sickness, disease or death, any property damage, and any monetary loss, that results from or arises out of the Work performed by the Contractor, or by or in consequence of the Contractor's neglect in safeguarding the Work, its use of unacceptable materials in the Work, or resulting from any act, omission, negligence, or misconduct of the Contractor, any of its subcontractors, anyone directly or indirectly employed by them or anyone for whose acts the Contractor is or may be liable. The Owner may retain as much of the monies due the Contractor under the Contract as the Owner considers necessary to ensure that a fund will be available to pay a settlement or judgment of such suits, actions, or claims. If insufficient monies are or will become due, the Contractor's surety and/or insurers will not be released from liability until all such claims and actions have been settled and suitable evidence to that effect has been furnished the Owner.

46. ASSIGNMENTS

Neither party to the Contract shall assign the Contract in whole or any part without the written consent of the other, nor shall the Contractor assign any monies due or to become due to him hereunder, without the prior written consent of the Owner. Consent to assignment shall not be unreasonably withheld. No assignment shall relieve any party from its obligations under the Contract.

47. CONTRACTUAL DISPUTES (*Code of Virginia*, § 2.2-4363)

- a. Contractual claims, whether for money or for 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 such claim must be given to the Owner within fourteen (14) Days of the time of the occurrence or beginning of the Work upon which the claim is based. Such Notice shall state that it is a "notice of intent to file a claim" and include a written statement describing the act or omission of the Owner or its agents that allegedly caused or may cause damage to the Contractor and the nature of the claimed damage. Verbal notice, the Owner's actual knowledge, or a written notice given more than fourteen (14) Days after the occurrence or beginning of the Work upon which the claim is based, shall not be sufficient to satisfy the requirements of this Section. All claims shall state that they are "claims" pursuant to this Section, be submitted along with all practically available supporting evidence and documentation and the certification required by Subsection 47(f), and request a final decision. Certificates for payment, applications for payment, vouchers, invoices and similar requests for payment submitted for work done by the Contractor in accordance with the expected contract performance are routine submissions and are not claims under this Section. Proposed or requested Change Orders, demands for monetary compensation or other relief, and correspondence and e-mails to the Owner or its representatives, which do not strictly comply with the requirements of this Section, are not claims under this Section. Failure to timely provide notice of intent to submit a claim shall preclude any relief to the Contractor, including but not limited to an extension of the Contract Completion Date or payment of additional compensation.
- b. Although the Contractor may be required to submit certain classes of claims prior to Final Payment, and the Contractor is not prevented from submitting claims during the pendency of the Work, the Owner shall not be obligated to render a final written decision on any claim until after Final Payment. No written decision denying a claim or addressing issues related to the claim shall be considered a denial pursuant to this Section unless the written decision makes express reference to this Section and is signed by the Agency head or his or her designee. The Contractor may not institute legal action prior to receipt of the Owner's final written decision on the claim unless the Owner fails to render such a decision within ninety (90) Days of submission of the claim or within ninety (90) Days of Final Payment, whichever is later.
- c. The decision of the Owner shall be final and conclusive unless the Contractor within six (6) months of the date of the final decision on a claim, initiates legal action as provided in *Code of Virginia* § 2.2-4364. Failure of the Owner to render a timely decision on a claim shall not result in the Contractor being awarded the relief claimed nor shall it result in any other relief or penalty. The sole result of the Owner's failure to render a timely decision shall be the Contractor's right to immediately institute legal action. No administrative appeals procedure pursuant to § 2.2-4365 of the *Code of Virginia* has been established for contractual claims under this Contract.
- d. Pursuant to *Code of Virginia*, § 2.2-4366, Alternative Dispute Resolution, the Owner may enter into an agreement with the Contractor to submit disputes arising from the performance of this Contract to arbitration and utilize mediation and other alternative dispute resolution procedures. However, such procedures entered into by the Owner, the Commonwealth, or any department, institution, division, commission, board or bureau thereof, shall be non-binding and subject to *Code of Virginia* § 2.2-514, as applicable. The details for the implementation of Alternative Dispute Resolution are provided in CPSM Section 3.2.7.
- e. In the event that a dispute, claim or controversy between the Owner and the Contractor arises regarding the requirements of the Contract, the performance of the Work, payment due the Contractor, the terms of any Change Order, or otherwise, the Contractor shall not stop, suspend or delay the Work or any part of the Work to be performed under the Contract, or under any Change Order, or as ordered by the Owner. The Contractor shall continue to diligently prosecute the Work to completion, including work required in any Change Order or as directed by the Owner.

- f. The Contractor shall submit a Contractor's Claim Certification (DGS-30-234) certifying that the claim is a true and accurate representation of the claim. Claims submitted without the Contractor's Claim Certification will be deemed incomplete and will not be considered.
- g. The compensation expressly provided for by this Contract shall be the Contractor's sole available compensation for the acts, omissions or breaches by the Owner. These remedies shall survive termination or breach of the Contract.

48. ASBESTOS

- a. This subsection applies to projects involving existing buildings where asbestos abatement is not a part of the Work, when the scope of the Project has been reviewed and a comprehensive survey conducted by an individual licensed by the Virginia Department of Professional and Occupational Regulation to conduct building inspections for asbestos-containing materials in buildings, and where the Owner has attempted to remove or encapsulate all asbestos-containing material that may become friable or damaged during this Project.

Prior to commencement of Work, the results of the comprehensive survey or any other asbestos survey shall be made available to the Contractor, who shall be responsible for performing his Work so as not to disturb any remaining asbestos, encapsulated or otherwise, identified in such survey or surveys.

If the Contractor discovers or inadvertently disturbs any material that he knows, should have known or has reason to believe, may contain asbestos that has not been previously identified, was overlooked during the removal, was deemed not to be friable or was encapsulated, the Contractor shall stop Work in the area containing or suspected to contain the asbestos, secure the area, and notify the Owner and the A/E immediately by telephone or in-person with written Notice as soon as possible. The Owner will have the suspect material sampled.

If the sample is positive and must be disturbed in the course of the Work, the Owner shall have the material repaired or removed and shall pay for the bulk sample analysis.

Except as provided in *Code of Virginia* § 11-4.1, if the material disturbed is not within the Contractor's authorized Work and/or Work area or under this Contract, the Contractor shall pay for all associated sampling and abatement costs.

- b. If asbestos abatement is included as a part of the Work, the Contractor shall assure that the asbestos abatement work is accomplished by those duly licensed as described in Section 3 of these General Conditions and in accordance with the specific requirements of the Contract and all applicable laws and regulations.
- c. If asbestos abatement is included as part of the Work, the licensed asbestos Subcontractor shall obtain the insurance required under Section 11(b)(4) of these General Conditions.

49. TRAINING, OPERATION AND MAINTENANCE OF EQUIPMENT

- a. As a part of the Work, the Contractor in conjunction with his Subcontractors and Suppliers shall provide the Owner's operations and maintenance personnel with adequate instruction and training in the proper operation and maintenance of any equipment, systems, and related controls provided or altered in the Work. The training requirements may be further defined in the Specifications.
- b. The Contractor shall provide the Owner with a minimum of two (2) copies of operating, maintenance and parts manuals for all equipment and systems provided in the Work. Further specific requirements may be indicated in the Specifications.

50. PROJECT MEETINGS

- a. The intention of this Section is that the Contractor, the Owner and the A/E have timely exchange of information and cooperate to accomplish the Work as required by the Contract Documents. The Contractor is responsible for managing the Work, obtaining approvals and requesting clarifications on a timely basis. The Owner and A/E are responsible for making a reasonable effort to provide timely responses to the Contractor.
- b. **Preconstruction Meeting:** Prior to the start of construction and no later than 15 Days after the Notice to Proceed, a “Preconstruction” meeting shall be held with attendees to include the Owner’s Project Manager and Project Inspector, the A/E’s project manager and representatives of each design discipline involved in the Project, the Regional Fire Marshal, the Contractor’s project manager and superintendent (and scheduler, if Contractor desires), and representatives of the Contractor’s major Subcontractors. The purpose of the meeting is to clarify and discuss the specifics related to, but not limited to, the following:
 1. Persons involved from each entity and their chain of authority including the names of persons authorized to sign Change Orders and any limits to their authority. Name of Contractor’s on-site certified Responsible Land Disturber.
 2. Names, addresses, email addresses, telephone numbers and FAX numbers to be used for Requests for Information (RFI), Requests for Clarification (RFC), Requests for Proposals (RFP), shop drawings, Submittals, and Notice.
 3. Contractor’s proposed construction schedule, the requirements for schedule updates and recovery schedules, assessment and management of risks to on-time and on-budget completion, and Owner’s sequencing requirements, if any.
 4. Schedule of Values and Certificate for Payment (CO-12) requirements and procedures.
 5. Procedures for shop drawings, product data and Submittals.
 6. Procedures for handling Field Orders and Change Order (CO-11).
 7. Procedures for Contractor’s request for time extension, if any.
 8. Construction Site requirements, procedures and clarifications to include:
 - Manner of conducting the Work
 - Site specialties such as dust and erosion control, stormwater management, project signs, clean up and housekeeping, temporary facilities, utilities, security, and traffic
 - Safety
 - Layout of the Work
 - Quality control, testing, inspections, and notices required
 - Site visits by the A/E and others
 - Owner’s Project Inspector duties
 - Running Punch List
 - As-Built Drawings
 9. Procedures and documentation of differing or unforeseen Site conditions.
 10. Monthly Pay Meeting.
 11. Assignment of responsibility for generation of meeting minutes of all project meetings.
 12. Project Close-Out requirements and procedures.

13. Project records.
 14. Requirements for the Contractor to furnish the Owner a list of hazardous materials that may be brought onto the job site, and 48- hour notification requirement.
- c. **Monthly Pay Meeting:** Section 36 establishes the requirement for a monthly pay meeting which will usually be held at or near the Site. In addition to Owner, A/E and Contractor representatives, the following representatives, at a minimum, should be available to attend portions of the meeting, as applicable or necessary:
- Owner's Project Inspector
 - Contractor's project superintendent
 - A/E representative of each discipline where Work was performed for the current pay request or where Work is projected to be performed in the coming month.
 - A representative of each subcontractor who performed work included in the current pay request.
 - A representative of each subcontractor who is projected to perform work in the coming month.

The following topics should be included, as a minimum, in the monthly pay meeting:

1. Observations of status, quality and workmanship of Work in progress
 2. Validation of the Schedule of Values and Certificate for payment
 3. Status of progress of the Work and conformance with proposed construction schedule and recovery schedule, if any
 4. Outstanding Requests for Information, Requests for Clarification and Requests for Proposal
 5. Submittals with action pending
 6. Status of pending Change Orders
 7. Status of Running Punch List items
 8. Work proposed for coming pay period
 9. Discussions of any problems or potential problems which need attention
- d. **Other Meetings:** Requirements for other meetings, such as progress meetings, coordination meetings, pre-installation meetings and/or partnering meetings, may be included in the Contract Documents.

51. SMALL BUSINESS PROCUREMENT PLAN

If the Total Contract Amount of the Contract is greater than \$10,000 and the Contractor is a SWaM/SDV Business; then the Contractor shall include a Small Business Procurement Plan in its Bid (if subcontracting work is intended by the Contract as part of its performance of the Work).

If the Total Contract Amount of the Contract is greater than \$100,000, then the Contractor shall include in its Bid a Small Business Procurement Plan and report on the involvement of SWaM/SDV Businesses in the Contractor's performance of the Contract as follows:

1. **Periodic Progress Reports:** The Contractor shall report on involvement of SWaM/SDV Business with each periodic invoice submitted by the Contractor. The report shall identify each subcontract or agreement with a SWaM/SDV Business, including the total contract value, and state the total amounts paid to each SWaM/SDV Business in connection with the Contract as of the report date. The report shall provide this information separately for each type of SWaM/SDV Business and shall clearly indicate those SWaM/SDV Businesses which were identified in the Contractor's Small Business Procurement Plan submitted by the Contractor in the procurement phase for the Contract. The Contractor shall provide two (2) copies of each periodic report to the Owner. Failure to submit the report with each invoice will result in the invoice being rejected by the Owner without payment.
2. **Final Compliance Report:** Prior to or with its final invoice for payment, the Contractor shall certify and report on its compliance with the Small Business Procurement Plan, submitted by the Contractor in its Bid for the Contract, to the Owner through DGS' eVA system. In the Final Compliance Report, the Contractor shall:
 - Provide a written explanation to the Owner of any variances between the Contractor's Small Business Procurement Plan and the actual participation of SWaM/SDV Businesses in the Contractor's performance of the Contract; and
 - Report on the involvement of other SWaM/SDV Businesses in the Contractor's performance of the Contract, including the contract value, the type of SWaM/SDV Business, a comparison of the actual amount paid with the planned amounts, the total amount paid to each type of SWaM/SDV Business, and a calculation of the percentage of the Total Contract Amount paid to SWaM/SDV Business.

A format for the Final Compliance Report will be provided by the Owner.

The Owner may withhold final payment to the Contractor until the Contractor has complied with the requirements of its Small Business Procurement Plan submitted by the Contractor in the procurement phase for the Contract.

END OF GENERAL CONDITIONS

SUPPLEMENTAL GENERAL CONDITIONS

The Commonwealth of Virginia General Conditions of the Construction Contract, Form DGS-30-054 (CO-7), are modified and supplemented as hereinafter described.

1. Section 43, DAMAGES FOR DELAY, EXTENSION OF TIME, shall be supplemented by adding the following paragraphs:

Agreed Compensation/Liquidated Damages for Contractor Delay:

- (h) The Contractor acknowledges and agrees that its failure to achieve the dates established by the Contract for Substantial Completion and/or Final Completion will cause the Owner to incur substantial economic damages and losses of types and in amounts which are impossible to quantify with certainty. The Contractor and Owner agree that liquidated damages may be assessed and recovered by Owner from Contractor and Surety and that the liquidated damages set forth below represent a fair, reasonable and appropriate measure of the Owner's damages in the event of a delay and that such damages are not a penalty.
- (i) In addition to liquidated damages for delay, the Contractor also shall be liable to Owner for any and all other damages sustained by the Owner as a result of any other breach of the Contract by Contractor, including, but not limited to, costs incurred by Owner to complete the Work or remedy Defective Work.
- (j) If the Contractor does not achieve Substantial Completion of the Work by the Contract Completion Date, the Contractor shall pay to the Owner liquidated damages in the amount of **\$929.00** per Day for each and every partial or full Day of delay in Substantial Completion (the "Step One Liquidated Damages").
- (k) When the Contractor achieves Substantial Completion, the accrual of Step One Liquidated Damages shall cease and the Contractor shall have thirty (30) Days in which to achieve Final Completion of the Work.
- (l) If Final Completion of the Work is not achieved on or before the thirtieth (30th) Day after Substantial Completion, and if the Owner has not granted any extension of time for Final Completion, the Contractor shall pay to the Owner liquidated damages in the amount of **\$671.00** for each and every partial or full Day of delay in Final Completion ("Step Two Liquidated Damages").
- (m) The Contractor waives any and all challenges and defenses as to the validity, reasonableness or enforceability of the Step One Liquidated Damages and Step Two Liquidated Damages, including any claim that the liquidated damages are void as penalties or are not reasonably related to actual damages.

Small Business Subcontracting Plan

It is the goal of the Commonwealth that over 42% of its purchases be made from small businesses. All potential bidders are required to submit the subcontractor plan by one of the following methods in order to be considered responsive:

- A. Complete the subcontractor plan as specified in the electronic response; or
- B. Download the “paper response” form, complete the subcontractor plan section, and submit it as an attachment with the bid response.

Small Business: "Small business (including micro)" means a business that holds a certification as such by the Virginia Department of Small Business and Supplier Diversity (DSBSD) on the due date for bids. This shall also include DSBSD certified women-owned and minority-owned businesses and businesses with DSBSD service-disabled veteran-owned status when they also hold a DSBSD certification as a small business on the bid due date. Currently, DSBSD offers small business certification and micro-business designation to firms that qualify.

Certification applications are available through DSBSD online at www.SBSD.virginia.gov (Customer Service).

Bidder Name: _____

Preparer Name: _____ Date: _____

Who will be doing the work: ☐ I plan to use subcontractor(s) ☐ I plan to complete all work

Instructions

- A. If you are certified by the DSBSD as a micro/small business, complete only Section A of this form.
- B. If you are not a DSBSD-certified small business, complete Section B of this form. For the bid to be considered and the bidder to be declared responsive, the bidder shall identify the portions of the contract that will be subcontracted to DSBSD certified small businesses for the initial contract period in relation to the bidder's total price for the initial contract period in Section B.

Section A

If your firm is certified by the DSBSD provide your certification number and the date of certification.

Certification number: _____ Certification Date: _____

Section B

If the “I plan to use subcontractors box is checked,” populate the requested information below, per subcontractor to show your firm's plans for utilization of DSBSD-certified small businesses in the performance of this contract for the initial contract period in relation to the bidder's total price for the initial contract period. Certified small businesses include but are not limited to DSBSD-certified women-owned and minority-owned businesses and businesses with DSBSD service-disabled veteran-owned status that has also received the DSBSD small business certification. Include plans to utilize small businesses as part of joint ventures, partnerships, subcontractors, suppliers, etc. It is important to note that this proposed participation will be incorporated into the subsequent contract and will be a requirement of the contract. Failure to obtain the proposed participation dollar value or percentages may result in a breach of the contract.

B. Plans for Utilization of DSBSD-Certified Small Businesses for this Procurement

Subcontract #1

Company Name: _____ SBSD Cert #: _____
Contact Name: _____ SBSD Certification: _____
Contact Phone: _____ Contact Email: _____
Value % or \$ (Initial Term): _____ Contact Address: _____
Description of Work: _____

Subcontract #2

Company Name: _____ SBSD Cert #: _____
Contact Name: _____ SBSD Certification: _____
Contact Phone: _____ Contact Email: _____
Value % or \$ (Initial Term): _____ Contact Address: _____
Description of Work: _____

Subcontract #3

Company Name: _____ SBSD Cert #: _____
Contact Name: _____ SBSD Certification: _____
Contact Phone: _____ Contact Email: _____
Value % or \$ (Initial Term): _____ Contact Address: _____
Description of Work: _____

Subcontract #4

Company Name: _____ SBSD Cert #: _____
Contact Name: _____ SBSD Certification: _____
Contact Phone: _____ Contact Email: _____
Value % or \$ (Initial Term): _____ Contact Address: _____
Description of Work: _____

Subcontract #5

Company Name: _____ SBSD Cert #: _____
Contact Name: _____ SBSD Certification: _____
Contact Phone: _____ Contact Email: _____
Value % or \$ (Initial Term): _____ Contact Address: _____
Description of Work: _____

Subcontract #6

Company Name: _____ SBSD Cert #: _____
Contact Name: _____ SBSD Certification: _____
Contact Phone: _____ Contact Email: _____
Value % or \$ (Initial Term): _____ Contact Address: _____
Description of Work: _____



**CAPITAL OUTLAY
VENDOR QUALIFICATION CERTIFICATION FORM**

All bidders responding to this IFB should complete and return all requested information applicable to performing the work. Place N/A beside all questions that do not apply. This form must be provided to the Contract Officer within 2 business days of request if not returned with the bid or the bidder may be deemed non-responsive.

1. Name of Business: _____
2. Name of Owner or Chief Executive Officer: _____ Telephone Number: _____
3. How many persons are currently employed by the firm? _____
4. List all current projects and the value of the project that is being performed by your firm. _____

5. Is the firm currently removed from a vendor list or debarred/enjoined from doing business with any Commonwealth of Virginia Agency?

Yes _____ No _____ If yes explain: _____

6. Provide the firm name, contact person, email address and telephone / fax numbers of three (3) customers, for which your firm has provided services of the same/similar scope as those requested in this inquiry. We may contact these customers as references.

FIRM'S NAME	CONTACT PERSON	EMAIL ADDRESS	TELEPHONE / FAX #

7. Identify any VDOT locations for which your firm is currently working, the contract number associated with the work and the location where the work is being performed.



ATTACHMENT _____

State Corporation Commission Form

Failure to complete and return this attachment may result in your bid being deemed NON-RESPONSIVE.

Solicitation #: _____

Virginia State Corporation Commission (SCC) registration information.

The bidder: _____

☐ is a corporation or other business entity with the following SCC identification number: _____

-OR-

☐ is not a corporation, limited liability company, limited partnership, registered limited liability partnership, or business trust **-OR-**

☐ is an out-of-state business entity that does not regularly and continuously maintain as part of its ordinary and customary business any employees, agents, offices, facilities, or inventories in Virginia (not counting any employees or agents in Virginia who merely solicit orders that require acceptance outside Virginia before they become contracts, and not counting any incidental presence of the bidder in Virginia that is needed in order to assemble, maintain, and repair goods in accordance with the contracts by which such goods were sold and shipped into Virginia from bidder's out-of-state location) **-OR-**

☐ is an out-of-state business entity that is including with this bid an opinion of legal counsel which accurately and completely discloses the undersigned bidder's current contacts with Virginia and describes why those contacts do not constitute the transaction of business in Virginia within the meaning of § 13.1-757 or other similar provisions in Titles 13.1 or 50 of the Code of Virginia.

****NOTE**** >> Check the following box if you have not completed any of the foregoing options but currently have pending before the SCC an application for authority to transact business in the Commonwealth of Virginia and wish to be considered for a waiver to allow you to submit the SCC identification number after the due date for bids (the Commonwealth reserves the right to determine in its sole discretion whether to allow such waiver): ☐

Security and Identification Requirements for all Contractors and Employees of Contractors

The Virginia Department of Transportation (VDOT) reserves the right to later conduct a background check as part of the VDOT Security Clearance process on the Contractor's employees and on the Subcontractor employees. All employees of the Contractor and of Subcontractors shall have VDOT-approved identification passes while working at VDOT facilities. An identification pass is defined as a VDOT-issued Visitor Pass, a Contractor-issued photo-identification badge, or a VDOT-issued photo-identification badge. A Contractor-issued photo-identification badge is a form of identification that can be provided by either the Contractor or the Subcontractors to their own employees. The VDOT facilities are defined as all buildings, and the real (non-roadway) property owned or rented by VDOT.

Contractor-Issued Photo-Identification Badges:

- A. The Contractor and Subcontractor shall provide photo-identification badges for each employee requiring access to the VDOT facility. The Contractor-issued photo-identification badge must contain the employee's legal and common name, a clear photograph of the employee and contain the employee's company's name or logo. Photographs must be clear, front view, full face, and without dark glasses or hat.
- B. The Contractor shall provide a list of all Contractor employees and Subcontractor employees who will perform work at the VDOT facility to the VDOT Project Manager prior to starting work at the VDOT facility.
- C. VDOT shall issue a standard VDOT Visitor Badge to each employee of the Contractor and Subcontractor who require access to the VDOT facility. Each standard-VDOT Visitor Badge contains an identification number that shall be assigned to a specific employee.
- D. The Contractor's employees and Subcontractor's employees shall wear their Contractor-issued photo-identification badges and their standard VDOT Visitor Badge at or above chest level on the outermost garment of the employee, unless doing so interferes with safe working conditions. In such instances, the Contractor's employees and Subcontractors shall have the Contractor-issued photo-identification badges and standard VDOT Visitor Badges on their person for ready display.
- E. Contractor-issued photo-identification badges and standard VDOT Visitor Badges shall be kept in the custody of the Contractor's employees and Subcontractor's employees. It will be the responsibility of the Contractor to assure that the Contractor-issued photo-identification badge and standard VDOT Visitor Badge are present on each employee when working at the VDOT facility. The Contractor shall return each standard VDOT Visitor Badge to VDOT when an individual's employment is terminated and shall return all standard VDOT Visitor Badges to VDOT at the expiration of the contract. The Contractor shall notify VDOT immediately if any standard VDOT Visitor Badges are lost, stolen or destroyed and shall immediately return any damaged standard VDOT Visitor Badges.
- F. Standard VDOT Visitor Badges shall only be worn while conducting official VDOT business.
- G. The Contractor and VDOT will perform audits of all badges to assure accuracy of all information provided and employment of the person holding the badge.
- H. The contract shall not be considered complete until the Contractor returns all standard VDOT Visitor Badges. VDOT shall withhold the contract retainage until all standard VDOT Visitor Badges are returned. VDOT shall charge the Contractor \$5 for each missing standard VDOT Visitor Badges.

LIST OF DRAWING

<u>Sheet No.</u>	<u>Title</u>
C-100	Cover Sheet
C-101	General Site Construction Notes
C-200	Existing Conditions and Demolition Plan
C-300	Layout and Utility Plan
C-400	Grading Plan
C-500	Erosion & Sediment Control Plan
C-501	Erosion and Sediment Control Notes
C-502	Erosion and Sediment Control Details
C-600	Storm Sewer Profiles
C-700	Details
SW-1	VDOT SWPP Plan
SW-2	VDOT SWPP Plan
SW-3	VDOT SWPP Plan
SW-4	VDOT SWPP Plan
B-1	Soil Borings Logs
B-2	Soil Borings Logs
B-3	Soil Borings Logs
E-100	Electrical Site Plan
E-101	Riser Diagrams, Plan Schedules, Detail and Notes

Prototype Chemical Storage Buildings – 3,000 Ton Building 2 (106' x 73")

T1	Title Sheet
A1	Floor Plan, Schedules and Section
A2	Building Elevations and Section
A3	Work Pad Plan, Sections and Details
A4.1	Salt pond Plan, Sections and Details
A4.2	Salt Storage Tank (Not In Contract)
A5	Material Specifications
S1	Foundation Plan and Schedule
S2	Foundation Section, Details and Schedule
S3	Foundation Section, Details and Schedule
S4	General Notes
E1	Legend Abbreviations and Notes
E2	Specifications and Diagrams
E3.1	Building 1 Electrical Plan (Not In Contract)
E3.2	Building 2 Electrical Plan
E3.3	Building 3 Electrical Plan (Not in Contract)
E4	Schedules
E5	Details
E6	Calculations

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01000

SUMMARY OF WORK

PART 1 GENERAL

1.1 GENERAL DESCRIPTION

- A. The work generally consists of the construction of a new Prototype 3,000 Ton Chemical Storage Building and the demolition of an existing chemical storage building and spreader racks. Site work includes grading, storm sewer infrastructure installation, asphalt and gravel paving, and a hose bib service line.
- B. Location:
 - 1. Salem District AHQ Airport PC: 501-18130-077
4330 Thirlane Road
Roanoke, Virginia 24019
- C. This brief description, however, shall not in any way be construed to limit the Contractor's obligation for compliance with the Contract Documents.
- D. No asbestos containing materials shall be used on the project.

1.2 PROCEDURES FOR COMMENCING THE WORK

- A. The Owner will submit to the Contractor the Notice to Proceed shortly after execution of the Contract, at which the construction start time will be stipulated and the date of completion of the project will be stated.

1.3 MANNER OF CONDUCTING THE WORK

- A. Regularly clean up the work and, at all times, maintain the project in as neat and orderly a manner as is consistent with normal operation. Accomplish the work and furnish such temporary facilities, as to preclude interference with access to the existing site and to cause no possible interference with the operation of any essential service thereof.
- B. Do not operate or disturb the setting of valves, switches, or electrical equipment on the service lines to any VDOT building except by proper previous arrangement with the Owner.
- C. Coordinate demolition and installation of temporary and permanent utilities with the Owner, causing no disruption of existing building operations and minimum delay of the work. Notify the Owner a minimum of one week in advance of anticipated utility outages. Such work shall be scheduled at the Owner's convenience.

- D. Existing work, including concealed work not indicated or specified to be modified, and which is damaged or otherwise affected by the Contractor's operations, shall be restored to a condition as good as existed before the Work was commenced. Where new construction adjoins, connects to, or abuts existing Work, the junction shall be made in a substantial, workmanlike manner. Join new Work to existing work in such a manner as to make the joining as inconspicuous as possible. At the completion, the buildings and grounds shall be in first class condition within the intent of these specifications, with all new parts well joined to the old as required, all connections completed, and all facilities in full working condition.

1.4 VDOT EQUIPMENT AND MATERIALS

- A. No VDOT equipment or materials may be used by the Contractor for the construction of this project.

1.5 SECURITY

- A. All Contractor personnel shall be equipped with photo identification cards, worn at all times while at the construction site. Identification cards shall be supplied at Contractor's expense.

1.6 TIME FOR COMPLETION

- A. The entire work, including all the requirements of Section 01700 "Project Closeout," shall be substantially completed in 180 consecutive calendar days. Schedules will be reviewed at each monthly pay request. If critical path is behind schedule, Contractor shall recommend strategies to recover lost time.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.1 SUMMARY

- A. Submittals include shop drawings, product data, and samples as defined in the General Conditions and also include certificates, test data, schedules, and other submittals required to demonstrate compliance with the Contract Documents.

1.2 CONTRACTOR PREPARATION

- A. Review and coordinate submittals with all other related or affected work before they are submitted to the Architect, and all copies shall bear the Contractor's certification that he has checked and approved them. Certification shall include wording as stated in the General Conditions, Article 24 Submittals. By approving the submittals, the Contractor thereby represents that he has determined and verified applicable field measurements, field construction criteria, materials, catalog numbers and similar data, and has checked and coordinated each shop drawing and sample with the requirements of the work and the Contract Documents. Submittals submitted without such certification and coordination will be returned to the Contractor rejected, and will be considered not a formal submission. Delays in construction because of late submission or resubmission of submittals requested by the Architect are the Contractor's responsibility.
- B. If submittals deviate from the drawings and specifications because of standard shop practice or any other reason, make specific mention of such deviation in the letter of transmittal in order that, if acceptable, suitable action may be based on the stated deviation. Otherwise, the Contractor will not be relieved of the responsibility for executing the work in accordance with the drawings and specifications even though such submittals have been accepted.
- C. Where an item is part of an assembly and must be fully coordinated with that assembly, submit the entire assembly together in order that proper evaluation of the submittals may be made. Indication that the items have not been coordinated shall show cause for rejection of the entire group until such coordination has been made. The Architect's acceptance of a separate item shall not indicate acceptance of an assembly in which the item functions.

1.3 FORM OF SUBMITTAL

- A. Each submission shall be accompanied by a letter of transmittal in duplicate, listing the contents of the submissions and identifying each item by reference to specification or drawing. Clearly label shop drawings with the name of the project,

the Project Code (501-18130-077) and other necessary information. Product data and other similar material that cannot be so labeled conveniently, shall be bound in suitable covers bearing the identifying data.

- B. Submit shop drawings in the form of 1 reproducible print and 5 black or blueline prints. After review, the Architect will return the reproducible print with any applicable notations and an appropriate stamp. If corrections are to be made, revise the original drawings and submit a new reproducible and two prints, and so repeat until accepted. Leave a minimum clear space, 2-1/2 inches by 2-1/2 inches, on the reproducible print above or to the left of the title block for application of the Architect's review stamp. The Contractor shall be responsible for the prints required for the work, and these prints shall be from the final reproducible bearing the final stamp of the Architect.
- C. Clearly mark product data to identify the applicable products or models. Identify where options or modifications are required by the Contract Documents. Submit product data and other non-reproducible literature, except certificates, in the number of copies required by the Contractor, plus 3 to be retained by the Architect.
- D. In lieu of submitting hard paper copies, Contractor may submit an electronic copy in PDF format. In the electronic heading, identify the section and item submitted. A stamped PDF copy will be returned electronically.
- E. If certificates certify the performance or quality of materials or products, submit with other submittals. Submit certificates certifying the method of installation or quality of installation at the completion of the work. Provide 2 copies to be retained by the Architect, plus additional copies as required by the Contractor.
- F. Samples: Samples shall be of sufficient size and quantity to illustrate clearly the functional characteristics of the product with integrally related parts and attachment devices and shall be the standard by which the finished work will be evaluated. Furnish one sample for each required submittal unless otherwise specified in the technical specifications. In general, samples shall be delivered to the office of the Architect unless the Architect requests delivery to the Owner at the building site. Full size usable samples will be returned to the Contractor and accepted samples may be used as part of the work unless otherwise specified.

1.4 RESUBMISSION

- A. Change or correct submittals as required by the Architect and resubmit until accepted. Also indicate any changes which have been made other than those requested by the Architect.

1.5 ARCHITECT PROCEDURES

- A. Submittals will be reviewed with reasonable promptness. In general, allow a minimum of 10 business days for Architect's review and return of submittals. Submittals will be stamped by the Architect with one of the four following actions:

1. "No Exceptions Taken" indicates no exception were taken and the work may proceed. However, the Architect's notation shall not relieve the Contractor from the responsibility of complying with all requirements of this Contract, including the obligation to provide submittals that are accurate and complete. The Owner assumes no responsibility for figured dimensions on shop drawings.
2. "Make Corrections Noted" indicates that Contractor may proceed on the basis of corrections indicated. Resubmission is not required.
3. "Amend & Resubmit" indicates that final fabrication shall not proceed. Corrections shall be made to the submittal and it shall be resubmitted.
4. "Rejected - See Remarks" indicates rejection of the product/drawings or that insufficient product data has been submitted and the Contractor should submit new or revised data for acceptance.

1.6 CHANGES AFTER APPROVAL

- A. Without obtaining the prior written consent of the Architect, make no change in any submittal marked "No Exceptions Taken" or "Make Corrections Noted." If such written consent is obtained, revise the submittal to show fully the altered parts of the work and resubmit according to the procedures specified herein. The resubmitted submittal shall also state that the work shown supersedes and voids work identified on the drawings previously reviewed by the Architect and the date of such action.
- B. No submittal may be used in the shop or on the work except in accordance with the foregoing paragraphs. The ordering or fabrication of materials before approval of all relevant drawings shall be at the Contractor's risk.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01410

INSPECTIONS AND TESTS

PART 1 GENERAL

1.1 SUMMARY

A. Work Included:

1. Perform inspections and testing required of Contractor.
2. Cooperate with Architect, Owner's selected testing agency, and all others responsible for testing and inspecting the Work.

B. Work by Owner:

1. Where no testing requirements are specified, but Owner decides that testing is required, Owner may require and pay for such testing, to be performed under current pertinent standards for such testing.

1.2 PAYMENT FOR INSPECTIONS AND TESTS

A. Required Inspections and Tests:

1. Inspections and tests indicated to be performed by Owner's testing laboratory will be paid for by Owner.
2. Inspections and tests indicated to be performed by Contractor or his suppliers shall be paid for by Contractor.

B. Retesting:

1. When tests paid for by Owner indicate noncompliance with the Contract Documents, subsequent retesting occasioned by the noncompliance shall be performed by same testing agency, and costs thereof will be deducted by Owner from the Contract Sum. Refer to the General Conditions.

C. Code Compliance Testing:

1. Inspections and tests other than the special inspections listed at the end of this section, required by codes or ordinances, and which are made by a legally constituted authority, shall be responsibility of and shall be paid for by Contractor, unless otherwise provided in the Contract Documents.

1.3 CONTRACTOR'S QUALITY CONTROL TESTING

- A. Notwithstanding Owner's testing for quality assurance, Contractor is required to provide his own testing in order to control work in a manner which delivers the**

quality product specified. Contractor's testing is to control quality, and Owner's testing is to assure conformance to contract requirements.

- B. Inspecting and testing performed exclusively for Contractor's control of quality shall be the sole expense and responsibility of Contractor.

1.4 SPECIAL INSPECTIONS

- A. Definition: "Special inspections" are those inspections required by Chapter 17 "Structural Tests and Inspections" of the "Virginia Uniform Statewide Building Code (VUSBC)", 2018 edition.
- B. Special inspections applicable to Project and the party(s) responsible for performing special inspections are listed in "Schedule of Special Inspections" at end of this Section.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 INSPECTIONS/TESTING BY CONTRACTOR

- A. Throughout the Work, provide inspections, tests, certificates, and other data required to be provided by Contractor and his suppliers:
 - 1. As required by other Sections of these Specifications.
 - 2. As necessary to ensure compliance with requirements of the Contract Documents.

3.2 COOPERATION WITH TESTING LABORATORY

- A. Representatives of Owner's testing laboratory shall have access to Work at all times and at all locations where work is in progress. Provide facilities for such access to enable laboratory to perform its functions properly.
- B. Contractor shall notify Architect at least 48 hours in advance of any inspections required to be performed by testing laboratory or Architect.
 - 1. When permitted by Architect, notify Owner's testing laboratory directly of any inspections required to be performed by laboratory, with copy of notification to Architect.

3.3 SCHEDULES FOR TESTING

A. Establishing Schedule:

1. By advance discussion with testing laboratory selected by Owner, determine time required for laboratory to perform its tests and to issue each of its findings.
2. Provide all required time within construction schedule.
3. Incorporate into CPM scheduling.

B. Revising Schedule: When changes of construction schedule are necessary during construction, coordinate all such changes with testing laboratory.

C. Adherence to Schedule: When testing laboratory is ready to test according to established schedule, but is prevented from testing or taking specimens due to incompleteness of work, all extra charges for testing attributable to delay will be deducted by Owner from the Contract Sum.

3.4 SCHEDULE OF SPECIAL INSPECTIONS

A. Special inspections to be completed by the Owner's inspection agency is attached to the end of this section

END OF SECTION

MATERIAL/ ACTIVITY	TYPE OF INSPECTION (A/E add lines as needed to identify other required items)	THIS PROJ ?	REFERENCE	INSPECTION / TEST BY *				
				OWNER'S TEST LAB	A/E OF RECORD	SMOKE CONTROL	PROJECT INSPECTOR	CONTRACTOR / SUPPLIER
FOUNDATIONS								
Soil	Classify & Test Existing Soils & Fill Materials	X	Specs, 1705.6	X (Spot)				
Soil	Compaction Of Fill Materials	X	Specs, 1705.6	X				
Soil	Bearing At Bottom Of Footing Excavations	X	Specs, 1705.6	X (Spot)				
Piles	Driving Records, Tip & Cutoff Elevations		1705.7, 1705.9	X	4			
Piles	Load Test		1705.7	X	4			
Caissons	Drilling, Size, Bearing Conditions, Materials		1705.8, 1705.3	X				
CONCRETE CONSTRUCTION								
Concrete	Ready-Mix Plant Quality Control	X	Specs, 1704.2.5		2			X, 1
Concrete	Mix Design Tests And Certificates	X	Specs, 1705.3		X			X, 1
Reinf. Steel	Shop Drawings Of Reinforcing Steel	X	Specs		X			
Reinf. Steel	Placement Of Reinforcing Steel	X	1705.3	X (Spot)	X (Spot)		X	
Reinf. Steel	Welding		1705.3.1	X (Spot)	2			X,1
Reinf. Steel	Special Construction		1704.5.7		2			
Formwork	Shape, Location, Dimensions	X	1705.3	X (Spot)			X	X
Formwork	Removal and Reshoring	X	1705.3	X (Spot)				
Concrete	Test Cylinders & Strength Test	X	1705.3, 1910.10	X	4			
Concrete	Mix Proportions & Mix On Delivery Tickets	X	1705.3				X (Spot)	
Concrete	Slump Test	X	1705.3	X	4		X	
Concrete	Placement Procedures	X	1705.3	X	X (Spot)		X (Spot)	
Concrete	Curing Temperatures & Techniques	X	1705.3	X			X	
Prestressed	Prestressing Procedures & Forces		1705.3	X	2			X,1
Prestressed	Shop Drawings Of Prestressed Units		Specs		X			
Precast	Quality Control Of Manufacturer		1704.2.5		2			X, 1
Precast	Shop Drawings Of Precast		Specs		X			
Precast	Erection Of Precast		1705.3	X (Spot)	X (Spot)		X	X
Precast	Inspection Of Connections		1705.3	X (Spot)				
Shotcrete	Reinforcing Steel-Test Panel		1908.5, 1705.3	X	4			
Anchors	Anchors In Concrete	X	Specs, 1705.3, 1901.3	X				

MATERIAL/ ACTIVITY	TYPE OF INSPECTION (A/E add lines as needed to identify other required items)	THIS PROJ ?	REFERENCE	INSPECTION / TEST BY *				
				OWNER'S TEST LAB	A/E OF RECORD	SMOKE CONTROL	PROJECT INSPECTOR	CONTRACTOR / SUPPLIER
MASONRY CONSTRUCTION								
Quality Assurance	Indicate Quality Assurance Level (1, 2 or 3)		TMS 402, 3.1		X			
Clay Masonry	Certificates, Tests & Technical Data		TMS 602, Table 3	X (Spot)	X			3
Concrete Masonry	Certificates, Tests & Technical Data		TMS 602, Table 3	X (Spot)	X			3
Reinf. Steel	Shop Drawings		Specs		X			
Reinf. Steel	Size, Grade, Type, Location, Spacing Of Reinf Steel		TMS 602, Table 3, 4	X (Spot)				
Anchors	Manufacturer's Data		TMS 602, Table 3, 4	X (Spot)	X			3
Accessories	Manufacturer's Data		Specs		X			3
Mortar & Grout	Mix Design And Data		Specs		X			3
Mortar & Grout	Field Samples and Testing, Placement		TMS 602, Table 3, 4	X (Spot)	4			
Masonry Strength	Masonry Strength Verified		TMS 602, Table 3	X	2, 4			
Masonry	Placement Of Units, Mortar & Accessories		TMS 602, Table 4	X (Spot)				
Masonry	Protection Of Masonry Work		TMS 602, Table 4	X (Spot)				
Anchorage	Placement Of Devices		TMS 602, Table 4	X (Spot)				
Risk Cat. IV	A/E Shall edit list as required by TMS 402		TMS 602, Table 3, 4		X			
STEEL CONSTRUCTION								
Fabricator	Quality Control Inspection Of Shop	X	1704.2.5		2			X, 1
Fasteners	Mfr's Certificate Of Compliance	X	AISC 360-16		2			3
Struct. Steel	Mfr's Certificate Of Compliance	X	AISC 360-16		2			3
Weld Matl's	Manufacturer's Certificate Of Compliance	X	AISC 360-16		2			3
Metal Decking	Welding to Supports		1705.2.2	X (Spot)				
Metal Decking	Manufacturer's Certificate Of Compliance		1705.2.2		2			3
Joist	Mrf's Certificate of Compliance		1704.5.5		2			3
Joist	Open Web Steel Joists-End Connections and Bridging		1705.2.3	X (Spot)				
Details	Shop Drawings Review	X	Specs		X			
Erection	Installation Of High-Strength Bolts	X	AISC 360-16	X (Spot)				
Erection	Welding		AISC 360-16	X (Spot)				
Erection	Steel Framing And Connections	X	AISC 360-16	X (Spot)	X (Spot)		X	

MATERIAL/ ACTIVITY	TYPE OF INSPECTION (A/E add lines as needed to identify other required items)	THIS PROJ ?	REFERENCE	INSPECTION / TEST BY *				
				OWNER'S TEST LAB	A/E OF RECORD	SMOKE CONTROL	PROJECT INSPECTOR	CONTRACTOR / SUPPLIER
SEISMIC FORCE RESISTANCE INSPECTIONS (as required by VUSBC 1705.12)								
(Note: SDC refers to Seismic Design Category.)								
Structural Steel	Welding and Bolting (SDC = B or C or D)		1705.12.1, AISC 341	X (Spot)				
Wood	Field Glueing (SDC = C or D)		1705.12.2	X				
Wood	Fastening Of Seismic Force Resistance System (SDC = C or D)		1705.12.2	X (Spot)			X	
Light Gage Steel	Fastening (SDC = C or D)		1705.12.3	X (Spot)			X	
Light Gage Steel	Special Bolted Moment Frames (SDC = D)		1705.12.9	X (Spot)				
Components	Mechanical & Electrical - Anchorage and Labeling (SDC = C or D)		1705.12.4, 1705.12.6	X (Spot)				
Components	Architectural - Cladding, Veneer, Non-Bearing Walls (SDC = D)		1705.12.5	X (Spot)				
Components	Access Floors (SDC = D)		1705.12.5.1	X (Spot)				
Components	Storage Racks (SDC = D)		1705.12.7	X (Spot)				
SEISMIC RESISTANCE TESTING (as required by VUSBC 1705.13)								
Structural Steel	Steel Systems and Elements		1705.13.1, AISC 341					
Non-Structural	Components-Mfr's Certificate of Compliance		1705.13.2		2			3
Non-Structural	Designated Systems-Certificate of Compliance		1705.13.3		2			3
Structural	Isolation Systems		1705.13.4	X				
WOOD & LIGHT GAGE STEEL CONSTRUCTION								
Fabrication	Quality Control Inspection Of Shop		1704.2.5		2			X, 1
Sheathing	Grade Stamp, Thickness & Fastening		Specs, 1703.5	X	X (Spot)		X	
Wood	Grade Stamp		Specs, 1703.5		X (Spot)		X	
Wood/Light Gage	Diaphragm Fastening Per Code And Drawings		1705.2.2, 1705.5.1	X (Spot)	X (Spot)		X	
Trusses	Shop Drawings		Specs		X			
Trusses	Truss Placement, Bracing and Fastening & Anchorage		Specs, 1705.2.4, 1705.5.2		X (Spot)		X	
Laminates	Shop Drawings		Specs		X			
Laminates	Identification Per Shop Drawings		Specs		X (Spot)		X	

DGS-30-052

2018 VUSBC SPECIAL INSPECTIONS & STRUCTURAL OBSERVATIONS

CO-6b

(Rev. 07/22)

(STATE OWNED BUILDINGS)

2018 Code Version

Project Code: 501-18130-077

Project Title: Salem District Airport AHQ Chemical Storage Building

MATERIAL/ ACTIVITY	TYPE OF INSPECTION (A/E add lines as needed to identify other required items)	THIS PROJ ?	REFERENCE	INSPECTION / TEST BY *				
				OWNER'S TEST LAB	A/E OF RECORD	SMOKE CONTROL	PROJECT INSPECTOR	CONTRACTOR / SUPPLIER
FIREPROOFING								
Spray-on	Manufacturer's Data		Specs		X			3
Spray-on	Surface Conditions		1705.14.2	X				
Spray-on	Application		1705.14.3	X				3
Spray-on	Thickness		1705.14.4	X				
Spray-on	Density		1705.14.5	X				
Spray-on	Bond Strength		1705.14.6	X				
Mastic/Intumescent	Fire-Resistant Coatings - Materials, Application		1705.15	X	X (Spot)		X	3
GWB Fireproof	Manufacturer's Data		Specs		X			3
GWB Fireproof	Placement Of Materials		Specs		X (Spot)		X	
Fire Wall Assembly	Manufacturer's Data		Specs, 706.2		X			3
Fire Wall Assembly	Placement Of Materials		Specs, 706.2		X (Spot)		X	
EXTERIOR INSULATION & FINISH SYSTEMS (EIFS)								
Materials	Manufacturer's Data		Specs		X			3
Preparation	Condition Of Sheathing Substrate		Specs, 1705.16.1		X (Spot)		X	
Application	Methods, Proportions & Thickness Of Installation		Specs, 1705.16.1	X (Spot)	X (Spot)		X	
SMOKE CONTROL (see note 5)								
Ducts	Device Location And Air Duct Leakage		1705.18.1			X		
System	Pressure Difference, Flow Measurements & Detection Testing		1705.18.1			X		
Controls	Activation Sequence		1705.18.1			X		
STRUCTURAL OBSERVATIONS (see note 7)								
Struct. Observations	As determined in written statement by structural observer		Specs, 1704.6					

* The numbers listed refer to notes on Page 7.

MATERIAL/ ACTIVITY	TYPE OF INSPECTION (A/E add lines as needed to identify other required items)	THIS PROJ ?	REFERENCE	INSPECTION / TEST BY *				
				OWNER'S TEST LAB	A/E OF RECORD	SMOKE CONTROL	PROJECT INSPECTOR	CONTRACTOR / SUPPLIER

NOTES:

1. Fabricator, supplier, ready-mixed plant or other production plant shall provide certificates from an approved independent inspection, testing or quality assurance agency attesting that the plant meets at least one of the following criteria:
 - a. The plant is a certified production plant meeting the quality assurance standards of a recognized national standards organization for that product.
 - b. The plant maintains an agreement with an independent inspection or quality assurance agency to conduct periodic in-plant quality assurance inspections. The frequency of these inspections shall not be less than one every six months.
 - c. The plant has an in-shop quality assurance inspection program by an independent testing or quality assurance agency for the work/product to be provided on this project.
2. A/E shall review fabricator/supplier/producer certificates for conformance with appropriate standards of practice and quality assurance.
3. Contractor/supplier shall submit manufacturer's certificates of compliance for the materials/products.
4. Reviews records and test results for conformance with requirements.
5. Special Inspection firm shall have expertise in fire protection engineering, mechanical engineering, and certification as an air balancer. The special inspector listed on the cover page and the Agency are responsible for verifying that the inspector (s) for smoke control is qualified as required by VUSBC 1705.18.2.
6. Unless noted otherwise, the reference numbers listed refer to the 2018 VUSBC.
7. The Owner's structural observer shall submit a written statement to DEB identifying the frequency and extent of structural observations as required by VUSBC 1704.6.

1.1 SECTION 01500

TEMPORARY FACILITIES

PART 2 GENERAL

2.1 SUMMARY

- A. Furnish, install, and maintain temporary utilities, and other temporary installations required for construction and remove such facilities on completion.

2.2 FIELD OFFICES AND SHEDS

- A. Contractor's Facilities:
 - 1. Provide a field office building, trailer or shed adequate in size and accommodation for Contractor's offices, supply, and storage.
- B. Locate field office in area designated by Owner.

2.3 USE OF EXISTING FACILITIES

- A. A small portion of existing site may be used for storage and other construction requirements. Coordinate locations with the Owner.

2.4 TEMPORARY ELECTRICITY AND LIGHTING

- A. Provide connections to existing facilities, size to provide service required for power and lighting; Owner will pay for the costs of the power used.
- B. Install circuit and branch wiring, with area distribution boxes located so that power and lighting are available throughout the construction by the use of construction-type power cords.

2.5 TEMPORARY WATER

- A. The Contractor will be allowed to use the Owner's water as directed. Connections and protection of the same is the Contractor's responsibility.

2.6 TEMPORARY SANITARY FACILITIES

- A. Furnish temporary facilities at the construction sites. Provide in accordance with applicable local codes.

2.7 REMOVAL

- A. Completely remove temporary facilities when their use is no longer required. Repair and clean damage caused by temporary installations. Restore permanent facilities used for temporary services to their original condition.

PART 3 PRODUCTS

Not Used

PART 4 EXECUTION

Not Used

END OF SECTION

SECTION 01700
PROJECT CLOSEOUT

PART 1 GENERAL

1.1 SUMMARY

- A. Provide an orderly and efficient transfer of the completed work to the Owner.

1.2 DESCRIPTION

- A. Closeout is hereby defined to include general requirements near the end of the contract time, in preparation for final acceptance, final payment, normal termination of contract, occupancy by the Owner and similar actions evidencing completion of the work. Specific requirements for individual units of work are specified in other sections.

1.3 QUALITY ASSURANCE

- A. Prior to requesting inspection, the Contractor shall use adequate means to assure that the work is completed in accordance with the specified requirements and is ready for the requested inspection.

1.4 SUBSTANTIAL COMPLETION

- A. General: Prior to requesting Architect's inspection for certification of substantial completion, as required by General Conditions (for either the entire work or portions thereof), complete the following and list known exceptions in request:
1. In progress payment request coincident with or first following date claimed, show either 100 percent completion for portion of work claimed "substantially complete," or list incomplete items, value of incompleteness, and reasons for being incomplete.
 2. Submit statement showing accounting of changes to the Contract Sum.
 3. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications and similar documents.
 4. Submit record drawings, damage or settlement survey, and similar final record information.
 5. Deliver tools, spare parts, extra stocks of materials, and similar physical items to Owner.
 6. Submit one copy of Operations and Maintenance manuals for review and approval.
 7. Complete final cleaning up requirements.
 8. Touch-up and otherwise repair and restore marred exposed finishes.

- B. After completion of the above-specified prerequisites, submit written notice that the work, or designated portion thereof, is substantially complete and ready for inspection, the Contractor shall, in writing using Form CO-13.2a (Certificate of Substantial Completion), notify the Owner through the Architect at least ten (10) days prior to said date. The Architect/Engineer will affirm through his periodic inspections that a substantial completion inspection is in order and establish a mutually agreeable date and time for the inspection.
- C. Participants in the Substantial Completion inspection shall include representatives of the General Contractor, including subcontractors, the Architect, and the Owner.
- D. The Architect will make an inspection and compile a written list of unfinished work and defective work (punch list) which must be completed or corrected prior to the final inspection. The Architect may require that the Contractor provide a written list of all items not fully completed and/or operational along with his request for substantial completion inspection. Failure to identify unfinished or defective work shall not be construed to relieve the Contractor of his obligation to fully comply with the requirements of the Contract Documents.
- E. The Contractor shall promptly complete all work and correct deficient work including, but not necessarily limited to, the items identified in the punch list.

1.5 FINAL INSPECTION

- A. Prior to the Architect's Final inspection, a non-destruct moisture survey will be conducted by the Owner at his expense. Core drillings will also be made and the Contractor shall make repairs in accordance with warranty requirements. Approval of the survey report shall be the basis for final inspection and closeout.
- B. Upon verification that work is complete the Contractor shall notify the Architect, in writing, that the work is ready for final inspection. The Architect will schedule the final inspection with the Owner, allowing five (5) days notice to all participants.
- C. The Architect will receive the following from the Contractor, review same and turn them over to the Owner at the final inspection.
 - 1. The final Schedule of Values and Certificate of Payment (DGS 30-104 CO-12).
 - 2. Affidavit of Payment of Claims (DGS 30-108 CO-13).
 - 3. Certificate of Completion by the Contractor (DGS 30-136 CO-13.2).
 - 4. List of subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights, weekends, and holidays.
 - 5. Final O & M manuals.
- D. When the Architect concurs that all construction requirements have been met, the Architect will file with the Owner the Certificate of Completion by the Architect/Engineer (DGS 30-112 CO-13.1).

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 DESCRIPTION

- A. Throughout progress of the work, maintain an accurate record of changes in the Contract Documents, as described in this section and under Paragraph "Plans and Specifications" of the General Conditions.
- B. Upon completion of the work, transfer the recorded changes to a set of As-Built Documents, as described in this section. Cross reference all changes to addenda, change orders, etc.
- C. Additional requirements affecting the As-Built Documents may appear in other sections of these specifications.

1.2 QUALITY ASSURANCE

- A. Assign the responsibility for maintenance of As-Built Documents to one person on the Contractor's staff as approved by the Owner.
- B. Accuracy of Records:
 - 1. Thoroughly coordinate changes within the As-Built Documents, making adequate and proper entries on each page of the specifications and each sheet of drawings and other documents where such entry is required to show the change properly.
 - 2. Accuracy of records shall be such that a future search for items shown in the Contract Documents may rely reasonably on information obtained from the approved As-Built Documents.
- C. Make entries within 24 hours after receipt of information that the change has occurred.

1.3 DOCUMENTS AS CONDITION OF PAYMENT

- A. The Owner's approval of the current status of Project Record Documents is a prerequisite to the Architect's approval of requests for progress payment and request for final payment under the Contract.
- B. Prior to submitting each request for progress payment, secure the Owner's approval of the current status of the As-Built Documents.
- C. Prior to submitting request for final payment, submit the final As-Built Documents to the Owner and secure his approval.

1.4 RECORD DOCUMENTS

- A. Job Set: Promptly following receipt of the Owner's Notice to Proceed, secure from the Architect at no charge to the Contractor one complete set of all documents comprising the Contract.

1.5 MAINTENANCE OF JOB SET

- A. Maintain the job set of As-Built Documents at the site completely protected from deterioration and from loss and damage until completion of the work and transfer of all recorded data to the final Project Record Documents.
- B. Making entries on Drawings:
 - 1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by graphic line and note as required.
 - 2. Date all entries.
 - 3. Call attention to the entry by drawing a box or other shape in a manner that avoids confusion with the original shapes and elements on the drawing around the area or areas affected.
 - 4. In the event of overlapping changes, use different colors for the overlapping changes.
- C. Make entries in the pertinent other documents as approved by the Owner.

1.6 REVIEW AND SUBMITTAL

- A. Submit the completed set of As-Built Documents to the Architect for approval.
- B. Participate in review meetings as required.
- C. Make required changes and promptly deliver the final As-Built Documents to the Architect.

1.7 CHANGES SUBSEQUENT TO ACCEPTANCE

- A. The Contractor has no responsibility for recording changes in the work subsequent to Final Completion and acceptance by the Owner.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01730

OPERATION AND MAINTENANCE MANUALS

PART 1 GENERAL

1.1 SUMMARY

- A. Submit manuals containing operation and maintenance data for all electrical and mechanical equipment provided in the Project.

1.2 SUBMITTALS

- A. General: Submit following in accordance with Conditions of the Contract and requirements of Division 1 specification sections.
- B. Approval Copies of Operation and Maintenance Manuals:
 - 1. Submit approval copies a minimum of 30 days prior to operating instruction sessions specified in individual Sections and at the time of Substantial Completion if no field instruction is required.
 - 2. Submit (2) approval copies to Architect Engineer for review. Approval copies will be returned to Contractor with corrections noted. Correct approval copies as directed by Architect Engineer.
 - 3. All data must be approved by Architect Engineer prior to Contractor initiating final closeout procedures specified in Division 1 Section "Project Closeout."
- C. Final Copies: Submit (2) copies of corrected data to Architect Engineer a minimum of 5 days prior to operating instruction sessions specified in individual Sections and 5 days prior to final completion if no field instruction is required.

1.3 DATA FORMAT

- A. Group data into sections corresponding to specification sections bound in hardback binders with index tabs and pockets for holding folded sheet information.
- B. Inscribe the following on binders:
 - 1. The words "OPERATION AND MAINTENANCE DATA".
 - 2. Name and location of project.
 - 3. Project Code.
 - 4. Name of Division, such as "Mechanical" or "Electrical", and name of each specification section contained therein.
 - 5. Name of Contractor.
- C. Binders shall contain all applicable data specified herein. List each item of equipment and identify each item with same name, mark, number, or other

identification noted or scheduled in Contract Documents. Binders containing several items of equipment shall be provided with index tabs to separate each item.

D. The first section of each binder shall contain:

1. A table of contents;
2. Names, addresses, and telephone numbers of each subcontractor installing equipment; and name of each local representative.
3. Names, addresses, and telephone numbers of each vendor providing equipment, and name of each local representative.

1.4 DATA REQUIRED

A. Description: Provide manufacturer's catalog description supplemented as necessary to include the following:

1. Description of function of overall equipment item and description of major components. Catalog data and other preprinted literature shall have all inapplicable information crossed out.
2. System layout showing circuits, devices, and controls.
3. Wiring and control diagrams to explain detailed operation and control of each component.

B. Shop Drawings: Provide legible copies of approved shop drawings. Any comments incorporated in "corrections noted" approvals of shop drawings shall be recorded on drawings.

C. Operating Instructions:

1. Procedures for start up.
2. Sequencing of operations, as applicable.
3. Normal operating procedures covering basic overall functions of each component in relation to external inputs, outputs, controls, indicators, and alarms.
4. Procedures for shutdown.
5. Where start-up and/or shutdown of equipment operation must be performed in a particular sequence, caution notes shall be given, and text shall include clearly defined steps of procedure which describe actions to be taken.
6. Procedures for emergency operation describing whatever action should be taken to facilitate emergency operation, such as may occur as a result of momentary primary power loss or surges, excessive ambient temperature, fire alarm, and the like.

D. Maintenance and Service Instructions:

1. Manufacturer's maintenance and service manuals, including trouble-shooting guides.
2. Manufacturer's installation instructions.
3. Routine preventive maintenance schedules. Lubrication schedule, including lubricant type, grade, temperature range and frequency.
4. Parts list, including sources of supply.
5. Manufacturer's recommended spare parts list.
6. Special tools required.
7. Service organization reasonably convenient to the project site.

1.5 QUALITY

A. The quality of operating and maintenance data will be checked by Architect Engineer for general conformance with requirements of this Section The following checklist is representative of the characteristics which will be examined:

1. Accuracy.
2. Completeness.
3. Quality of printing:
 - a. Dropouts
 - b. Background
 - c. Legibility (no excessive reduction or filled-in characters)

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

DIVISION 2 – SITE CONSTRUCTION

SECTION 02060

DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes demolition and removal of selected buildings noted on the drawings.
- B. Coordinate the sequence of building component removal with the installation of new work. See Section 01000 Summary of Work for details.

1.2 RELATED DOCUMENTS

- A. Related Sections: Sections containing requirements that relate to this Section include, but are not necessarily limited to:
 - 1. Division 1 Section "Summary of Work": Phasing requirements.
 - 2. Division 1 Section "Contractor's Use of Premises": Use of the building.
 - 3. Division 1 Section "Temporary Facilities and Controls": Temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and environmental protection measures for selective demolition operations.

1.3 DEFINITIONS

- A. Remove: Remove and legally dispose of items.
- B. Existing to Remain: Protect existing facility buildings and structures to remain against damage and soiling during selective demolition.
- C. Remove and Salvage: Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area. Items indicated to be removed and salvaged remain Owner's property.
- D. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.

1.4 SUBMITTALS

- A. Submit photographs or other digital record, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by selective demolition operations. Failure to do so, will not absolve the Contractor's responsibility to repair damages identified by the Owner.

1.5 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from site with further disposition at Contractor's option.

1.6 PROJECT CONDITIONS

- A. Owner will occupy the facility. Conduct selective demolition so that Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- B. Owner assumes no responsibility for actual condition of building components to be selectively demolished.
 - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. ASBESTOS: (NO ASBESTOS PRESENT) An inspection to identify asbestos-containing materials has been conducted and can be found in Appendix A. No materials containing asbestos were identified by the reports for the buildings. Should the Contractor access any material suspected of containing asbestos not identified by the reports, they shall stop work in the immediate area and notify the Owner (VDOT)
- D. Storage or sale of removed items or materials on-site will not be permitted.
- E. LEAD COATING NOTE: An inspection to identify lead coated building components has been conducted and can be found in Appendix A. This report is provided for the Contractor's use and may not be all inclusive. It is the Contractor's responsibility to comply with all Virginia Occupational Safety and Health (VOSH) Regulation as they pertain to employee exposures to lead.

1.7 SCHEDULING

- A. Arrange selective demolition schedule so as not to interfere with Owner's on-site operations.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

- D. When unanticipated electrical or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Architect.
- E. Survey the condition of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition.
- F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 EXISTING UTILITIES

- A. Maintain existing utilities indicated to remain in service and protect against damage during selective demolition operations.
 - 1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to governing authorities.
 - a. Provide not less than 72 hours' notice to Owner if shutdown of service is required during changeover.
- B. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services serving area to be selectively demolished.
 - 1. Owner will arrange to shut off indicated utilities when requested by Contractor.
 - 2. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of building before proceeding with selective demolition.

3.3 PREPARATION

- A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.
- B. Conduct demolition operations to prevent injury to people and damage to adjacent facilities to remain. Ensure safe passage of people around selective demolition area.
 - 1. Erect temporary protection, such as railings and canopies, where required by authorities having jurisdiction.
 - 2. Protect walls, ceilings, floors, and other existing finish work that are to remain and are exposed during selective demolition operations.
 - 3. Cover and protect furniture, furnishings, and equipment that have not been removed.

3.4 POLLUTION CONTROLS

- A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust. Comply with governing environmental protection regulations.

1. Do not use water when it may damage existing construction and furnishings.
- B. Clean adjacent structures and improvements of dust and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.

3.5 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to extent required by new construction and as indicated. Use methods required to complete Work within limitations of governing regulations.
 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 4. Maintain adequate ventilation when using cutting torches.
 5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 6. Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 7. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.
 8. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.

3.6 PATCHING AND REPAIRS

- A. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.

3.7 DEBRIS AND WASTE REMOVAL

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION

SECTION 02110

SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Topsoil stripping.
 - 2. Clearing and grubbing.
 - 3. Removing above-grade improvements.
 - 4. Removing below-grade improvements.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.3 PROJECT CONDITIONS

- A. Traffic: Conduct site-clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, driveways access lanes, walks, or other occupied or used facilities without permission from authorities having jurisdiction and / or the owner.
- B. Protection of Existing Improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place.
 - 1. Protect improvements on adjoining properties and on Owner's property.
 - 2. Restore damaged improvements to their original condition, as acceptable to property owners.
- C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated or directed.

1.4 EXISTING SERVICES

- A. Notify utility locator services, including MISS UTILITY, a minimum of 72 hours prior to commencing field operations for area where Project is located before site clearing. Do not begin construction until all the utilities have been marked.
- B. General: Indicated locations are approximate; determine exact locations before commencing Work.

- C. Arrange and pay for disconnecting, removing, capping, and plugging utility services. Notify affected utility companies in advance and obtain approval before starting this Work.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 2 Section "Earthwork."
 - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.
 - 2. Ensure that a land disturbing permit and the proper erosion and sediment controls are in place for the off-site borrow site.

PART 3 EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction. Transfer benchmark elevation to a protected area if the existing benchmark is within the construction limits.
- B. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkway as specified in the construction documents.
- C. Protect the existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 UTILITIES

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing when requested by Contractor.
 - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 - 1. Owner will arrange to shut off indicated utilities when requested by Contractor.
 - 2. Arrange to shut off indicated utilities with utility companies.

- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
1. Notify the Architect not less than two days in advance of proposed utility interruptions.
 2. Do not proceed with the utility interruptions without Architect's written permission.
- C. Excavate for and remove underground utilities indicated to be removed.

3.3 SITE CLEARING

- A. General: Remove shrubs, grass, and other vegetation, improvements, or obstructions, as required, to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. Removal includes digging out and off-site disposal of stumps and roots.
- B. Topsoil: Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.
1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping.
 2. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water and limit their height to 8'. Cover all storage piles, if needed, to prevent wind erosion.
 3. Do not stockpile topsoil within drip line of remaining trees
 4. Dispose of unsuitable or excess topsoil as specified for disposal of waste material.
 5. Stockpile surplus topsoil and allow for respreading deeper topsoil.
- C. Clearing and Grubbing: Clear site of trees, shrubs, and other vegetation, as indicated on the drawings, generally within the limits of disturbance.
1. Completely remove stumps, roots, and other debris protruding through ground surface.
 2. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18 inches below the exposed subgrade
 3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
 - a. Place fill material in horizontal layers not exceeding 6 inches loose depth, and thoroughly compact each layer to a density equal to adjacent original ground.

D. Removal of Site Improvements: Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.

1. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - a. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

3.4 DISPOSAL OF WASTE MATERIALS

- A. Burning is not permitted on Owner's property.
- B. All surplus demolished building materials and other waste materials, except for extra materials required by the project specifications, shall be disposed of at a VDOT approved disposal site. The contractor shall provide the owner's representative with a signed approval notification from the disposal site prior to disposal of any materials. The notification must indicate that materials from the site will be accepted and disposal is in accordance with applicable regulations.

END OF SECTION

SECTION 02200

FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Water distribution piping and related components outside the building for water service

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.3 DEFINITIONS

A. PVC: polyvinyl chloride plastic

1.4 SUBMITTALS

A. Submit in accordance with Conditions of the Contract and the requirements of Section 01300 "Submittals."

1.5 QUALITY ASSURANCE

A. Regulatory Compliance

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for potable water service piping, including materials, hose threads, installation and testing.
3. Comply with standards of authorities having jurisdiction for fire-suppression water service piping including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

- D. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire service main products.
- E. NFPA compliance: comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for suppression.
- F. NSF Compliance:
 - 1. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-PW" on piping.
- G. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.6 PROJECT CONDITIONS

- A. Interruption of existing water-distribution service: do not interrupt service to facilities occupied by owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
 - 1. Notify architect no fewer than two days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of water-distribution service without architect's written permission.

1.7 COORDINATION

- A. Coordinate connection of water main with owner.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. Soft Copper Tube: ASTM B 88, Type K, water tube, annealed temper.
 - 1. Copper, Solder-Joint Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
- B. Hard Copper Tube: ASTM B 88, Type K, water tube, drawn temper.
 - 1. Copper, Solder-Joint Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.

- C. Mechanical-joint, ductile-iron pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
1. Mechanical-joint, ductile iron fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 2. Glands, gaskets, and bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- D. Push-on-joint, ductile-iron pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
1. Push-on-joint, ductile-iron fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 2. Gaskets: AWWA C111, rubber.
- E. Grooved-joint, ductile-iron pipe: AWWA C151, with cut, rounded-grooved ends.
1. Available manufacturers: subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
 - a. Anvil International, Inc.
 - b. Victaulic Company of America
 - c. American Ductile Iron Pipe
 2. Grooved-end, ductile-iron fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron castings with dimensions matching pipe.
 3. Grooved-end, ductile-iron-piping couplings: AWWA C606, for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.
- F. PE, Fire-Service Pipe: ASTM F 714, AWWA C906, or equivalent for PE water pipe; FMG approved, with minimum thickness equivalent to FMG Class 200.
1. Molded PE Fittings: ASTM D 3350, PE resin, socket- or butt-fusion type, made to match PE pipe dimensions and class.
- G. PVC, AWWA pipe: AWWA C900, class 150, with bell end with gasket, and with spigot end.
1. Comply with UL 1285 for fire-service mains if indicated.
 2. PVC fabricated fittings: AWWA C900, class 150, with bell-and-spigot or double-bell ends. Include elastometric gasket in each bell.
 3. PVC molded fittings: AWWA C907, class 150, with bell-and-spigot or double-bell ends. Include elastometric gasket in each bell.
 4. Push-on-joint, ductile-iron fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

- a. Gaskets: AWWA C111, rubber.
- 5. Mechanical-joint, ductile-iron fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

2.2 JOINING MATERIALS

- A. Brazing filler metals: AWS A5.8, BCuP series.
- B. Bonding adhesive for fiberglass piping: as recommended by fiberglass piping manufacturer.
- C. Plastic pipe-flange gasket, bolts, and nuts: type and material recommended by piping system manufacturer, unless otherwise indicated.

2.3 PIPE SPECIALTIES

- A. Transition fittings: manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
- B. Tubular-sleeve pipe couplings:
 - a. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.
 - b. Standard: AWWA C219

2.4 GATE VALVES

- A. AWWA, cast-iron gate valves: shall be in accordance with the Western Virginia Water Authority Construction Specifications and Standards, latest edition.
 - 1. Available manufacturers: subject to compliance with requirements, manufacturers offering products may be incorporated in the work include, the following:
 - a. American AVK Co.; Valves & Fittings Div.
 - 2. Nonrising-stem, metal-seated gate valves:
 - a. Description: gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.
 - 1. Standard: AWWA C500
 - 2. Minimum pressure rating: 200 psig
 - 3. End connections: mechanical joint.
 - 4. Interior coating: comply with AWWA C550
 - 3. Nonrising-stem, resilient-seated gate valves:
 - a. Description: gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem and stem nut.
 - 1. Standard: AWWA C509
 - 2. Minimum pressure rating: 200 psig

3. End connections: mechanical joint.
 4. Interior coating: comply with AWWA C550
4. Nonrising-stem, high-pressure, resilient-seated gate valves:
 - a. Description: ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem and stem nut.
 1. Standard: AWWA C509
 2. Minimum pressure rating: 250 psig
 3. End connections: push on or mechanical joint.
 4. Interior coating: comply with AWWA C550
5. OS&Y, rising-stem, metal-seated gate valves:
 - a. Description: cast- or ductile-iron body and bonnet; with cast-iron double disc, bronze disc and seat rings, and bronze stem.
 1. Standard: AWWA C500
 2. Minimum pressure rating: 200 psig
 3. End connections: flanged
6. OS&Y, rising-stem, resilient-seated gate valves:
 - a. Description: cast- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.
 1. Standard: AWWA C509
 2. Minimum pressure rating: 200 psig
 3. End connections: flanged

2.5 GATE VALVE ACCESSORIES AND SPECIALTIES

- A. Tapping-sleeve Assemblies: shall be in accordance with the Western Virginia Water Authorities Construction Specifications and standard, latest edition.
 1. Available manufacturers: subject to compliance with requirements, manufacturers offering products may be incorporated in the work include, the following:
 - a) American Cast Iron Pipe Co.; Waterous Co. Subsidiary
 - b) East Jordan Iron Works, Inc.
 - c) Flowserve
 - d) Mcwane Inc.; Clow Valve Co. Div. (Oskaloosa)
 - e) Mcwane, Inc.; Kennedy Valve Div.
 - f) Mcwane, inc.; M & H Valve Company Div.
 - g) Mueller Co.; Water Products Div.
 - h) U.S. Pipe and Foundry Company.
 2. Description: sleeve and valve compatible with drilling machine.
 - b. Standard: MSS SP-60
 - c. Tapping sleeve: cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed

flange for branch valve.

- d. Valve: AWWA, cast-iron, nonrising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.
- B. Valve Boxes: shall be in accordance with the Western Virginia Water Authority Construction Specifications and Standards, latest edition and comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "water", and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.
 - 1. Operating wrenches: steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
- C. Indicator posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

2.6 CORPORATION VALVES AND CURB VALVES

- A. Shall be in accordance with the Western Virginia Water Authority Construction Specifications and Standards, latest edition.
- B. Manufacturers:
 - 1. Available manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a) Amcast Industrial Corporation; Lee Brass Co.
 - b) Ford Meter Box Company, Inc. (The); Pipe Products Div.
 - c) Jones, James Company
 - d) Master Meter, Inc.
 - e) McDonald, A. Y. Mfg. Co.
 - f) Ueller Co.; Water Products Div.
 - g) Red Hed Manufacturing & Supply
- C. Service-Saddle Assemblies: Comply with AWWA C800. Include saddle and valve compatible with tapping machine.
 - 1. Service Saddle: Copper alloy with seal and AWWA C800, threaded outlet for corporation valve.
 - 2. Corporation Valve: Bronze body and ground-key plug, with AWWA C800, threaded inlet and outlet matching service piping material.
- D. Curb Valves: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.
- E. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron

valve boxers. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER", and bottom section with base that fits over curb valve and with a barrel approximately 3 inches in diameter.

1. Shutoff rods: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Division 02300 Earthwork for excavating, trenching and backfilling.

3.2 PIPING APPLICATIONS

- A. General: use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on above ground piping and piping in vaults.
- E. Underground water-service piping NPS 3/4 to NPS 3 shall be any of the following:
 1. PVC, schedule 80 pipe; PVC, schedule 80 socket fittings; and solvent-cemented joints.
- F. Underground water-service piping NPS 4 to NPS 8 shall be of the following:
 1. Soft copper tube, ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed joints.
 2. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed, mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical, grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints.
 3. PVC, schedule 40 pipe; PVC, schedule 40 socket fittings; and solvent-cemented joints.
 4. NPS 4 and NPS 6: NPS 6 PVC, AWWA class 150 pipe; PVC, AWWA class 150 fabricated fittings; and gasketed joints.
 5. NPS 8: PVC, AWWA class 200 pipe; PVC, AWWA class 200 fabricated, push-on-joint, ductile-iron, mechanical-joint, ductile-iron fittings; and gasketed joints.

- G. Water meter box water-service piping NPS 3/4 to NPS 2 shall be same as underground water-service piping.
- H. Underground fire-service-main piping NPS 4 to NPS 12 shall be any of the following:
 - 1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed, mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical, grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints.
 - 2. PVC, AWWA class 150 pipe listed for fire-protection service; PVC class 150 fabricated or molded fittings; and gasketed joints.

3.3 VALVE APPLICATIONS

- A. General application: use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Underground valves, NPS 3 and larger: AWWA, cast-iron, nonrising-stem, resilient-seated gate valves with valve box.
 - 2. Underground valves, NPS 4 and larger, for indicator posts: UL/FMG, cast-iron, nonrising-stem gate valves with indicator post.

3.4 PIPING INSTALLATION

- A. Water-main connection: connect to existing private water meter on-site.
- B. Comply with NFPA 24 for fire-service-main piping materials and installation.
- C. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
 - 1. Install PE corrosion-protection encasement according to ASTM a 674 or AWWA C105.
- D. Install PVC, AWWA pipe according to ASTM f 645 and AWWA M23.
- E. Bury piping with depth of cover over top at least 36-inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:

1. Under driveways: with at least 36 inches of cover on top.
 2. In loose gravelly soil and rock: with at least 12 inches additional cover.
- F. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
1. Terminate water-service-piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- G. Install underground piping with both restrained joints and thrust blocks at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

3.5 JOINT CONSTRUCTION

- A. Make pipe joints according to the following:
1. Ductile-iron piping, gasketed joints for water-service piping: AWWA C600 and AWWA M41.
 2. Ductile-iron piping, gasketed joints for fire-service-main piping: UL 194
 3. Ductile-iron piping, grooved joints: cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
 4. PVC piping gasketed joints: use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricants according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
 5. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing:
 - i. Dielectric fittings for NPS 2 and smaller: use dielectric nipples.
 - ii. Dielectric fittings for NPS 2-1/2 to NPS 4: use dielectric nipples.
 - iii. Dielectric fittings for NPS 5 and larger: use dielectric flange kits.

3.6 ANCHORAGE INSTALLATION

- A. Anchorage, general: install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
1. Concrete thrust blocks
 2. Locking mechanical joints.
 3. Set-screw mechanical retainer glands.
 4. Bolted flanged joints.

5. Pipe claps and tie rods.
- B. Install both mechanical joint restraints and thrust blocks at all tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
 1. Gasketed-joint, ductile-iron, water-service piping: according to AWWA C600.
 2. Gasketed-joint, PVC water-service piping: according to AWWA M23.
 3. Bonded-joint fiberglass, water-service piping: according to AWWA M45
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces

3.7 VALVE INSTALLATION

- A. AWWA gate valves: comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. AWWA valves other than gate valves: comply with AWWA C600 and AWWA M44
- C. UL/FMG, gate valves: comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
- D. UL/FMG, valves other than gate valves: comply with NFPA 24.

3.8 PROTECTIVE ENCLOSURE INSTALLATION

- A. Install concrete base level and with top approximately 2 inches above grade.
- B. Install protective enclosure over valves and equipment.
- C. Anchor protective enclosure to concrete base.

3.9 CONNECTIONS

- A. Piping installation requirements are specified in other divisions. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect water-distribution piping to existing water main.
- C. Connect water-distribution piping to interior domestic water and fire suppression piping.
- D. Ground equipment according to division 26 "Electrical Grounding".
- E. Connect wiring according to division 26 section "Conductors and Connectors".

3.10 FIELD QUALITY CONTROL

- A. Piping tests: conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic tests: test at not less than one-and-one-half times working pressure for two hours.
 - 1. Increase pressure in 50 psig increments and inspect each joint between increments. Hold at test pressure for 1 hour. Decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- C. Prepare reports of testing activities.

3.11 IDENTIFICATION

- A. Install continuous underground detectable trace wire during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified on plans.
- B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel.

3.12 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
 - 1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
 - 2. Use purging and disinfection procedure prescribed by authorities having jurisdictions, or if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
 - 3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
 - a) Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
 - b) Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.

- c) After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
- d) Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION

SECTION 02300

EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Preparing subgrades for pavements and lawns.
 - 2. Excavating and backfilling for buildings and structures.
 - 3. Subbase course for concrete walks and pavements.
 - 4. Base course for asphalt paving.
 - 5. Subsurface drainage backfill for walls and trenches.
 - 6. Excavating and backfilling trenches within building lines.
 - 7. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.
 - 8. Installing geotextile fabric below grade under asphalt pavement

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.3 DEFINITIONS

- A. Backfill: Soil materials used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Layer placed between the subbase course and asphalt paving.
- C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations.
 - 1. Authorized Additional Excavation: Excavation below subgrade elevations as directed by Architect. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

- 2. Bulk Excavation: Excavations more than 10 feet in width and pits more than 30 feet in either length or width.
 - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.
- J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- K. General Excavation: Excavations for drainage structures, paving, structures, and general paving
- L. Trench Excavation: Excavations for utility and drainage pipes, lines, and drainage channels.
- M. Rip Rock: Any material that cannot be removed by scrapers, loaders, pans, dozers, or graders; and requires the use of a single-tooth ripper mounted on a crawler tractor having a minimum pull rated at not less than 56,000 pounds.
- N. Trench Rock: Rip rock encountered during trench excavation.
- O. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

- A. Submit in accordance with Conditions of the Contract and the requirements of Section 01300 "Submittals."
- B. Product Data: Geotextile fabric.
- C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
 - 1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
 - 2. Laboratory compaction curve according to ASTM D 698 for each on-site or

- borrow soil material proposed for fill and backfill.
3. Laboratory compaction curve according to ASTM D 1557 for each on-site or borrow soil material proposed for fill and backfill

1.5 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.
- B. The services of an independent testing agency will be procured by the Owner to test for field quality control. See paragraph 3.19.
- C. Pre-excavation Conference: Conduct conference at Project site to comply prior to excavation work. Attendees shall include the Architect, the Contractor, VDOT and the grading subcontractor.

1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated:
- B. Notify Architect not less than two days in advance of proposed utility interruptions.
- C. Do not proceed with utility interruptions without Architect's written permission.
- D. Contact utility-locator service for area where Project is located before excavating.
- E. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from on-site excavations.
- B. Satisfactory Soils: ASTM D 2487 soil classification groups CL, ML, SC and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. A minimum standard Proctor (ASTM D 698) maximum dry density of approximately 90 pounds per cubic feet for fill material.
- C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, MH, CH, OL,

OH, and PT, or a combination of these group symbols.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Backfill and Fill: Satisfactory soil materials.

E. Subbase: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (38-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

F. Base: VDOT #21 Aggregate

G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (38-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve. Satisfactory soils as defined above may also be used with a maximum liquid limit of 40 and a plasticity of not less than 20.

H. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

I. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (38-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

J. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

L. Select Sand: Select sand shall meet the requirements for materials and gradation in section 202-Fine Aggregate, of the Virginia Department of Transportation Road and Bridge Specifications, 2007 Edition. The size used shall be Standard size A or B as listed and defined in Table II-1, "Fine Aggregate" of the VDOT specifications

2.2 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description

of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Geotextile Fabric

1. A woven geotextile fabric conforming to ASTM D 4873 with the following minimum properties

<u>Property</u>	<u>Test Procedure</u>	<u>Minimum Requirements</u>
Grab tensile strength	ASTM D 4632	300 lbs
Grab elongation	ASTM D 4632	15%
Trapezoid tear	ASTM D 4533	115 lbs
CBR puncture	ASTM D 6241	1000 lbs
UV resistance (500 hrs)	ASTM D 4355	80%
Permittivity	ASTM D 4491	4 gpm/sf
A.O.S.	ASTM D 4751	50 U.S. Sieve

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- D. Provide and install all perimeter erosion and sediment controls prior to earthwork operations.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or

water accumulation.

- C. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
- D. Install a dewatering system, in needed, to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

- A. Classified Excavation: Excavation is classified and includes excavation to required subgrade elevations. Excavation will be classified as earth excavation, unsatisfactory soils excavation, or rock excavation as follows:
 - 1. Earth excavation includes excavation of pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; together with soil and other materials encountered that are not classified as rock, unsatisfactory soils or unauthorized excavation.
 - 2. Intermittent drilling, blasting, or ripping to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.
 - 3. Rock excavation includes removal and disposal of rock material and obstructions encountered and as defined as rip rock above.
 - 4. Unsatisfactory soils are as defined above and identified by the Owner's geotechnical testing agency.
 - 5. Rock and unsatisfactory soils excavation will be paid by unit prices included in the Contract Documents.
 - 6. Do not excavate rock and unsatisfactory soils until it has been classified and cross-sectioned by Architect.

3.5 EXCAVATION FOR STRUCTURES

- A. General: In accordance with the soils report in Appendix A excavated subgrades shall be evaluated by the geotechnical engineer/special inspections agent. Localized authorized undercutting and/or in-place stabilization may be required. Controlled engineered fill shall replace undercut soils and paid for at the unit price included on the bid form.
- B. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

- C. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
- D. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended for bearing surface.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
 - 1. Clearance: As indicated.
- C. Trench Bottoms: Excavate trenches 6 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe and fittings. Undercut 6 inches if unyielding bearing material or rock is encountered.
- D. Excavate trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

3.8 APPROVAL OF SUBGRADE

- A. Notify Architect and Owner's geotechnical testing agency when excavations have reached required subgrade.
- B. If the Testing Agency determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain,

accumulated water, or construction activities, as directed by Architect.

3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Architect.
- B. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover as needed to prevent windblown dust.
- B. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for record documents.
 - 3. Inspecting and testing underground utilities.
 - 4. Removing concrete formwork.
 - 5. Removing trash and debris.
 - 6. Removing temporary shoring and bracing, and sheeting.
 - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls, if required.
- B. Restrict the maximum thickness of layers of the placement of loose fill and backfill soil materials to 6 inches when lightweight compaction equipment must be used. This would include close proximity to unbraced building walls, utility trenches and small excavations for manholes, underground vaults/boxes, etc.

3.12 UTILITY TRENCH BACKFILL

- A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits

- B. Place and compact initial backfill of subbase material, free of particles larger than 1 inch (25 mm), to a height of 12 inches (300 mm) over the utility pipe or conduit.
 - 1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
- C. Coordinate backfilling with utilities testing.
- D. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.
- E. Place and compact final backfill of satisfactory soil material to final subgrade.
- F. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.13 Fill

- A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.
- B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- C. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.
 - 3. Under steps and ramps, use engineered fill.
 - 4. Under building slabs, use engineered fill.
 - 5. Under footings and foundations use engineered fill.

3.14 MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 3 percent of optimum moisture content.
 - 1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 3 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF BACKFILLS AND FILLS

- A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

- B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
 - 1. Under structures, building slabs, work and loading areas, steps, and pavements, scarify and re-compact top 12 inches of existing subgrade and each layer of backfill or fill material at 98 percent.
 - 2. Under gravel/aggregate areas scarify and re-compact top 4 inches of existing subgrade and each layer of backfill or fill material at 95 percent.
 - 3. Under lawn or unpaved areas, scarify and re-compact top 6 inches below subgrade and compact each layer of backfill or fill material at 85 percent.

3.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Lawn or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1 inch.
 - 3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.17 SUBBASE AND BASE COURSES

- A. Under pavements and walks, place subbase course on prepared subgrade and as follows:
 - 1. Place base course material over subbase.
 - 2. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 698.
 - 3. Shape subbase and base to required crown elevations and cross-slope grades.
 - 4. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
 - 5. When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.
- B. Pavement Shoulders: Place shoulders along edges of subbase and base course

to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.18 GEOTEXTILE INSTALLATION

- A. Site Preparation:
 - 1. Prepare area to a smooth uniform surface. Remove all sharp protruding objects.
- B. Installation
 - 1. Spread immediately ahead of covering operation. Do not expose to sunlight for more than 7 days. Lay smooth without wrinkles.
 - 2. Overlap adjoining sections a minimum of 36 inches.
 - 3. Repair all damaged fabric with patch of same material overlapping 3 feet minimum from damaged area.

3.19 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work complies with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- D. Testing agency will test compaction of soils in place according to ASTM D 698, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
 - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet or less of wall length, but no fewer than two tests.
 - 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet or less of trench length, but no fewer than two tests.
- E. When the testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained.

3.20 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to the specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- C. Scarify or remove and replace soil material to depth as directed by Architect; reshape and re-compact.
- D. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Burning is not permitted on Owner's property.
- B. All surplus demolished building materials and other waste materials, except for extra materials required by the project specifications, shall be disposed of at a VDOT approved disposal site. The contractor shall provide the owner's representative with a signed approval notification from the disposal site prior to disposal of any materials. The notification must indicate that materials from the Van Dorn site will be accepted and disposal is in accordance with applicable regulations.

END OF SECTION

SECTION 02400

STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Pipe and fittings
2. Manholes
3. Nonpressure transition couplings
4. Expansion Joints
5. Catch Basins
6. Stormwater inlets
7. Pipe outlets

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.3 SUBMITTALS

A. Submit in accordance with Conditions of the Contract and the requirements of Section 01300 "Submittals."

PART 2 - PRODUCTS

Refer to site plan details for VDOT Road and Bridge standard products as indicated. Plastic pipe products shall be per details indicated or approved alternative.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Division 02300 Earthwork for excavating, trenching and backfilling.

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout consider design considerations. Install piping as

indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process or microtunneling.
- F. Install gravity-flow, nonpressure drainage piping according to the following:
 - i. Install piping pitched down in direction of flow.
 - ii. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
 - iii. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

3.3 PIPE JOIN CONSTRUCTION

- A. Join gravity-flow, nonpressure drainage piping according to the following:
 - 1. Join gravity PVC corrugated sewer piping according to ASTM D 2321 for elastomeric-seal joints.
 - 2. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber gasketed joints.
 - 3. Join HDPE pipe according to manufacturer's written instructions.
 - 4. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.4 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in

pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

3.5 CATCH BASIN INSTALLTION

- A. Set frames and grates to elevations indicated.

3.6 STORMWATER INLET AND OUTLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Construct rip rap of broken stone, as indicated.
- C. Install outlets that spill onto grade, anchored with concrete, where indicated.
- D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
- E. Construct energy dissipators at outlets, as indicated.

3.7 CONNECTIONS

- A. Make connections to existing piping and underground manholes.
 - 1. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- B. Pipe couplings and expansion joints with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 - 1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - i. Unshielded flexible couplings for same or minor difference OD pipes.
 - ii. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
 - iii. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.8 IDENTIFICATION

- A. Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
 - 1. Use warning tape or detectable warning tape over ferrous piping.

2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.9 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 1. Submit separate reports for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder or size not less than 92.5 percent of piping diameter
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test New piping stems, and parts of existing systems that have been altered, extended, or repaired for leaks and defects.
 1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours advance notice.
 4. Submit separate report for each test.
 5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
 - b. Option: Test plastic piping according to ASTM F 1417.
 - c. Option: Test concrete piping according to ASTM C 924
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials and repeat testing until leakage is within allowances specified.

END OF SECTION

SECTION 02510
ASPHALT PAVEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Prepare pavement sub-grade as described in Contract Documents to receive pavement base and paving.
2. Furnish and install pavement base and asphaltic concrete paving in parking, entrance and drive lanes as described in Contract Documents.

B. Related Sections:

1. Section 02300: Earthwork

1.2 SUBMITTALS

A. Quality Assurance / Control:

1. Submit certification from Asphalt batch plant for proposed mix design of each class of mix for information prior to beginning of work.
2. Copies of test results from tests conducted to assure compliance to Contract Document requirements.

1.3 QUALITY ASSURANCE

A. Qualifications: Paving contractor to be certified and experienced with installing and finishing VDOT Superpave Asphalt Concrete.

B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with industry standards, the specified requirements and the methods for proper performance of the work of this section.

C. Asphalt Mixing Plant: VDOT Certified

D. Obtain Materials from same source throughout project

E. Pre-Installation Conferences:

1. Schedule paving pre-installation conference after staking out all areas requiring asphalt paving and after the base aggregate is installed.

1.4 PROJECT CONDITIONS

A. Environmental Requirements:

1. Do not perform work during following conditions:

- a. Ambient temperature and / or surface temperature of base below 50 deg F.
- b. Presence of free surface water.
- c. Over-saturated base and sub-grade materials.
- d. Rainy or foggy weather

PART 2 - PRODUCTS

2.1 MATERIAL

A. Base:

- 1. New Aggregate Base:
 - a. Road Base type gravel or crushed stone shall be VDOT Type I Aggregate, No 21 A and shall conform with materials specified in Section 208 of the VDOT Road and Bridge Specifications
 - b. Quality Requirements as established by testing:
 - 1) R-value: 70 minimums.
 - 2) Sand Equivalent: 25 minimums.
 - 3) Durability Index: 35 minimum.

B. Asphalt Cement Primer: Meet requirements of ASTM D 2027, MC 70, plus or minus one grade.

C. Tack Coat: Shall be VDOT RC-250 or equivalent

D. Superpave Asphalt Concrete Pavement Mixture:

- 1. Asphalt Concrete Base Mixture: VDOT BM-25.0A bituminous concrete
- 2. Asphalt Concrete Surface Mixture: VDOT SM-9.5A bituminous concrete

E. Asphalt Cement:

- 1. All asphalt cement shall conform to the current Superpave specifications for the above mixtures Specifications

PART 3 - EXECUTION

3.1 PREPARATION

A. Survey and stake parking surfaces to show grading required by Contract Documents.

B. Sub-Grade:

- 1. Finish grade parking surface area to grades required by Contract Documents.
- 2. Compact sub-grade as specified in Section 02300.

C. Work Area Protection

- 1. On-site, provide and maintain temporary signs, signals, lighting devices, markings, and barricades to protect personnel and new construction from damage by equipment and vehicles until the Architect approves the surface.

3.2 PREPARATION

- A. Protect finished surfaces adjacent to asphalt work from overspray, damage by equipment, etc.
- B. For repair work, cut existing surface back to undisturbed material to provide uniform division lines between existing and new work.
- C. Butt new work to existing surfaces to result in smooth transitions and uniform sections.
- D. Before placing surface, inspect the subgrade and base for conformity with the specified section. If necessary, remove or add material to bring all portions of the subgrade and base to proper section and correct elevation. Thoroughly compact and inspect the adjusted section after correcting.

3.3 INSTALLATION

- A. Site Tolerances:
 - 1. Sub-Grade: 1 inch high. Measure using string line from curb to curb, gutter, flat drainage structure, or grade break.
 - 2. Sub-Base:
 - a. Base shall be 8 inches thick minimum after compaction, except where shown thicker on drawings.
 - b. Measure using string line from curb to curb, gutter, flat drainage structure, or grade break.
 - 3. Paving:
 - a. Apply asphaltic concrete paving in single 3.0 inch lift for the BM-25.0 and a single 1.5 inch for the SM-9.5 Surface. Pavement thicknesses are after compaction
 - b. Surface texture of hand worked areas shall match texture of machine-laid areas.
- B. Base:
 - 1. For Asphalt Pavement: Begin spreading base material at the point nearest the source of supply. Permit traffic and hauling over the base. Fill ruts formed by traffic and reroll. After base course placement, continue machining and rolling until surface is smooth, compacted, well bonded, and true to the designed cross section. Compact to 100 percent ASTM D-698 maximum dry density. Maintain the base smooth and true to grade and cross section until asphaltic concrete placement
 - 2. If roller is smaller than 8 ton, lay gravel and compact in two courses.
 - 3. Compact as specified in Section 02300.
 - 4. Priming: Prime base with application of 0.2 to 0.5 of asphalt cement primer per square yard if pavement will be laid more than three days after compaction of base, or if precipitation is anticipated between completion of compaction of base and laying of pavement.
 - 5. Re-compact unprimed base if it receives precipitation before pavement is laid.
 - 6. Remove or repair improperly prepared areas as directed by Architect.

C. Asphalt Paving:

1. Tack coat vertical concrete surfaces that will be in contact with paving with RC-250 at a rate of 0.1 gallons per square yards.
2. Uniformly mix materials so aggregate is thoroughly coated with asphalt.
3. Place at temperatures between 250 and 325 degrees Fahrenheit with a self-propelled laydown machine.
4. Longitudinal bituminous joints shall be vertical and properly tack coated if cold. Transverse joints shall always be tack coated.
5. Compaction:
 - a. Compact asphalt paving to 96 percent minimum. Determine percent compaction by dividing density of test cores as determined by either ASTM D 1188 or ASTM D 2726 by laboratory compacted density as determined by ASTM D 1559. Maximum total air voids in completed asphaltic concrete shall be 8 percent as determined by ASTM D 2041.
 - b. Roll with powered equipment capable of obtaining specified density.
 - c. Begin breakdown rolling immediately after asphalt is placed when asphalt temperature is at maximum. Complete breakdown rolling before mix temperature drops below 240 degrees Fahrenheit. Complete handwork compaction concurrently with breakdown rolling.
 - d. Complete intermediate rolling as soon as possible after breakdown rolling and before mix temperature drops below degrees Fahrenheit. Do not roll paving for compaction purposes after asphalt temperature falls below 185 deg F.
 - e. Execute compaction so visibility of joints is minimized. Complete finish rolling to improve asphalt surface as soon as possible after intermediate rolling and while asphalt paving is still warm. Do not use vibration for finish rolling.
6. Surface shall be uniform with no 'birdbaths.' Leave finished surfaces clean and smooth. Variations from specified grades shall not exceed 1/2 inch.

3.4 FIELD QUALITY CONTROL

- A. Site Tests: When tested with 10 foot straight edge, surface of completed work shall not contain irregularities in excess of 1/4 inch.
- B. The Owner's representative will be obtaining cored in-place samples for laboratory testing.

END OF SECTION

DIVISION 3 - CONCRETE

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Cast-in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.

1.2 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixes: For concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mix water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement.
- D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork. Design and engineering of formwork are Contractor's responsibility.
- E. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and installing and removing reshoring.
- F. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
 - 1. Cementitious materials and aggregates.
 - 2. Form materials and form-release agents.
 - 3. Steel reinforcement and reinforcement accessories.
 - 4. Admixtures.
 - 5. Curing materials.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
 - 1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for formwork and shoring and reshoring installations that are similar to those indicated for this Project in material, design, and extent.
- C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- D. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
- E. ACI Publications: Comply with the following, unless more stringent provisions are indicated:
 - 1. ACI 301, "Specification for Structural Concrete."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. Structural 1, B-B, or better, mill oiled and edge sealed.
 - b. B-B (Concrete Form), Class 1, or better, mill oiled and edge sealed.

- B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of the exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes not larger than 1 inch (25 mm) in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Plain-Steel Wire: ASTM A 82, as drawn.

2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.
- B. Joint Dowel Bars: Plain-steel bars, ASTM A 615/A 615M, Grade 60 (Grade 420). Cut bars true to length with ends square and free of burrs.

2.4 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
 - 1. Fly Ash: ASTM C 618, Class C or F.
 - 2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:

1. Class: Moderate weathering region, but not less than 3M.
2. Nominal Maximum Aggregate Size: 1-1/2 inches (38 mm).

C. Water: Potable and complying with ASTM C 94.

2.5 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1,

F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

G. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Evaporation Retarder:

- a. Eucobar; Euclid Chemical Co.
- b. Vapor Aid; Kaufman Products, Inc.
- c. E-Con; L&M Construction Chemicals, Inc.
- d. Confilm; Master Builders, Inc.
- e. SikaFilm; Sika Corporation.

2. Clear, Waterborne, Membrane-Forming Curing Compound:

- a. Safe-Cure & Seal 20; ChemMasters.

- b. Diamond Clear VOX; Euclid Chemical Co.
 - c. SureCure; Kaufman Products Inc.
 - d. Dress & Seal WB; L&M Construction Chemicals, Inc.
 - e. Vocomp-20; W. R. Meadows, Inc.
3. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound:
- a. Klear-Kote Cure-Sealer-Hardener, 30 percent solids; Burke Group, LLC (The).
 - b. Polyseal WB; ChemMasters.
 - c. Lumiseal WB Plus; L&M Construction Chemicals, Inc.
 - d. Vocomp-30; W. R. Meadows, Inc.

2.7 VAPOR RETARDERS

- A. Vapor Retarder: ASTM E 1745, Class C, of one of the following materials; or polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick:
- 1. Nonwoven, polyester-reinforced, polyethylene coated sheet; 10 mils (0.25 mm) thick.

2.8 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- F. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Evaporation Retarder:
 - a. Spray-Film; ChemMasters.
 - b. Eucobar; Euclid Chemical Co.
 - c. Vapor Aid; Kaufman Products, Inc.
 - d. E-Con; L&M Construction Chemicals, Inc.
 - e. Confilm; Master Builders, Inc.
 - f. SikaFilm; Sika Corporation.

2. Clear, Waterborne, Membrane-Forming Curing Compound:

- a. Safe-Cure & Seal 20; ChemMasters.
- b. Diamond Clear VOX; Euclid Chemical Co.
- c. SureCure; Kaufman Products Inc.
- d. Dress & Seal WB; L&M Construction Chemicals, Inc.

2.9 RELATED MATERIALS

- A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.10 REPAIR MATERIALS

- A. Repair Topping: Traffic-bearing, cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6 mm).
 1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm) or coarse sand as recommended by topping manufacturer.
 4. Compressive Strength: Not less than 5700 psi (39 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXES

- A. Concrete mixtures shall comply with ACI 301. Prepare normal-weight concrete (145 PCF) design mixes unless otherwise noted, proportioned according to ACI 301. As follows:
 1. Class A: Footings:
 - a. Exposure Class: ACI 318 F1
 - b. Minimum compressive strength: 3500 PSI at 28 days.
 - c. Maximum water-cementitious materials ratio: 0.55
 - d. Slump limit: 4 inches +/- inch with a maximum of 8 inches if a type I or II plasticizing admixture conforming to ASTM C 1017/C1017M or a type F or G high-range water-reducing admixture conforming to ASTM C494/C494M is permitted.
 - e. Air content: 4.5% (+/- 1.5%)
 2. Class B: Retaining Walls
 - a. Exposure Class: ACI 318 F2
 - b. Minimum compressive strength: 4500 PSI at 28 days.
 - c. Maximum water-cementitious materials ratio: 0.45
 - d. Slump limit: 4 inches +/- inch with a maximum of 8 inches if a type I or II plasticizing admixture conforming to ASTM C 1017/C1017M or a type F or G

- high-range water-reducing admixture conforming to ASTM C494/C494M is permitted.
- e. Air content: 6% (+/- 1.5%)

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
 - 2. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure

PART 3 EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch (3 mm).
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.

1. Do not use rust-stained steel form-facing material.
- F. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- G. Chamfer corners or edges of concrete.
- H. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- I. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- J. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 1. Install anchor bolts, accurately located, to elevations required. Coordinate with Section Fabric Roof Structure and other applicable sections.
 2. Install reglets to receive top edge of foundation sheet waterproofing and membrane roofing.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork, for sides of walls and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.
- B. Leave formwork, for beam soffits, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved the following:
 1. Determine compressive strength of in-place concrete by testing representative field- or laboratory-cured test specimens according to ACI 301.
- C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

- D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR RETARDERS

- A. Vapor Retarder: Place, protect, and repair vapor-retarder sheets according to ASTM E 1643 and manufacturer's written instructions.

3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Shop- or field-weld reinforcement according to AWS D1.4.
- F. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 - 3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than 1/2 inch (12 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement, unless approved by Architect or the Testing Company representative.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mix.
- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.
- D. Deposit concrete in forms in horizontal layers no deeper than 24 inches (600 mm) and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.
1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.

2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
- F. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- G. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.
- H. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

- A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch (3 mm) in height.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

- A. General: Comply with recommendations in ACI 302.1R for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
- C. Broom Finish: Apply a broom finish to exterior and interior concrete slabs, steps, and ramps, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.11 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

3.12 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.2-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch (19 mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete

of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

5. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

- E. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.13 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
- C. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 1. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mix, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
 2. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
 3. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
 4. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of five standard cylinder specimens for each composite sample.
 5. Compressive-Strength Tests: ASTM C 39;
 - a. Test two field-cured specimens at 7 days and two at 28 days.
 - b. Hold one specimen as a spare.
 - c. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at

age indicated.

- D. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
- E. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
- F. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.
- G. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- H. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

END OF SECTION

SECTION 07920

JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joint sealants for following locations:
 - a. Exterior and interior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below:
 - 1) The intersections of various materials as indicated or required for a permanently watertight installation.
 - 2) Joints between different materials where a precise fit can not be achieved.
 - 3) Perimeter joints between frames of doors and other materials.
 - 4) Other joints as indicated.

1.2 REFERENCES

- A. ASTM C 920: "Standard Specification for Elastomeric Joint Sealants."
- B. ASTM C 1193: "Standard Guide for Use of Joint Sealants."

1.3 SUBMITTALS

- A. General: Submit in accordance with Conditions of the Contract and requirements of Section 01300 "Submittals".
- B. Product data for sealants and accessory materials specified.
- C. Color Chips: Samples for color selection consisting of cured portions of actual sealant materials proposed for use.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants produced and installed to establish and maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.
- B. Provide joint sealants for interior applications produced and installed to establish and maintain water- resistant and airtight continuous seals without causing staining or deterioration of joint substrates.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed joint sealant applications similar in material, design, and extent to that indicated for this Project that have resulted in construction with a record of successful in-service performance.
- B. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.
- B. Store and handle materials in compliance with manufacturer's recommendations to prevent deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealants under following conditions:
 - 1. Temperature Conditions: When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40 deg F.
 - 2. Wet Substrate: When joint substrates are wet.
 - 3. Joint Width Conditions: Where joint widths are less than allowed by joint sealant manufacturer for application indicated.
 - 4. Contaminants: Until contaminants capable of interfering with sealant adhesion are removed from joint substrates.

PART 2 PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Manufacturer's standard colors selected by Architect.

2.2 ELASTOMERIC JOINT SEALANT

- A. One part non sag polyurethane, ASTM C 920, Type S, Grade NS, Class 25; Pecora Dynatrol I, Sonneborn Sonolastic NP 1, or Tremco Dymonic.

1. Use: Exterior and interior non-traffic surfaces.

2.3 JOINT SEALANT BACKING

- A. General: Provide nonstaining sealant backings compatible with joint substrates, sealants, primers and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-staining, non-waxing, non-extruding strips of flexible open-cell polyurethane foam, of size, shape, and density necessary to control sealant depth.
- C. Bond-Breaker Tape: Self-adhesive polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure.

2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer for adhesion of sealant to joint substrates indicated.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces, formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and following:
 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent protective coatings tested and approved for sealant adhesion and compatibility

- by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 3. Remove laitance and form release agents from concrete.
 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Installation of Sealant Backings:
1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - a. Do not leave gaps between ends of joint fillers.
 - b. Do not stretch, twist, puncture, or tear joint fillers.
 - c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
- D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling

recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at same time sealant backings are installed.

E. Tooling of Nonsag Sealants:

1. Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint.
 - a. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
2. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or that are not approved by sealant manufacturer.

3.4 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION AND REPAIR

- A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion.
- B. If, despite protection, damage or deterioration occurs, cut out and replace damaged or deteriorated joint sealants immediately so that installations with repaired areas are indistinguishable from original work.

END OF SECTION

SECTION 260500

ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Except as modified in this Section, General Conditions, Supplementary Conditions, applicable provisions of Division 1 General Requirements, and other provisions and requirements of the Contract Documents apply to work of Division 26 Electrical.
- B. Applicable provisions of this section apply to all sections of Division 26, Electrical.

1.2 CODE REQUIREMENTS AND FEES

- A. Electrical work shall comply with applicable inspection services:
 - 1. Underwriters Laboratories,
 - 2. National Fire Protection Association.
 - 3. 2020 National Electrical Code.
- B. Resolve any code violations discovered in contract documents with the Engineer prior to award of the contract.

1.3 CONTRACTOR'S QUALIFICATIONS

- A. An approved contractor for the work under this division shall be:
 - 1. A specialist in this field and have the personnel, experience, training, and skill, and the organization to provide a practical working system.
 - 2. Able to furnish evidence of having contracted for and installed not less than three (3) systems of comparable size and type that have served their Owners satisfactorily for no less than three (3) years.

1.4 WORKMANSHIP

- A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- B. Perform work by persons qualified to produce workmanship of specified quality.
- C. Secure products in place with positive anchorage devices designed and

sized to withstand stresses, vibration, and racking. Under no conditions shall material or equipment be suspended from structural bridging.

- D. Provide finishes to match approved samples; all exposed finishes shall be approved by the Architect / Engineer. Submit color samples as required.

1.5 MANUFACTURER'S INSTRUCTIONS

- A. Comply with instructions in full detail, including each step in sequence.
- B. Should instruction conflict with Contract Documents, request clarification from Architect / Engineer before proceeding.

1.6 MANUFACTURER'S FIELD SERVICES

- A. When required in individual Specification Sections, manufacturer shall provide a manufacturer's qualified personnel to observe:
 - 1. Field conditions.
 - 2. Condition of installation.
 - 3. Quality of workmanship.
 - 4. Start-up of equipment.
 - 5. Testing and adjusting of equipment.
- B. Manufacturer's qualified personnel shall make written report of observations and recommendations to Architect/Engineer.

1.7 CONTRACT DRAWINGS

- A. Contract drawings are diagrammatic only and do not give fully dimensioned locations of various elements of work. Determine exact locations from field measurements.
- B. Every effort has been made by the Engineer to indicate wiring of all receptacles, light fixtures, switches, telephone outlets, HVAC equipment, other equipment, elevator equipment, and all other devices / appliances requiring electrical power. It is the intent of the Engineer that all light fixtures be powered and controlled unless specifically noted on the plans; that all wiring devices (receptacles and direct connected equipment) be circuited to a power source of the correct voltage, unless specifically noted on the drawings; and that all HVAC, elevator equipment and other equipment be properly wired to the correct voltage power source; that all communications and security systems devices and equipment and all fire alarm system devices and equipment are installed, wired and systems are fully operational.

- C. It is the responsibility of the Contractor to review the architectural drawings (reflected ceiling plans) for light fixtures, casework elevation details for electrical devices which are not indicated on the electrical drawings; to review the mechanical and plumbing documents and other consultant equipment drawings to determine the electrical rough-ins for all equipment requiring power connections, and to include in their proposals the correct and complete electrical rough-ins for all of these items which were inadvertently not indicated on the electrical drawings, OR the Contractor shall specifically enumerate each item requiring electrical rough-in which is not specifically shown on the electrical drawings, and indicate the electrical provisions of these items as specifically excluded from his proposal.

1.8 PROJECT RECORD DOCUMENTS

- A. Maintain at the job site a separate set of white prints (black line) of the contract drawings for the sole purpose of recording the "as-built" changes and diagrams of those portions of work in which actual construction is significantly at variance with the contract drawings. Mark the drawings with a colored pencil. Prepare, as the work progresses and upon completion of work, reproducible drawings clearly indicating locations of various major and minor feeders, equipment, and other pertinent items, as installed. Record underground and under slab service and feeders installed, dimensioning exact location and elevation of such installations.

1.9 SPACE REQUIREMENTS

- A. Consider space limitations imposed by contiguous work in selection and location of equipment and material. Do not provide equipment or material that is not suitable in this respect.

1.10 RELATION WITH OTHER TRADES

- A. Carefully study all matters and conditions concerning the project. Submit notification of conflict in ample time to prevent unwarranted changes in any work. Review other Divisions of these specifications to determine their requirements.
- B. Provide sleeves and inserts in forms as required for the work. Stub up and protect open ends of pipe before any concrete is placed. Furnish sizes of required equipment pads. Furnish and locate bolts and fittings required to be cast in them. Locate and size openings required for installation of work specified in this Division in sufficient time to prevent delay in the work.

1.11 CONCEALED AND EXPOSED WORK

- A. When the word "concealed" is defined as hidden from sight as in chases, furred spaces or above ceilings. "Exposed" is defined as open to view, in plain sight.

1.12 GUARANTEE

- A. Guarantee work for one (1) year from the date of substantial completion of the project. During that period make good any faults or imperfections that may arise due to defects or omissions in material, equipment or workmanship. At the Owner's option, replacement of failed parts or equipment shall be provided.

1.13 MATERIAL AND EQUIPMENT

- A. Furnish new and unused materials and equipment meeting the requirements of the paragraph specifying acceptable manufacturers. Where two (2) or more units of the same type or class of equipment are required, provide units of a single manufacturer.

1.14 NOISE AND VIBRATION

- A. Select equipment to operate with minimum noise and vibration. If noise or vibration is produced or transmitted to or through the building structure by equipment, piping, ducts or other parts of work, and judged objectionable by the Owner, Architect, or Engineer, rectify such conditions at no additional cost to the Owner. If the item of equipment is judged to produce objectionable noise or vibration, demonstrate at no additional cost that equipment performs within designated limits on a vibration chart.

1.15 ACCEPTABLE MANUFACTURERS

- A. Manufacturers names and catalog number specified under sections of Division 26 are used to establish standards of design, performance, quality and serviceability and not to limit competition. Equipment of similar design, materials, energy efficiency characteristics (where applicable) and lighting performance characteristics (where applicable) equal to that specified, manufactured by a named manufacturer shall be acceptable on approval. A request for prior approval of equipment not listed must be submitted seven (7) days before bid due date. Submit a marked-up set of the relevant specification section indicating all variances, a comparison to the specified product, and of construction and performance criteria, complete design and performance data for the specified product and the proposed substitution for comparison to the Engineer. The Architect issues approvals of acceptable manufacturers as addenda to the Construction Documents.

1.16 UTILITIES, LOCATIONS AND ELEVATIONS

- A. Examine the site and verify the location and elevation of all utilities and of their relation to the work. Existing utilities indicated on the site plans are for reference only and shall be field verified by the Contractor with the respective public or private utility.

1.17 WARRANTIES

- A. Submit three (3) copies of all warranties and guarantees for systems, equipment, devices and materials. These shall be included in the Operating and Maintenance Manuals.

1.18 BUILDING CONSTRUCTION

- A. It shall be the responsibility of the sub-contractor to consult the Contract Drawings, details and specifications and thoroughly familiarize himself as to the construction and all job related requirements. All construction trades shall cooperate with the General Contractor / Construction Manager job site superintendent and lay out work so that all raceways and other items are placed in the walls, furred spaces, chases, etc., so that there shall be no delay in the job.

1.19 TEMPORARY FACILITIES

- A. General: Refer to Division 1 for general requirements on temporary facilities.
- B. Temporary Wiring: Temporary power and lighting for construction purposes shall be provided under this Division. Installation of temporary power shall be in accordance with NEC Article 527.
- C. Temporary facilities, wire, lights, and devices are the property of this Contractor and shall be removed by this Contractor at the completion of the Contract.
- D. Prior to shutdown of existing power, provide at minimum 120/240 volt, 1-phase, 3-wire electrical service to provide temporary power to all critical loads as identified by Owner including but not limited to all security systems, fire alarm panel and associated remote power supplies. Contractor shall coordinate directly with local utility regarding temporary power service and metering and shall provide all necessary permits and fees at no cost to the Owner.

- E. Provide a minimum 30-space panelboard with required branch circuit breakers as required and all associated temporary wiring as required. Remove all temporary power prior to substantial completion.

1.20 ELECTRICAL OPERATION AND MAINTENANCE MANUAL

A. Content of Manual:

1. Neatly typewritten Table of Contents for each volume arranged in systematic order as outlined in the specifications.
 - a. Contractor, name of responsible principal, address and telephone number
 - b. A list of each product required to be included, indexed to content of the volume.
 - c. List with each product, name, address and telephone number of:
 - 1) Subcontractor or installer
 - 2) Maintenance contractor as appropriate
 - 3) Identify area of responsibility of each.
 - 4) Local source of supply for parts and replacement
 - d. Identify each product-by-product name and other identifying symbols as set forth in Contract Documents.
2. Product Data:
 - a. Include those sheets pertinent to the specific product.
 - b. Annotate each sheet to:
 - 1) Identify specific product or part installed.
 - 2) Identify data applicable to installation.
 - 3) Delete references to inapplicable information.
3. Drawings:
 - a. Supplement product data with drawings as necessary to illustrate:
 - 1) Relations of component parts of equipment and systems
 - 2) Control and flow diagrams
 - b. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
 - c. Do not use Project Record Documents as maintenance drawings.
4. Written text as required to supplement product data for the particular installation.
5. Copy of each warranty, bond and service contract issued
 - a. Provide information sheet for Owner's personnel, giving:
 - 1) Proper procedures in event of failure
 - 2) Instances that might affect validity of warranties or bonds
6. Shop drawings and product data as specified.

B. Sections for Equipment and Systems:

1. Content for each unit of equipment and system as appropriate:
 - a. Description of unit and component parts:
 - b. Operating procedures:
 - 1) Start up, break-in, routine / normal operating instructions
 - 2) Regulation, control, stopping, shut down and emergency instructions
 - 3) Summer and winter operating instructions
 - 4) Special operating instructions
 - c. Maintenance procedures:
 - 1) Routine operations
 - 2) Guide to trouble-shooting
 - 3) Disassembly, repair and reassembly
 - 4) Alignment, adjusting and checking
 - 5) Routine service based on operating hours
 - d. Servicing and lubrication schedule
 - 1) List of lubricants required
 - e. Manufacturer's printed operating and maintenance instructions.
 - f. Copies of typed circuit directories of panel board to reflect actual room graphics numbers and room names (not architectural room numbers from the drawings).
 - 1) Electrical
 - 2) Controls
 - 3) Communications
 - g. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
 - 1) Predicted life of part subject to wear
 - 2) Items recommended to be stocked as spare parts
 - h. Schedule of fuses
 - i. Complete equipment field accessible internal wiring diagrams
 - j. Schedule of lamps
 - k. Schedule of ballasts
 - l. Each Contractor's coordination drawings
 - 1) As installed color coded piping diagrams.
 - m. List of original manufacturer's spare parts and recommended quantities to be maintained in storage
 - n. Other data as required under pertinent sections of the specifications
2. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel.
3. Additional requirements for operating and maintenance data as outlined in respective sections of specifications

4. Provide complete information for products specified in Division 16.
5. Provide certificates of compliance as specified in each related section.
6. Provide start up reports as specified in each related section.
7. Provide signed receipts for spare parts and material.
8. Provide training report and certificates.

1.21 SHOP DRAWINGS AND PRODUCT DATA

- A. Submittals shall not be combined or bound together with any other material submittal.
- B. Submittal Specification Information:
 1. Every submittal document shall bear the following information as used in the project manual:
 - a. The related specification section number
 - b. The exact specification section title
 2. Submittals delivered to the Architect / Engineer without the specified information will not be processed. The Contractor shall bear the risk of all delays, as if no submittal had been delivered.
- C. Submit individually bound shop drawings and product data for the following when specified or provided:
 1. Enclosed Switches and Circuit Breakers
 2. Enclosed Motor Controllers
 3. Panelboards and enclosures
 4. Wiring devices
 5. Electrical controls and time switches
 6. Surge Protection Devices
 7. Surface Raceways
 8. Medium Voltage Cable and Connectors
 9. Fire Rated Cables and Connectors
- D. Mark up a complete copy of the specification section for the product to indicate a) acknowledgement of the specification requirement (Comply), or b) acknowledgement that the particular specification requirement does not apply to this specific project (Not Applicable) or, c) acknowledgement that the specification requirement cannot be made or that a variance is being submitted for review to the Architect/Engineer/Owner (Does Not Comply, Explanation:) Do not submit an outline form of compliance, submit a complete copy with the product data.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavate trenches for underground raceways to the required depth to ensure minimum coverage.
- B. Backfill shall not be placed until the work has been inspected, tested, and approved. Complete backfill to the surface of natural ground or to the lines and grades shown on drawings. Except where special materials are required by other Divisions, use stabilized sand to six inches above conduits, continue backfill with select fill material. Do not use peat, silt, muck, debris or other organic materials. Deposit backfill in uniform layers and compact each layer as specified in other Divisions.

3.2 IDENTIFICATION OF EQUIPMENT

- A. Identification of Equipment:
 - 1. All major equipment shall have a manufacturer's label identifying the manufacturer's address, equipment model and serial numbers, equipment size, and other pertinent data. Take care not to obliterate this nameplate. The legend on all nameplates or tags shall correspond to the identification shown on the Operating Instructions.
 - 2. Three layer laminated plastic engraved identifying nameplate shall be permanently secured to each switchboard, distribution panel, motor control center, transformer, panelboard, safety disconnect switch, enclosed circuit breaker, wireway, busduct plug, terminal cabinet, surge protective device, capacitor, individual motor controller, contactor, fire alarm panels (main and remote booster), and communications (voice, data, video) cabinet or rack and rooftop equipment (ie: supply and exhaust fans, rooftop HVAC equipment) with stainless steel screws.
 - a. Utility Power: White letters on black background
Generator Power (Emergency): White letters on red background
UPS Power: White letters on blue background
Load Bank Circuits: White letters on green background
 - b. Identifying nameplates shall have ½-inch high, engraved letters for equipment designation and ¼-inch letters indicating source circuit designation, (i.e., "PANEL HA – served from MDP-6 located in Mech. Rm. 100").
 - c. Each switchboard, distribution panel, and motor control center branch circuit device shall have a nameplate showing the load and location of load served in ¼-inch high, engraved letters. Circuit breaker name and kirk key if applicable.

- d. Each section of multiple section panelboards shall also indicate panelboard section number (i.e., Panel “HA-Section 2 – served from MDP-6 located in Mech. Rm. 100”)
 - e. Enclosed switches, starters, circuit breakers and contactors: Provide neatly typed label inside each motor starter and contactor enclosure door identifying motor or load served, nameplate horsepower, full load amperes, code letter, service factor, and voltage / phase rating. Provide Phenolic nameplate on cover exterior to indicate motor or load served, location of load served, panel(s) and circuit(s) serving load(s), description and location of control controlling contactor (i.e., contactor controlled by switch in Room A107.), and panel and circuit feeding line side of control transformer. Example of label for lighting / receptacle contactor: Lighting Contactor
Panel HA 2,4,6
Control circuit – Panel HA 2,4
Location – West parking Lot Pole Lights
Switched – BMCS
3. Cardholders and directory cards shall be furnished for circuit identification in panelboards. Cardholder shall be located on inside of panel door and shall be in a metal frame with clear plastic front. Circuit lists shall be typewritten. Circuit descriptions shall include explicit description and identification of items controlled by each individual breaker, including final graphics room number or name designation and name of each item served. If no building appointed room number or name is given, list locations per the following examples – A. Storage in Rm 100 – B. Office in Rm 100 – C. Storage west of Rm. 100. List corridors as “corridors.” Identify circuits controlled by contactors using a separate notation for each contactor used. List notation at bottom of schedule stating the circuits are controlled by a contactor, list exact location of contactor, and how switched. Do not use architectural room number designation shown on plans. Obtain final graphics room number identification from Architect’s final room number graphics plan. All locations served by breakers shall be listed on schedule. Panel schedule shall be large enough to contain all information required. Also refer to Section 26 24 16.
4. Permanent, waterproof, black markers shall be used to identify each lighting and power grid junction box, gutter and wireway. Clearly indicate the panel and branch circuit numbers available at that junction box, gutter or wireway. Where low voltage relay panels are used for lighting control, identify the low voltage relay panel and number in addition to the branch circuit panel and number.

5. Pull Boxes, Transformers, Disconnect Switches, etc.: Field work each with a name plate showing identity, voltage and phase and identifying equipment connected to it. The transformer rating shall be shown on the panels or enclosures. For an enclosure containing a motor starter, the nameplate shall include the Owner's motor number, motor voltage, number of motor phases, motor load being serviced, motor horsepower, and motor full load current. Nameplates shall also indicate where panel is fed from.
- B. Prohibited Markings: Markings intended to identify the manufacturer, vendor, or other source from whom the material has been obtained are prohibited for installation in public, tenant, or common areas within the project. Also prohibited are materials or devices that bear evidence that markings or insignias have been removed. Certification, testing (e.g., Underwriters Laboratories), and approval labels are exceptions to this requirement.
- C. Warning Signs: Provide warning signs where there is hazardous exposure associated with access to or operation of electrical facilities. Provide text of sufficient size to convey adequate information at each location; mount permanently in an appropriate and effective location. Comply with industry standards for color and design.
- D. Wire and Cable Markers: Provide vinyl cloth markers with split sleeve or tubing type, except in manholes provide stainless steel with plastic ties.
- E. Wire and Cable Labeling: Provide wire markers on each conductor in all boxes, pull boxes, gutters, wireways, contactors, and motor controllers and load connection. Identify with panelboard / switchboard branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on equipment manufacturer's shop drawings for control wiring.
- F. Underground Warning Tape: Thomas and Betts or approved equal. Six-inch-wide plastic tape, colored red or orange with suitable warning legend describing buried electrical lines; telephone lines and data lines. All underground electrical conduits shall be so identified. Tape shall be buried at a depth of six (6) inches below grade and directly above conduits or ductbanks. Provide magnetic marking tape below all underground electrical conduits.

3.3 CUTTING AND PATCHING

- A. General: Comply with the requirements of Division 1 for the cutting and patching of other

work to accommodate the installation of electrical work. Except as authorized by the Architect / Engineer, cutting and patching of electrical work to accommodate the installation of other work is not permitted.

3.4 INSTRUCTION OF OWNER'S PERSONNEL

- A. Prior to substantial completion, conduct an on-site training program to instruct Owner's operating personnel in the operation and maintenance of the electrical systems.
 - 1. Provide the training during regular working day.
 - 2. The Instructors shall be experienced in their phase of operation and maintenance of the electrical systems and with the project.
- B. Use operation and maintenance manuals as the basis of instruction. Review manual with personnel in detail. Explain all aspects of operation and maintenance.
- C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shut down of each item of equipment.
- D. Demonstrate equipment functions (both individually and as part of the total integrated system).
- E. Prepare and insert additional data in the operating and maintenance manuals when the need for additional data becomes apparent during instructions.
- F. Submit a report within one week after completion of training. List time and date of each demonstration, time devoted to the demonstration, and a list of people present.
- G. At the conclusion of the on-site training program, have the person designated by the Owner sign a certificate to certify that he / she has a proper understanding of the system, that the demonstrations and instructions have been satisfactorily completed, and the scope and content of the operating and maintenance manuals used for the training program are satisfactory.
- H. Provide a copy of the report and the certificate in an appropriately tabbed section of each Operating and Maintenance Manual.

3.5 OPENINGS

- A. Framed, cast or masonry openings for boxes, equipment or conduits are specified under other divisions. Drawings and layout work for exact size and location of all openings are included under this division.

3.6 OBSTRUCTIONS

- A. The drawings indicate certain information pertaining to surface and subsurface obstructions, which has been taken from available drawings. Such information is not guaranteed, however, as to accuracy of location or complete information.
 - 1. Before any cutting or trenching operations are begun, verify with Owner's representative, utility companies, municipalities, and other interested parties that all available information has been provided.
 - 2. Should obstruction be encountered, whether shown or not, alter routing of new work, reroute existing lines, remove obstruction where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of the new work and leave existing services and structures in a satisfactory and serviceable condition.

3.7 VANDAL RESISTANT DEVICES

- A. Where vandal resistant screws or bolts are employed on the project, deliver to the Owner 2 suitable tools for use with each type of fastener used, and 25 percent spare fasteners.
- B. Proof of delivery of these items to the Owner shall be included in the Operating and Maintenance Manuals.

3.8 PROTECTION

- A. Protect work, equipment, fixtures, and materials per the manufacturer's requirements. At work completion, work must be clean and in original manufacturer's condition.
- B. Do not deliver equipment to this project site until progress of construction has reached the stage where equipment is actually needed or until building is closed in enough to protect the equipment from weather. Equipment allowed to stand in the weather shall be rejected, and the contractor is obligated to furnish new equipment of a like kind at no additional cost to the Owner.

3.9 TESTING

- A. The contract will not be declared to be substantially complete until the functional operation of the subsystems have been demonstrated and verified and reports have been provided, reviewed and accepted.
- B. The project will not be declared substantially complete until the following has taken place.
 - 1. The "As-Built" drawings have been submitted, reviewed and accepted by the Architect / Owner / Owner's Construction Representative.
 - 2. The various systems and building emergency lighting system have been commissioned and accepted.

3.10 LOAD BALANCING

- A. Balance load on all phases in each panel to within 10% of respective phase loads.

END OF SECTION

SECTION 260510

UTILITY COORDINATION & SERVICE ENTRANCE

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. General: Electrical service shall be provided by local utility company. Provide infrastructure, conduit, ductbanks and pathways from public street right-of-way to building.
- B. Power Company Data: Obtain from utility company information and installation standards for electrical installation.
- C. Responsibilities: Determine what equipment and labor is provided by utility company and what equipment and labor is required of this Contractor.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Service Data: Ensure that utility company service data is accurate and verified.

2.2 PRIMARY SERVICE

- A. General: Division 26 shall provide primary service conduit, manholes, and pull boxes as required and as specified for electrical service. Division 26 shall provide grounding rods, grounding conductors, sleeves, conduits, pull boxes and manholes as required by the utility company.
- B. Electric utility company shall provide primary cables, splices, terminations, and primary underground and overhead service conductors.

2.3 SECONDARY SERVICE CONDUCTORS

- A. General: Division 26 shall provide secondary service entrance conductors and conduit.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Standards: The installation of the service entrance provisions shall comply

with the published standards and requirements of the utility company, the utility company's specific construction requirements for this project, and with requirements of this Division.

- B. Correction: Any failure to meet the standards and requirements shall be corrected to the satisfaction of the utility company and Owner without any additional cost to the Owner.
- C. Contractor shall provide all construction materials and labor that the utility company determines to be the responsibility of the customer, at no additional cost to the Owner.
- D. The materials and labor required by the for a complete installation shall be provided by the contractor and includes, but is not limited to permanent or removable / lockable vehicular barriers, grounding rods, grounding conductors, sleeves, concrete pads, conduits, metering racks and metering enclosures.
- E. Primary distribution poles and service entrance ductbank locations shall be staked and surveyed prior to pole installation by the Contractor to verify their proper placement is within the Owner's property and respective utility easements. Contractor shall verify by survey that the pole and service entrance ductbank location and easements do not interfere with existing easements, right-of-ways, or other restricted properties. Conflicts with existing easements and restrictions shall be brought to the attention of the Architect prior to construction.
- F. Contractor shall initiate contact with the utility providers and Owner within 14 days of Notice to Proceed to ensure permanent power will be available to the site. Any delays resulting from lack of this coordination shall be the responsibility of the Contractor.

END OF SECTION

SECTION 260519

CONDUCTORS & CONNECTORS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide electrical conductors, wire and connector work as shown, and specified.
- B. Types: The types of conductors and connectors required for the project include the following:
 - 1. 600V building conductors
 - 2. 600V building conductor connectors
- C. Application: The applications for conductors and connectors required on the project are as follows:
 - 1. Power distribution circuitry
 - 2. Appliance, receptacle, and equipment branch circuitry
 - 3. Motor branch circuitry
 - 4. Control wiring
 - 5. Line voltage

1.2 QUALITY ASSURANCE

- A. UL Label: Conductors and connectors shall be UL labeled.

1.3 REFERENCES

- A. Refer to other specific specification sections regarding specialized wiring and connections.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CONNECTORS

- A. General: Except as indicated, provide conductors and connectors of manufacturer's standard materials, as indicated by published product information, designed and constructed as instructed by the manufacturer, and as required for the installation.
- B. Conductors: Provide factory-fabricated conductors of the size, rating, material, and type as indicated for each use. Conductors shall be soft or annealed copper wires meeting, before stranding, the requirements of

ASTM B 3, Standard Specification for Soft or Annealed Copper Wire for Electrical Purposes, latest edition.

1. Conductors for control wiring sized #14 AWG through #10 AWG shall be stranded.
 2. Conductors for power and lighting shall be stranded. Stranding shall be Class B meeting the requirements of ASTM B 8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium Hard, or Soft.
- C. Insulation for standard building conductors: Insulation shall meet or exceed the requirements of UL 83, Standard for Thermoplastic Insulated Wires.
1. All wiring inside lighting fixtures shall be temperature rated per NEC.
 2. Insulation for copper conductors shall be UL Type THHN/THWN, 90 degrees C.

2.2 COLOR CODES FOR CONDUCTORS FOR BRANCH CIRCUITS AND FEEDERS

- A. Provide color coding for conductors as required by NEC 210.5. Color coding for phase and voltage shall match the existing building color coding.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install electrical conductors and connectors as shown, in accordance with the manufacturer's written instructions, the requirements of NEC, the NECA Standard of Installation, and industry practices.
- B. Coordination: Coordinate conductor installation work with electrical raceway and equipment installation work, as necessary for interface.
- C. Conductors:
1. Provide a grounded (neutral) conductor for each branch circuit. Do not share grounded (neutral) conductors.
 2. No more than six phase conductors shall be installed in a single raceway.
 3. When any combination of four or more phase and grounded (neutral) conductors are installed in a raceway, the minimum size for all conductors including equipment ground conductor shall be #10 AWG, and they shall be de-rated accordingly.
 4. Any combination of phase conductors and grounded (neutral)

- conductors in any raceway shall not exceed nine.
5. When more than three (3) conductors are size #10 AWG, they shall be installed in a one-inch conduit.
 6. Pull conductors together when more than one is being installed in a raceway. Whenever possible, pull conductors into their respective conduits by hand. Use pulling lubricant when necessary.
 7. No wire smaller than #12 AWG shall be permitted for any lighting or power circuit. No wire smaller than #14 AWG shall be used for any control circuit, unless shown otherwise.
 8. For 15 and 20 amp branch circuits operating at 150V or less, provide #10 AWG wire when the first outlet is over 75-feet from the panelboard. For branch circuits operating at 150 to 600 volts, provide #10 AWG wire when the first outlet is over 150-feet from the panelboard.
 9. Neatly train and lace wiring inside boxes, equipment and panelboards. Provide tie-straps around conductors with their shared neutral conductor where there are more than two neutral conductors in a conduit.
 10. Do not install a pull string in conduits containing conductors.
- D. Identification: Label each phase conductor in each junction box with corresponding circuit number, using self-adhesive wire markers.
- E. Splices and Joints:
1. In accordance with UL 486A, C, D, E, and NEC.
 2. Aboveground Circuits (No. 10 AWG and smaller):
 - a. Connectors: Solderless, screw-on, reusable pressure cable type, rated 600 V, 220° F, with integral insulation, approved for copper and aluminum conductors.
 - b. The integral insulator shall have a skirt to completely cover the stripped wires.
 - c. The number, size, and combination of conductors, as listed on the manufacturers' packaging, shall be strictly followed.
- F. Aboveground Circuits (No. 8 AWG and larger):
1. Connectors shall be indent, hex screw, or bolt clamp type of high conductivity and corrosion resistant material, listed for use with copper and aluminum conductors.
 2. Provide field-installed compression connectors for cable sizes 250 kcmil and larger with not less than two clamping elements or compression indents per wire.
 3. Insulate splices and joints with materials approved for the particular use, location, voltage, and temperature. Splice and joint insulation level shall be not less than the insulation level of the conductors being joined.

4. Plastic electrical insulating tape: Per ASTM D2304, flame-retardant, cold and weather resistant.
- G. Underground Branch Circuits and Feeders:
 1. Submersible connectors in accordance with UL 486D, rated 600 V, 190°F, with integral insulation.

3.2 TESTING

- A. Pre-Energization Check: Before energizing, check cable and conductors for circuit continuity and short circuits. Correct malfunctions.

END OF SECTION

SECTION 260526

ELECTRICAL GROUNDING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Grounding shall conform to the requirements of:
 - 1. 2020 National Electrical Code.
 - 2. All Local Utility Companies
- B. Ground effectively and permanently.
 - 1. Neutral conductor at the main service disconnect and other separately derived systems.
 - 2. All conduit systems.
 - 3. All electrical equipment and related current carrying supports or structures.
 - 4. All metal piping systems.
 - 5. All building structural metal frames.

1.2 REFERENCE STANDARDS

- A. ANSI/IEEE Standard 142 - "Recommended Practice for Grounding of Industrial and Commercial Power Systems."
- B. ANSI/UL 467 - "Safety Standard for Grounding and Bonding Equipment."
- C. Article 250 of the NEC (NFPA 70) for grounding.
- D. NECA – Standard of Installation
- E. NETA ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems
- F. EIA / TIA 607

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Copperweld
- B. Cadweld
- C. Burndy

- D. O. Z Gedney

2.2 GROUNDING ELECTRODES

- A. Driven Rod Electrode: UL Listed, 3/4" x 10'-0" copper clad grounding electrode.
- B. Metal Frame of Building.
- C. Foundation concrete encased rebar.

2.3 WIRE

- A. Stranded, copper cable
- B. Foundation Electrodes: 4/0 AWG
- C. Grounding Electrode Conductor: Size to meet NFPA 70 requirements

PART 3 - EXECUTION

3.1 GROUNDING AND BONDING

- A. In the service equipment, provide a separate (dedicated) ground bus.
 - 1. Bond the ground bus with copper bus bar or cable, of equal or greater current carrying capacity of the service grounding conductor, to the neutral bar.
 - 2. Resistance of neutral to ground shall not exceed 10 Ohms.
 - 3. Connect the electric service grounding electrode conductors to the incoming metal water pipe system (when available, using a suitable ground clamp) and to a supplemental electrode such as a ground rod or ground loop.
 - 4. Provide grounding and bonding at the power company's metering equipment.
 - 5. Provide access and cover for access to the ground grid and removable connections for testing the system.
- B. Connect the grounding electrode conductor between the ground bus and the grounding electrode system.
 - 1. In rigid PVC conduit.
 - 2. Provide connection for each rod ground electrode.
 - a. All rod electrodes shall be located outside the building in non-paved areas where available. Access cover top shall be flush with finish grade or floor.
 - b. Install rod electrodes as indicated. Install additional rod

electrodes as required to achieve specified resistance to ground.

- c. The minimum distance between driven ground rod electrodes shall be 10'.
- 3. The total ground resistance shall not exceed 10 Ohms for service entrance grounds and 25 Ohms for equipment grounds.
 - a. Where this condition cannot be obtained with one electrode, install a longer electrode, deep-driven sectional electrodes, or additional grounding electrodes until the required ground resistance is obtained.
- C. Provide an insulated equipment grounding conductor inside all conduits, raceways, surface raceways, gutters and wireways. The ground wire shall be bonded to each box to suitable lug, bus, or bushing. All bonding jumpers shall be routed inside conduit or raceway.
- D. Provide all conduit terminating in transformers, panelboards and voice/data outlets with grounding bushings, where required and ground wire extended to ground bus in equipment.

3.2 METAL FRAME OF BUILDING OR STRUCTURE

- A. Effectively ground the building steel or structure per NEC 250-52 (2).

3.3 MISCELLANEOUS REQUIREMENTS

- A. Continuity of the building equipment grounding system shall be maintained throughout the project. Equipment grounding jumpers shall be installed across conduit expansion fittings, liquid-tight flexible metal and flexible metal conduit, light fixture pigtails in excess of 6', and other non-electrically continuous raceway fittings.
- B. Equipment grounding conductors and grounding electrode conductor shall be stranded copper conductors and run in a suitable raceway. Grounding conductors and grounding electrode conductor shall be continuous, without joints or splices over their entire length, except as allowed by NFPA 70/NEC.
- C. For separately derived alternating current system grounds, bond the case and neutral of each transformer secondary winding directly to the nearest available effectively grounded structural metal member as required in NEC 250.
- D. Ground lighting fixture bodies to the conduit grounding system.
- E. Receptacles shall require a ground wire bonded to the conduit ground

system, except where and insulated/isolated grounding receptacle or outlet is specified.

- F. Motor Frames: Ground the frame of each motor with a properly sized separate ground wire inside flexible conduit.
- G. Ground each panelboard by connecting the grounding conductors to the grounding stud.
- H. Ground each secondary dry-type transformer to the ground bus of the primary side panelboard. Provide a bonding jumper between the ground stud and the neutral only at one location either inside the transformer enclosure or at each transformer secondary overcurrent protection device. Ground transformer ground stud or the nearest structural steel member, or nearest member of the ground electrode system.
- I. Bond every item of equipment served by the electrical system to the building equipment ground system. This includes panelboards, disconnect switches, receptacles, fans, air handling units, pumps and flexible duct connections.
- J. Ground all metal conduit including metal conduit used for bends and penetrations through concrete.

3.4 ELECTRICAL SWITCHGEAR NOT INTENDED NOR UL LISTED AS SERVICE ENTRANCE RATED

- A. Remove all factory installed grounding screws, straps or studs identified for neutral to ground bonding.
- B. Do not convert neutral bus to ground bus.

3.5 MANHOLE AND/OR PULL BOX GROUNDING

- A. Provide a driven ground rod and ground bond loop in each power and telephone manhole or pull box. Bond cable racks and medium voltage cable shields at splices and terminations, ductbank conduit ground bushings and all other metal components in manholes or pull box to the ground loop.

END OF SECTION

SECTION 260533

CONDUIT SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and install a complete system of electrical conduits and fittings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Raceways and Fittings unless otherwise indicated:
 - 1. Allied
 - 2. International Metal Hose
 - 3. Ipex
 - 4. Heritage Plastics
 - 5. Wheatland
 - 6. Can-Tex
 - 7. North American Pipe
 - 8. Anamet, Inc.
 - 9. Electri-Flex Co.
 - 10. Western Tube and Conduit
- B. Stainless Steel Conduit and Fittings:
 - 1. Calbrite
 - 2. Gibson
 - 3. ABB
- C. Aluminum Conduit and Fittings:
 - 1. American Conduit/Sapa
 - 2. Wheatland
 - 3. Patriot Aluminum Products
- D. Condulets and Conduit Bodies unless otherwise indicated:
 - 1. Appleton
 - 2. Form 85
 - 3. ABB
- E. Stainless Steel Condulets and Conduit Bodies:
 - 1. Calbrite
 - 2. Gibson
 - 3. Crouse Hinds

- F. Steel MC Cable
 - 1. AFC
 - 2. Southwire
 - 3. General Cable
 - 4. Kaf-Tech

2.2 PROHIBITED PRODUCTS

- A. Prohibited Products
 - 1. BX cable
 - 2. AC cable
 - 3. Electrical nonmetallic tubing (ENT)
 - 4. Flexible polyethylene or PVC tubing
 - 5. Intermediate Metal Conduit (IMC)

2.3 RIGID METAL CONDUIT (RMC)

- A. Schedule 40 conduit and fittings:
 - 1. Galvanized Conduit - Mild steel pipe, Zinc coated inside and out
 - 2. Aluminum Conduit - Aluminum Alloy 6063, T-1 temper
 - 3. Threaded ends and fittings
 - 4. Insulated bushings

2.4 ELECTRICAL METALLIC TUBING (EMT)

- A. Metallic Tubing
 - 1. Zinc Coated Steel - Cold rolled steel tubing, Zinc coated inside and out
 - 2. Aluminum - Aluminum Alloy 6005, 6063. Temper T-1
- B. Fittings shall meet the same requirements as EMT conduits.
 - 1. Full Compression Fittings
 - 2. Insulated throat connectors
- C. Prohibited Products
 - 1. Cast metal fittings
 - 2. Uni-couple type connectors
 - 3. Split ring, anti-short bushings

2.5 FLEXIBLE CONDUIT

- A. Steel flexible metallic conduit:
 - 1. Zinc coated inside and out
 - 2. 18-inches minimum length, 24-inches maximum length

- 3. 18 inches minimum length; 6 feet maximum length for light fixture whips only
- B. Liquid tight flexible steel conduit
 - 1. Type L.A. - Grounded
 - 2. 18-inches minimum length, 24-inches maximum length

2.6 PVC CONDUIT

- A. Schedule 40 and Schedule 80
- B. PVC fittings and solvent welded joints
- C. PVC elbows and fittings, except for threaded/slip-on/glue or straight conduit slip-on / glue fittings, shall not be used on this project.

2.7 CONDULETS AND CONDUIT BODIES

- A. Form 85
- B. PVC Coated: Form 8
- C. LBC Condulets shall be used for size 2 inch and above. LL and LR Condulets shall not be used for 2 inch and above

2.8 ROOF MOUNTED CONDUIT AND BOX SUPPORTS

- A. Refer to roofing specifications for additional information. The limitations and restrictions contained in any roofing specification shall prevail and supercede these specifications for roof mounted supports for conduits and boxes.
- B. Acceptable Manufacturer:
 - 1. Portable Pipe Hangers
 - 2. Cooper B-Line C-Port
 - 3. Miro Industries Models 2.5, 2.5-5, 2.5-AH, 12-AH, 16-AH

2.9 STAINLESS STEEL CONDUIT

- A. Rigid Conduit, Fittings and Supports:
 - 1. Type 304 Stainless Steel
 - 2. Threaded ends
 - 3. Insulated Bushings
- B. EMT, fittings and Supports:

1. Type 304 Stainless Steel
2. Compression Fittings
3. Insulated Bushings

2.10 METAL CLAD (MC) CABLE

- A. Minimum conductor size shall be #12 AWG. All conductors shall be stranded copper.
- B. All MC Cable shall have an insulated ground conductor.
- C. Armor: A zinc coated galvanized steel armor shall be applied over the cabled wire assembly with an interlock in compliance with Section 13 of UL 1569.
- D. Fittings shall be UL listed and identified as MCI-A for such use with metal clad interlocking armor ground. Connectors shall be of steel or malleable iron and shall have saddle clamp to insure a tight termination of MC or MCI-A Cable to box.

2.11 EXTERIOR IN-GRADE PULL BOXES

- A. Hubbell CDR 30x48 inch minimum, provide larger size as required by conduit size or quantity:
 1. Tier 22 rated traffic duty
 2. Conduit entry knock-outs as required
 3. Bolt down cover
 4. Integral or separate bottom
 5. Adjust to grade option
 6. Extension as required for specified conduit depth

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install electrical conduits and fittings for all wiring of any type unless otherwise indicated.
- B. Minimum Size Conduit:
 1. 0.75-inch unless otherwise indicated
 2. (2) 1-inch for low voltage systems unless otherwise indicated
 3. 2-inch between buildings unless otherwise indicated
- C. Provide separate raceway systems for each of the following when

specified, indicated or required:

1. 120/208 volt circuits
 2. 277/480 volt circuits
 3. Emergency
 4. Life safety branch
 5. Critical branch
 6. Equipment branch
- D. Maintain 13-inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
- E. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- F. Use conduit hubs to fasten conduit to sides and tops of electrical equipment, device, box, gutter, wireway, disconnect, etc. in damp and wet locations.
- G. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- H. Do not use no-thread couplings and connectors for galvanized steel or aluminum rigid conduit.
- I. In areas where raceway systems are exposed and acoustical or thermal insulating material is to be installed on walls, partitions, and ceilings, raceways shall be blocked out proper distance to allow insulating material to pass without cutting or fitting. Also provide Kindorf galvanized steel channels to serve as standoffs for panels, cabinets and gutters.
- J. All conduit terminations at locations including but not limited to, switchgear, pull boxes, outlet boxes, stub-up, and stub-outs:
1. Insulated throat connectors for EMT conduits.
 2. Insulated bushing on all rigid conduit terminations.
 3. Locknuts inside and outside of all boxes and enclosures.
 4. Threaded type plastic bushing at all boxes and enclosures.
- K. All boxes are to be accessible after completion of construction.
- L. All conduits must be kept dry and free of water or debris with approved pipe plugs or caps. Cap or plug conduit ends prior to concrete pours.
- M. Install expansion and deflection fittings and bonding jumpers on straight runs which exceed 200-feet, on center, and at 200-feet maximum, on center, on straight runs which exceed 400-feet, and where conduits cross building expansion joints.
- N. Provide grounding bushings at concentric/eccentric knockouts or where reducing washers are used.
- O. Install conduit as a complete system, without conductors, continuous from outlet to outlet and from fitting to fitting.

- P. Make up threaded joints of conduit carefully in a manner to ensure a tight joint.
- Q. Conduit bends shall be factory elbows or shall be bent using equipment specifically designed to bend conduit of the type used to maintain the conduit's UL listing.
- R. Provide chrome or nickel-plated escutcheon plates on conduit passing through walls and ceilings in finished areas.
- S. Install one 2-inch diameter conduit nipple between multi-sectional panels independent of feeder conductors.
- T. Prohibited Installations unless noted otherwise
- U. Do not route on floors, paved areas or grade.
- V. Do not Obstruct Equipment Manufacturer's Recommended Service Space or access to that location
- W. Where aluminum alloy conductors are specified, approved and substituted for copper conductors, provide the required conduit size based on conduit fill using NEC or recognized cable manufacturer's conduit fill tables for aluminum alloy compact conductors.

3.2 INTERIOR ABOVE GRADE INSTALLATION

- A. Conduit Types
 - 1. Concealed Conduits:
 - a. EMT
 - 2. Exposed conduits in Equipment Rooms:
 - a. EMT
 - b. RGC when installed below 18-inches above finished floor.
 - 3. Exposed conduits:
 - a. RGC:
 - i. Below 9-feet AFF
 - b. Aluminum rigid conduit
 - 4. Wet Location
 - a. Aluminum rigid conduit
 - 5. Damp Location
 - a. Aluminum rigid conduit
 - 6. Conduit in concrete walls, floor or roof slab:
 - a. RGC
- B. Maintain head room and present neat appearance.
- C. Minimum 6-inches clear of bottom of roof deck.
- D. Perpendicular or parallel to building lines.
- E. Where a piece of equipment is connected from a switch or box on

adjacent wall, the conduit shall go up the wall from the box, across, and back down to the equipment.

- F. Conceal conduit systems in finished areas.
- G. Conduit may be exposed in exposed mechanical and electrical rooms or where otherwise indicated.
- H. Prohibited Installations
 - 1. Do not block walkways

3.3 BELOW GRADE INSTALLATION

- A. Conduit Type:
 - 1. PVC
- B. Unless shown otherwise, do not install conduit in or below concrete building slabs.
- C. Conduit for all floor boxes shall be routed below building slab from floor box to nearest column, wall, or as indicated.
- D. Changes in direction of underground conduit runs exceeding a total of 10 degrees, either vertical or horizontal, shall be accomplished by long sweep bends having a minimum radius of curvature of 25 feet and a maximum arc of 22.5 degrees.
- E. Provide conduit spacers for parallel branch/feeder conduits. Use suitable manufactured separators and chairs installed 4 feet on centers. Securely anchor conduit at each chair to prevent movement during concrete placement.
- F. Conduit below building slab shall be installed minimum 18-inches below finished floor and in select fill.
- G. Electrical feeder conduits, telecommunications tie, trunk, or service cable conduits shall be installed minimum 48-inches below finished floor and in select fill.
- H. Electrical service primary shall comply with the respective utility company requirements and standards.
- I. Provide two "caution" plastic tapes at 6-inches and 18-inches below finished slab, grade, or pavement.
- J. Conduits located outside building, provide magnetic locator tape at top of first compacted layer of backfill.

- K. As each section of the underground conduit is completed, a testing mandrel with diameter $\frac{1}{4}$ -inch smaller than the conduit, shall be drawn through each conduit. A brush with stiff bristles shall be drawn through until conduit is clear of particles of earth, sand, or gravel. Conduit plugs shall then be installed.
- L. Verify location and routing of all new and existing underground utilities with the Owner and Architect on the job site. Stake out these existing utilities so that they will not be damaged. Stake out new utilities to provide coordination with other trades and with new and existing utilities, easements, property lines, restricted land use areas, and right-of-ways.
- M. Conduit for 120V and above shall be separated from control and signal conduits by a minimum of 3-inches.
- N. Prohibited Installation.
 - 1. Unless shown otherwise, do not install conduit horizontally in concrete slabs.

3.4 EXTERIOR ABOVE GRADE INSTALLATION

- A. Conduit Type:
 - 1. Aluminum Rigid Conduit
 - 2. RGC where subject to physical damage or where located less than four feet above finished floor, grade or pavement.
- B. Conduit for mechanical / plumbing equipment shall be routed with the associated mechanical / plumbing pipe support rack system where practical, coordinate with Divisions 22 and 23.

3.5 ABOVE ROOF INSTALLATION AND ROOF PENETRATION

- A. Where specifically indicated to be routed or mounted on the roof, installation shall be as specified, recommended by roofing manufacturer, recommended by roof support manufacturer and as required by NEC.
- B. Roof penetrations shall be made in adequate time to allow the roofing installer to make proper flashing.
- C. Conduit for equipment mounted on roof curbs shall be routed through the roof curb.
- D. Prohibited Installations:
 - 1. Conduit, gutters, pull boxes, junction boxes, etc. shall not be routed on roof unless specified otherwise.

2. Do not install conduit, junction boxes, etc. within 18 inches of outside edges of roof access openings.

3.6 CORROSIVE LOCATION CONDUIT AND FITTINGS INSTALLATION

- A. Corrosive locations are, including but not limited to, cooling towers, natatoriums, therapeutic pool areas, greenhouses, water treatment rooms.
- B. Underground conduit shall be as specified in this section.
- C. Exterior conduits and boxes within 100 feet of exhaust openings shall be stainless steel.
- D. Exposed conduits in chemical storage rooms, pool mechanical equipment (pump rooms, and pool equipment storage rooms) and greenhouses shall be Schedule 80 PVC. Boxes shall be PVC or 304 Stainless Steel.
- E. Exposed conduits and boxes in indoor pool areas and all other indoor public areas shall be Type 304 Stainless Steel.

3.7 CLASSIFIED HAZARDOUS LOCATION CONDUIT AND FITTINGS INSTALLATION

- A. UL listed for the hazard classification
- B. Underground conduit shall be as specified in this section.

3.8 CONDUIT SUPPORTS

- A. Fasten conduit supports to building structure and surfaces;
- B. Support with malleable iron conduit clamps or on conduit racks at intervals as required by NEC
- C. Support conduit on galvanized channel, using compatible galvanized fittings (bolts, beam clamps, and similar items), and galvanized threaded rod pendants at each end of channel and secure raceway to channel and channel to structure. Channel supports shall have cut ends filed smooth
- D. Where rod pendants are not used, channel supports are to be secured to structure at each end.
- E. Conduit supports are to be secured to structure using washers, lock washers, nuts and bolts or rod pendants; use of toggle bolt “wings” are not acceptable.
- F. Support single conduit runs using a properly sized galvanized conduit hanger.

- G. Group related conduit on conduit rack. Construct rack using steel channel; provide space on each rack for 25 percent additional conduits.
- H. Connections to joists shall be made with galvanized channel extended between joist chords or with galvanized channel bearing on the vertical legs of joist chord angles.
- I. Conduits installed in public areas, not concealed by architectural ceilings, shall be supported by galvanized steel channel racks. Coordinate routing with Architect / Owner.
- J. Provide electrical insulating sleeve or wrapping for aluminum conduit supported by zinc coated supports or fasteners.
- K. Galvanized Surfaces: Clean welds, bolted connections, cuts, and abraded areas and apply ZRC galvanized paint or equivalent.
- L. Terminate all motor connection conduits in mechanical room spaces with a floor pedestal and with "Tee" conduit at motor outlet height for flexible conduit.
- M. Where conduit is not embedded in concrete or masonry, conduit shall be firmly secured by approved clamps, half-straps or hangers.
- N. No more than 12 conduits containing branch circuits may be installed in junction boxes, pull boxes or gutters.
- O. Anchors:
 - 1. Rawl Plugs or approved equal anchors.
 - 2. Lead cinch anchors or pressed anchors.
- P. Hardware:
 - 1. Indoors: cadmium plated unless noted otherwise
 - 2. Exterior: Galvanized unless noted otherwise
- Q. Prohibited Installation.
 - 1. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
 - 2. Do not support conduit from conduit, ceiling support wires, roof deck, structural bridging
 - 3. Plastic anchors and lead anchors shall not be used for overhead applications.
 - 4. Beam clamp attachments to steel joist chords
 - 5. Do not support more than one conduit from a single all-thread rod support.
 - 6. Do not utilize Tie wire or short pieces of conduit as supports or

hangers.

- R. Acceptable Manufacturer's
 - 1. Kindorf,
 - 2. Unistrut,
 - 3. Superstrut,
 - 4. Caddy,
 - 5. Minerallac

3.9 CONDUIT PENETRATIONS, SLEEVES AND ESCUTCHEONS

- A. Furnish sleeves for placing in construction for all conduit passing through concrete or masonry walls, partitions, beams, grade level other than floor, and roofs. A conduit sleeve shall be one size larger than the size of conduit, which it serves except where larger sizes are required for manufactured water, fire, or smoke stop fittings.
 - 1. Sleeves set in concrete floor construction shall be minimum Schedule 40 galvanized steel.
 - 2. Sleeves shall extend 3-inches above the finished floor.
- B. Sleeves in concrete or masonry walls shall be Schedule 40 galvanized steel. Sleeves shall be set flush with finished wall.
- C. Install manufactured UL listed water, fire, and smoke stop fittings, or caulk around conduit or cables in sleeves with sufficient UL listed fire safe insulation or foam to maintain wall or floor slab fire or smoke rating. Refer to Architecture drawings for locations of rated walls.
- D. Provide Linkseal Mechanical Seals around conduit penetrations through walls below grade. Provide a pull box to serve as a water stop inside wall penetration. Internally seal low voltage cabling conduit penetrations with waterproof caulking.
- E. Sleeves penetrating walls below grade shall be Schedule 40 black steel pipe with ¼-inch thick steel plate secured to the pipe with continuous fillet weld. The plate shall be located in the middle of the wall and shall be 2-inches wider all around than the sleeve that it encircles. The sleeve should extend a minimum of 24-inches on either side of the penetration. The entire assembly shall be hot-dipped galvanized after fabrication. Do not sleeve or penetrate grade beams.
- F. Conduit passing through the housing on connected equipment shall pass through a cleanly cut hole protected with a threaded steel bushing. Route

conduit through roof openings, for piping and ductwork or through suitable roof jack, with pitch pocket. Coordinate location with roofing installation as required.

- G. Conduit passing through fire rated wall shall be sealed with Fire Stop. Route conduit to preserve fire resistance rating of partitions and other elements, using materials and methods under the provisions of Division 7.

3.10 PVC CONDUIT AND FITTINGS INSTALLATION

- A. Where 3-1/2-inch conduit is specified and the required or specified material is Schedule 80 PVC, provide 4-inch conduit.

3.11 FLEXIBLE METAL AND LIQUID TIGHT FLEXIBLE METAL CONDUIT AND FITTINGS INSTALLATION

- A. Liquid Tight Flexible Metal Conduit shall only be used for connections to equipment mounted on roof, rotating equipment, transformers, and kitchen or food processing equipment, or where flexible conduit is required outdoors.
- B. Liquid tight flexible metal conduit may be 0.5-inch for roof top supply / exhaust fans only
- C. Flexible metal conduit and liquid tight flexible metal conduit shall only be used for final connections from junction box to equipment, light fixtures, power poles, etc.
- D. Prohibited Installation:
 - 1. Do not use for exterior wall or roof penetrations unless sleeved utilizing PVC coated RGC conduit at least one size larger than the outside diameter of the flexible conduit.

3.12 EXTERIOR IN-GRADE PULL BOXES

- A. Provide pull boxes where specified and as required.
- B. Pull boxes located in pavement shall be set with proper extensions so that top of cover is flush with pavement.
- C. Pull boxes located in non-paved areas shall be set two-inches above surrounding finished grade. Provide 12-inch wide by 8-inch deep reinforced concrete crown around neck or opening and sloped down away from pull box opening.

3.13 IDENTIFICATION

- A. Conduit Systems: Provide adequate marking of conduit larger than one inch exposed or concealed in interior accessible spaces to distinguish each run as either a power (120/208V or 277/480V) or signal / communication conduit (Fire Alarm, BAS, BMCS, Security, CCTV, Access Control, Intrusion Detection, Telecom, etc.). Except as otherwise indicated, use orange banding with black lettering. Provide self-adhesive or snap-on type plastic markers. Locate markers at ends of conduit runs, near switches and other control devices, near items of equipment served by the conductors, at points where conduit passes through walls or floors or enters non-accessible construction, and at spacing of not more than 50-feet along each run of exposed conduit. Switch-leg conduit and short branches for power connections need not be marked, except where conduit is larger than 1-inch.

END OF SECTION

SECTION 260537

ELECTRICAL BOXES & FITTINGS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide electrical box and fitting work as required, scheduled, indicated, and specified.

1.2 QUALITY ASSURANCE

- A. UL Label: Electrical boxes and fittings shall be UL labeled.

PART 2 - PRODUCTS

2.1 FABRICATED MATERIALS

- A. Interior Outlet Boxes: Provide galvanized steel interior outlet wiring boxes, of the type, shape, and size, including depth of box, to suit respective locations and installation. Construct with stamped knockouts in back and sides. Provide gang boxes where devices are shown grouped. Single box design; sectional boxes are not acceptable, except for wall mounted electronic displays.
 - 1. Type of Various Locations:
 - a. Wall mounted video displays, televisions, electronic signage and similar installations; recessed wall mounted box for power and/or multi-media (low voltage) outlets: Arlington Industries #TVBS 613 or equal, 4-gang steel box with white trim plate.
 - b. Technology, data, voice, video and multi-media outlet boxes at locations other than wall mounted video displays, televisions, electronic signage and similar installations: minimum 4-inch square (2-gang), 3-inch deep interior outlet boxes.
 - c. Security, access control , and video surveillance outlet boxes: single gang, 3-inch deep outlet boxes mounted long axis vertically.
 - d. All other applications: minimum 4-inch square (2-gang) 2-1/8-inch deep boxes.
 - 2. Interior Outlet Box Accessories: Outlet box accessories required as for installation, including covers or wall device plates, mounting brackets, wallboard hangers, extension rings, plaster rings for boxes in plaster construction, fixture studs, cable clamps and metal straps

for supporting outlet boxes. Accessories shall be compatible with outlet boxes used and meet requirements of individual wiring.

- B. Damp Location Outlet and Damp or Wet Location Switch Boxes: Deep type, hot dipped galvanized cast-metal weatherproof outlet wiring boxes, of type, shape, and size required. Include depth of box, threaded conduit ends, and stainless steel cover plate with spring-hinged waterproof caps suitable for application. Include faceplate gasket and corrosion-resistant, tamper / vandal proof fasteners.
- C. Wet Location Outlet Boxes: Hot dipped galvanized cast-iron weatherproof outlet wiring boxes, of type, shape, and size required. Include depth of box, threaded conduit ends.
- D. Junction and Pull Boxes: Galvanized sheet steel junction and pull boxes, with screw-on covers, of type, shape, and size, to suit respective location and installation.
 - 1. Type for Various Locations:
 - a. Minimum Size: 4-inch square, 2-1/8-inches deep.
 - b. 150 Cubic Inches in Volume or Larger: Code gauge steel with sides formed and welded, screw covers unless shown or required to have hinged doors. All boxes mounted above ceiling shall have screw covers. Boxes in all other areas with covers larger than 12-inches shall have hinged with screw covers. Knockouts factory stamped or formed in field with a cutting tool to provide a clean symmetrically cut hole.
 - c. Exterior or Wet Areas: 304 stainless steel NEMA 3R construction with gaskets and corrosion-resistant fasteners
- E. Conduit Bodies: Provide galvanized cast-metal conduit bodies, of type, shape, and size, to suit location and installation. Construct with threaded conduit ends, removable cover, and corrosion-resistant screws.
- F. Bushings, Knockout Closures, and Locknuts: Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts, and insulated conduit bushings of type and size to suit use and installation.
- G. Outlet boxes in fire rated walls: Provide 2-hour rated gasket within box and below cover, equal to Rectorseal Metacaulk box guard and cover guard.

PART 3 - EXECUTION

3.1 INSTALLATION OF BOXES AND FITTINGS

- A. Install electrical boxes and fittings as shown and as required, in compliance with NEC requirements, in accordance with the manufacturer's written instructions, in accordance with industry practices.
- B. Provide recessed device boxes for wall mounted interactive media boards, video displays, televisions, electronic signage and similar installations.
- C. Junction and pull boxes, condulets, gutters, located above grid ceilings shall be mounted within 18-inches of ceiling grid. Junction and pull boxes above grid ceilings shall be mounted in the same room served. Junction boxes and pull boxes required for areas with inaccessible ceilings shall be located above the nearest accessible ceiling area. All junction box or pull box openings shall be side or bottom accessible. Removal of light fixtures, mechanical equipment or other devices shall not be required to access boxes.
- D. Determine from the drawings and by measurement the location of each outlet. Locate electrical boxes to accommodate millwork, fixtures, marker boards, and other room equipment at no additional cost to the Owner. The outlet locations shall be modified from those shown to accommodate changes in door swing or to clear interferences that arise from construction as well as modifying them to center in rooms. The modifications shall be made with no cost as part of coordination. Check the conditions throughout the job and notify the Architect of discrepancies. Verify modifications before proceeding with installation. Set wall boxes in advance of wall construction, blocked in place and secured. Set all wall boxes flush with the finish and install extension rings as required extending boxes to the finished surfaces of special furring or wall finishes. Provide wall box support legs attached to stud to prevent movement of box in wall.
- E. Unless noted or directed otherwise at installation, place outlet boxes as indicated on architectural elevations and as required by local codes.
- F. Outlets above counters, mount long axis horizontally. Refer to architectural elevations and coordinate to clear backsplash and millwork.
- G. Provide pull boxes, junction boxes, wiring troughs, and cabinets where necessary for installation of electrical systems. Surface mounted boxes below 9 feet and accessible to the public shall not have stamped knockouts.
- H. Provide weatherproof boxes for interior and exterior locations exposed to weather or moisture.
- I. Provide knockout closures to cap unused knockout holes in boxes.

- J. Locate boxes and conduit bodies to ensure access to electrical wiring. Provide minimum 12-inch clearance in front of box or conduit body access.
- K. Secure boxes to the substrate where they are mounted, or embed boxes in concrete or masonry.
- L. Boxes for any conduit system shall not be secured to the ceiling system, HVAC ductwork or piping system.
- M. Provide junction and pull boxes for feeders and branch circuits where shown and where required by NEC, regardless of whether or not boxes are shown.
- N. Coordinate locations of boxes in fire rated partitions and slabs to not affect the fire rating of the partition or slab. Notify the Architect in writing where modification or construction is required to maintain the partition or slab fire rating.
- O. Identification: Paint the exterior and cover plates of building interior junction boxes and pull boxes to correspond to the following colors:
 - 1. Orange: - 480/277 VAC systems
 - 2. Blue: - 240 VAC three phase delta systems.
 - 3. Red – All Emergency circuits, regardless of load, and fire alarm system.
 - 4. Light Green - 120/208 VAC 3 phase and 120/240 VAC single-phase systems
 - 5. Yellow – Building Management and Control System - BMCS
 - 6. White - Security and Surveillance equipment circuits
- P. All box covers shall be labeled with Panel ID and circuit numbers of all circuits available in box using permanent black marker. Boxes containing main feeders are to list where fed from and load (example “MSB to Panel HA”). Information listed is to be legible, markovers are not acceptable. Multi-sectional panel numbers are not to be listed on covers (example “LA2” referring to Panel LA sec. 2 is to be listed as “LA”). Label covers for special applications explaining contents (example “Emerg. Gen. Annunciator controls”, “IDF ground”). Do not attach box covers that have both sides painted or labeled differently. In public areas where boxes are painted same color as room per architect, label inside covers.
- Q. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- R. Use flush mounting outlet box in finished areas unless specifically indicated as being used with exposed conduit.

- S. Locate flush-mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- T. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches with stud separation. Provide minimum 24 inches with separation in acoustic rated walls.
- U. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness. Provide UL listed materials to support boxes in walls to prevent movement. Ensure box cannot be pushed inside wall.
- V. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- W. Install flush mounting box without damaging vapor barriers, wall insulation or reducing its effectiveness.
- X. Use gang box with plaster ring for single device outlets.
- Y. Support outlets flush with suspended ceilings to the building structure.

3.2 ADJUSTING

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closures in unused box openings.
- C. Box extenders or plaster rings shall not be used to increase the Code mandated cable capacity of a box.

END OF SECTION

SECTION 262400

ELECTRICAL GEAR

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Panelboards and enclosures, including cabinet, as shown, scheduled, indicated, and specified. Safety and disconnect switch work where required, scheduled, indicated, and specified.

1.2 QUALITY ASSURANCE

- A. UL Standards: All electrical gear shall confirm to all applicable UL standards and shall be UL labeled.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Eaton
- B. Square D
- C. Siemens
- D. General Electric Co.

2.2 PANELBOARDS

- A. General: Panelboards shall be dead-front type equipped with circuit breakers as shown and scheduled.
- B. Busing Assembly: Panelboard phase, neutral and equipment ground busing shall be copper. Bus structure and mains shall have ratings as shown and scheduled. Ratings shall be established by heat rise tests with maximum hot spot temperature on any connector or busbar not to exceed 65°C rise above 40°C ambient. Heat rise test shall be conducted in accordance with UL 67. The use of conductor dimensions is not accepted in lieu of actual heat tests. Furnish a bare uninsulated ground bus inside each panelboard enclosure. Two section panelboards shall be connected with copper cable, with an ampacity conforming to the upstream overcurrent device. Panelboards serving non-linear loads and fed with neutrals greater than 100% shall have 200% neutral busing.

- C. **Circuit Breakers:** Circuit breakers shall be molded case, thermal magnetic type equipped with individually insulated, braced, and protected connectors. The front faces of circuit breakers shall be flush with each other. Tripped indication shall be shown by the breaker handle taking a position between ON and OFF. Make prepared space provisions for additional breakers so that no additional connectors will be required to add breakers. Circuit breakers in panelboards 600 Amps and below shall have bolt-in breakers. Two and three pole breakers shall have internal common trips. External handle ties will not be accepted for line to line connected loads. External handle ties are acceptable only for designated shared neutral loads. Circuit breakers for panelboards rated 601 amps and above shall have plug-on circuit breakers.

1. Provide panelboard branch circuit breakers with interrupting capacity as shown, but in no case less than the following symmetrical amperes RMS:

Voltage (volts)	Interrupting Capacity
120/208/240	10,000 AIC

2. Circuit breakers for lighting circuits shall be UL listed switch duty (SWD).
3. Ground fault interrupter (GFI) circuit breakers, where shown, shall be 5 mA ground fault trip and shall include a TEST button.
4. Arc fault circuit breakers shall comply with UL 1699.
5. Circuit breakers with frame size 600A and higher shall have magnetic trip adjustment of 3X to 10X.
6. Provide distribution panel circuit breakers with high interrupting capacity, or integral current limiters as shown. Circuit breakers shall have interrupting capacity not less than the following symmetrical amperes RMS:

CONVENTIONAL FRAME SIZE/ VOLTAGE	INTEGRAL INTERRUPTING CAPACITY
100A/240V	10,000 AIC
225A/240V	25,000 AIC
400A/240V	65,000 AIC
600A/240V	65,000 AIC
800A/240V	65,000 AIC

- D. **Spaces:** Where space for future breakers or switches is shown, panelboard enclosure shall include removable blank panels or knockouts to allow installation of future breakers or switches, prepared spaces, and panelboard busing shall be complete, including required connectors.

- E. Integrated Equipment Rating: Each panelboard, as a complete unit, shall have a short-circuit rating equal or greater than the available short circuit current. Rating shall have been established by tests on similar panelboards with the circuit breakers installed.
- F. Panelboard Enclosures:
 - 1. Provide sheet steel enclosures. Provide all NEMA 1 panelboard fronts with spring-loaded door pulls, and flush lock and key.
 - 2. All NEMA 1 enclosure panelboards shall be hinged "door-in-door" type with interior hinged door with hand operated latch or latches, as required providing access only to circuit breaker operating handles, not to exposed energized parts. Outer hinged door shall be securely mounted to the panelboard box with factory bolts, screws, clips, or other fasteners, requiring a tool for entry. Hand operated latches are not acceptable. Push inner and outer doors shall open left to right.
 - 3. Equip with interior circuit directory frame, card, and clear plastic covering for panelboards.
 - 4. Provide gray powder coat finish over a rust inhibitor.
 - 5. Enclosures at exterior locations shall be NEMA 3R.
 - 6. Enclosure shall be for recessed or surface mounting as shown.
 - 7. Enclosures shall be fabricated by the same manufacturer as panelboards to be enclosed. Multi-section panelboards shall have same physical dimensions.

2.3 ENCLOSED SWITCHES

- A. General: Provide commercial duty type, dead-front, sheet steel enclosed, surface-mounted safety switches of the type and size indicated. Safety switches shall be rated for the voltage of the circuit where they are installed. Safety switches used as motor disconnects shall be horsepower rated for the motor served.
- B. Switch Mechanism:
 - 1. Safety switches shall be quick-make, quick-break type with permanently attached arc suppressor. Constructed so that switch blades are visible in the OFF position with the door open. The operating handle shall be an integral part of the box, not the cover. Switch shall have provision to padlock in the OFF position. Safety switches shall have a cover interlock to prevent unauthorized opening of the switch door when the switch mechanism is in the ON position, or closing of the switch mechanism when the switch door is open.
 - 2. Cover interlock shall have an override mechanism to permit switch inspection by authorized personnel. Current-carrying parts shall be constructed of high conductivity copper with silver-plated switch contacts. Lugs shall be suitable for copper conductors and front

removable.

- C. Fusing: Provide fusible safety switches where required or indicated. Fuse clips shall be positive pressure rejection type fuse clips suitable for use with UL Class R or Class J fuses.
- D. Neutral: Provide safety switches with number of switched poles indicated. Where a neutral is present in the circuit, provide a solid neutral with the safety switch. Where a ground conductor is present in the circuit, provide a separate solid ground with the safety switch.
- E. Enclosures in indoor locations shall be NEMA 1 heavy duty enclosures unless shown otherwise. Enclosures in exterior locations shall be NEMA 3R stainless steel, heavy duty

2.4 ENCLOSED CIRCUIT BREAKERS

- A. Molded-Case Circuit Breaker: NEMA AB 1, 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 250A and larger.
 - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 - 3. Electronic Trip Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:
 - a. Instantaneous trip
 - b. Long-and short-time pickup levels.
 - c. Long-and Short-time time adjustments.
 - d. Ground-fault pickup level, time delay and I^2t response
- B. Molded-Case Circuit Breaker Features and Accessories: Standard frame sizes, trip ratings and number of poles.
 - 1. Lugs: Mechanical style suitable for number, size, trip ratings and material of conductors.
 - 2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
- C. Enclosures in indoor locations shall be NEMA 1 heavy duty enclosures unless shown otherwise. Enclosures in exterior locations shall be NEMA 3R stainless steel, heavy duty.

PART 3 - EXECUTION

3.1 INSTALLATION OF PANELBOARDS AND ENCLOSURES

- A. General: Install panelboards and enclosures, as shown, including electrical connections, in accordance with the manufacturer's written instructions, the requirements of NEC, NECA Standard of Installation, and industry practices. Circuit breakers shall be factory installed except for required field modifications due to actual site conditions.
- B. Coordination: Coordinate installation of panelboards and enclosures with conductor and raceways installation work.
- C. Anchoring: Anchor enclosures to walls and structural surfaces ensuring that they are permanently and mechanically secured.
- D. Directory Card: Provide a typed circuit directory card(s) upon completion of work. Directory card shall be of super heavy-weight index card stock, 110 lb., white. Directory shall include type of load (i.e.: receptacles, lighting, exhaust fan, etc.) and location (i.e.: Room 102, Office in Room 102, Storage Room north of Room 102, etc.). Room number shall be identified as the actual graphics room number assigned to the space and not the room number identified on the Plans. If no school room number is assigned, list school name for room. List corridors as "corridor". If unsure how to list rooms that may not have a number or name contact maintenance electrical supervisor or his designee. Circuits with shunt trip shall be identified with the control circuit operating the shunt trip (i.e.: Kitchen Hood No. 2). Shunt trip breakers with common trip circuit shall be grouped in the panelboard (i.e.: circuits 1, 3, 5 and 7). All breakers controlled via contactors, or that supply control voltage to contactors shall be noted, and provide information at the bottom of directory card to include exact location of contactors, (example – plenum of Room 100) and how controlled (example – via BMCS). If breakers serve more than one contactor, the notations shall be separate for each contactor. Directory cards shall be large enough, including plastic holders, to include all necessary information. Directory cards are not to be folded to fit in holders. All breaker spaces are to be identified including for 2-pole and 3-pole breakers (list load on each space).
- E. Circuit Arrangement: Arrange branch circuit connections to 3-phase panelboards so that when two or three circuits are run with a common neutral, each circuit is connected to a different phase unless shown otherwise. Branch circuits shall be connected to the circuit breakers in the panelboard to provide the best possible phase balance, unless shown otherwise.
- F. Panelboards not intended to be used as service entrance (SE) rated shall have the factory installed neutral to ground bonding screws and straps removed.

- G. Spare Conduits: Provide (3) 1-inch conduits capped to 6-inches above accessible ceiling space all recessed panelboards.
- H. Conductors shall be bent neatly opposite the fuse or circuit breaker to which they are to be attached. Vertically installed conductors shall be neatly tie-wrapped. Conductors shall be connected in a neat and professional manner. Conductors brought in from the top or bottom of the cabinet shall be bent neatly opposite the fuse or circuit breaker to which they are to be attached. Each conductor shall be run along the full height of the panel and returned to the circuit breaker or fuse location to allow relocation of the conductor to any position along the bus. Neutral and grounding conductors shall be installed similar to the phase conductors. Panelboard shall be cleaned of all construction debris prior to substantial completion review.
- I. Circuit breakers and conductors installed for SPD devices shall be located at the top or bottom of the panelboard in respect to the location of the SPD device. Route all conductors to the SPD device using long sweep bends and the shortest conductor length possible.
- J. Install copper ground bus for copper ground conductors. Ground conductors size #1 and larger are to be landed to can with mechanical lugs and not to ground bus.
- K. Install panels so that breaker number 1 is the top left breaker. Panel interiors shall not be installed where breaker number 1 is the bottom right breaker.
- L. In panels that contain multi-layered neutral bus install neutrals beginning with the back neutral bus row and work forward. Do not make up neutrals on front neutral bus row unless all other rows are full.
- M. Label breaker mounting space with stick-on number labels.
- N. Mount the fully aligned panelboard such that the maximum height of the top circuit breaker above the finished floor shall not exceed 78 inches. Mount panelboards that are too high such that the bottom of the cabinets will not be less than 6 inches above the finished floor.

3.2 ENCLOSED SWITCH AND CIRCUIT BREAKER INSTALLATION

- A. General: Install safety and disconnect switches where required or indicated, in accordance with the manufacturer's written instructions, requirements of the NEC, NECA Standard of Installation, and industry practices. Provide fuse identification label when fused switches are required showing type and size inside door of each switch.

- B. Location: Provide safety switches within 50' and in sight of motor served. There shall be minimum 3' clearance in front of safety switch and a clear path in which to access wall mounted switches (ie.: not having to walk and/or stand on obstacles such as drain pans on floor to service).
- C. Supports: Provide all safety and disconnect switches with galvanized angle or other supports where mounting on wall or other rigid surface is impractical. Switches shall not be supported by conduit alone. Where safety and disconnect switches are mounted on equipment served, the switch shall not inhibit removal of service panels or interfere with access areas. Provide mounting hardware that will allow removal of safety and disconnect switches. Do not utilize drive pin anchors through enclosure.
- D. Safety and Disconnect Switches: Install disconnect switches used with motor-driven appliances, motors and controllers within sight of the controller position unless indicated otherwise.

3.3 TESTING

- A. Before energizing, energization, check for continuity of circuits and short circuits.

END OF SECTION

**AIRPORT AHQ CHEMICAL STORAGE BUILDING
SALEM DISTRICT**

APPENDIX A



ASBESTOS NOTE: (NO ASBESTOS PRESENT) An inspection to identify asbestos-containing materials has been conducted and can be found as part of Appendix A to the Project Specifications. No materials containing asbestos were identified by the report for the building. Should the Contractor access any material suspected of containing asbestos not identified by these reports, he shall stop work in the immediate area and notify the Owner (VDOT).

THE REMOVAL OF ASBESTOS MATERIALS IS NOT TO BE CONDUCTED WITHOUT THE OWNERS ASBESTOS PROJECT MONITOR BEING ON-SITE.

CONTACT INFO

Monitor on Contract – H&P – 540-777-0265 / gwhitt@handp.com

LEAD COATING NOTE: An inspection to identify lead coated building components has been conducted and can be found as part of Appendix A to the Asbestos Project Specifications. This report is provided for the Contractor's use and may not be all inclusive. It is the Contractor's responsibility to comply with all Virginia Occupational Safety and Health (VOSH) Regulations as they pertain to employee exposures to lead.

All lead and lead coated building components are to be recycled whenever possible.

Hughes Associates Architects & Engineers assumes no responsibility for the adequacy or accuracy of the asbestos and lead inspection reports contained in the contract documents as this information was prepared by VDOT. The Contractor shall address any related questions to the VDOT representative.

November 7, 2023

Virginia Department of Transportation
Central Office
1401 East Broad Street
Richmond, Virginia 23219

Attention: Robert Curran, Capital Outlay Asbestos/Lead Coordinator
Email: robert.curran@vdot.virginia.gov / Phone: 804-786-6724

Subject: Task Order #16: Asbestos and Lead Based Paint Inspection Services
Building 2140845-Chemical Storage Building 1
Airport AHQ
4830 Thirlane Road
Roanoke, Virginia 24019
H&P Project: 20231662

Mr. Curran:

Hurt & Proffitt, Inc. (H&P) was requested to conduct limited sampling of suspect asbestos containing materials and lead based painted components from **Building 2140845** located at the Airport AHQ in Roanoke, Virginia. The sampling was performed by H&P representative Mr. Ken Hundley (Virginia Asbestos Inspector License number is 3303 001516) on October 5, 2023. This letter and attachments represent H&P's report for the above-referenced project.

1.0 Building Description

The structure is one story and is the Chemical Storage Building 1 and is constructed of wood with shingle roofing.

2.0 Asbestos Survey Procedures and Findings

The survey included collection and submittal of three (3) individual samples of suspect asbestos containing materials (ACM) that were submitted for analysis for asbestos. The sampling was limited to non-invasive means and was performed in accordance with VDOT requirements and state and federal regulations. The survey was conducted on the reasonably and safely accessible portions of the building.

The suspect asbestos samples were submitted for analysis by EPA Method No. 600/R-93/116 and 600/M4-82-020 (polarized light microscopy (PLM)). All samples were analyzed by SanAir Technologies Laboratory of Powhatan, Virginia, a NVLAP accredited laboratory licensed to

perform asbestos bulk analysis within the State of Virginia. The sampling results are shown in the following table. Copies of the laboratory Asbestos Analysis Bulk Report and Chain of Custody forms are included as an attachment to this report.

Table I – Building 2140845 Sample Analysis Results

Sample #	Sample Type	Lab Description.	Chain of Custody Description	Results	Condition	Quantity
005-WLL-A	Wall Layer	Black Tar-Like	Interior	NAD	Fair	2,000 Ft ²
005-WLL-B	Wall Layer	Black Tar-Like	Interior	NAD	Fair	
005-WLL-C	Wall Layer	Black Tar-Like	Interior	NAD	Fair	

None Detected: No Asbestos Detected

3.0 Analysis Results

Based on the results of laboratory analysis, asbestos was not identified in the materials sampled during this survey.

3.1 Presumed Asbestos Containing Materials

During the conduct of this survey, sampling was limited to those materials which were within the areas designated by the client, which were safely accessible, and which were able to be sampled without damaging systems or structures. As such, **other materials not represented in this survey should be presumed to be positive, unless sampling is conducted and they are shown to be negative for asbestos.**

4.0 Applicable Regulations

Following are some applicable regulations pertaining to asbestos containing materials.

4.1 EPA/NESHAP Regulations for Asbestos Containing Materials

The U.S. Environmental Protection Agency promulgated the National Emission Standards for Hazardous Air Pollutants (NESHAP) [40 CFR Part 61], which addresses the application, removal, and disposal of asbestos-containing materials (ACM). Under NESHAP the following categories are defined for asbestos-containing materials:

Friable - When dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Non-friable - When dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Category I Non-friable ACM - Packings, gaskets, resilient floor coverings, and asphalt roofing products containing more than 1% asbestos.

Category II Non-friable ACM – Any material, excluding Category I Non-friable ACM, which contains more than 1% asbestos.

Regulated Asbestos Containing Material (RACM) – One of the following:

1. Friable ACM
2. Category I Non-friable ACM that has become friable.
3. Category I Non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading.
4. Category II Non-friable ACM that has a high probability of becoming, or has become, friable by the forces expected to act on the material in the course of demolition or renovation operations.

Under NESHAP, the following actions are required:

1. Prior to the commencement of demolition or renovation activities, the building owner must inspect the affected facility or part of the facility where the demolition or renovation activities will occur for the presence of asbestos.
2. Remove all RACM from the facility before any activity begins that would break up, dislodge, or similarly disturb the material or preclude access for subsequent removal.
3. RACM need not be removed if:
 - a) It is Category I non-friable ACM that is not in poor condition.
 - b) It is on a facility component that is encased in concrete or other similar material and is adequately wet whenever exposed.
 - c) It was not accessible for testing and was therefore not discovered until after demolition began and because of the demolition the material cannot be safely removed.
 - d) It is Category II non-friable ACM and the probability is low that the material will become crumbled, pulverized, or reduced to powder during demolition.

Note: Based on our experience, we recommend that all ACM be removed prior to renovation or demolition due to the fact that disturbance can damage them, create potential exposure to

workers and occupants and make them friable. This recommendation is made as a best practice to reduce potential exposure and limit liability.

4.2 OSHA

The Occupational Safety and Health Administration (OSHA) regulates employee exposure to asbestos under 29 CFR 1926.1101 and 29 CFR 1926.1001. Work associated with known or suspect asbestos containing materials (ACM), including trace (<1%) levels of asbestos, must be conducted according to these regulations in addition to the noted EPA regulations where applicable.

If the materials that have been identified as asbestos containing will be disturbed or are in poor condition, it is recommended that the asbestos be removed by an appropriately trained and licensed asbestos abatement contractor in accordance with Virginia, EPA and OSHA regulations.

If work is performed that will impact suspect materials that have not been sampled, it is recommended that they be sampled by a Virginia licensed Asbestos Inspector prior to disturbance. We note that during renovation or demolition activities, it is not uncommon to reveal materials that were not accessible during the survey or their presence could not otherwise be known.

5.0 Lead In Paint Sampling and Analysis Results

The procedure used to obtain representative samples of coatings present on structural components was by collection of dried paint film in general accordance with the methods described in the ASTM E 1729-05 standard. The samples were analyzed by EPA Method 7000B by an NVLAP (101882-0) accredited laboratory for total lead concentration. Based on the nature of this survey, when one component tests positive for the presence of lead in paint all similar painted components must be assumed to be positive, unless additional testing is performed. The results are listed below in Table I. Copies of the Laboratory Certificate of Analysis and Chain of Custody form are included as an attachment.

- **Suspected paint materials were not observed during this site visit so no samples were collected.**

6.0 Regulatory Compliance for Lead

H&P recommends that the contractor adhere to all applicable EPA regulations regarding disposal requirements and OSHA regulations for employee exposure.

OSHA Regulations

Based on the results of analysis, lead is present in the brown doors/frames. OSHA regulations for lead exposure do apply since when a painted or coated surface is disturbed, it could generate lead in dust greater than the action level exposure concentration of 30 ug/m³ established by the OSHA "*Lead Exposure in Construction Rule*" (29 CFR 1926.62). **The OSHA standard gives no guidance on acceptable levels of lead in coatings at which no exposure to airborne lead (above the action level) would be expected;** however, OSHA defines airborne concentrations and lists specific work practices which may create a lead hazard. Therefore, personnel exposure monitoring should be performed during any removal or demolition process to establish worker exposure levels which can be used to determine appropriate personnel protection and environmental controls for the specific work practice and material type. In accordance with OSHA requirements, the Contractor performing the work will be required to conduct this monitoring.

EPA Regulations

For disposal of construction/demolition debris that have lead, the EPA requires the generator perform testing for lead content of the waste stream to determine proper disposal in accordance with the requirements of 40 CFR 261.11, Criteria for Listing Hazardous Waste.

7.0 Limitations

This report summarizes the results of our sample collection and analysis of the suspect ACM and lead painted materials at the VDOT facility based on our understanding of the requested scope of work. The findings prepared by H&P are based upon our observations and the analytical analysis of the samples collected at the time of our field inspection. The services performed were provided in accordance with generally accepted environmental industry standard practices. No warranty, expressed or implied, is made. Our observations, conclusions and recommendations are based upon conditions readily visible at the site at the time of our visit, the results of testing and analysis and information provided to us by others.

Our conclusions and recommendations are based on the guidelines presented by the EPA, Commonwealth of Virginia and OSHA. Any conditions discovered which deviate from the data contained in this report should be presented to us for our evaluation. This report has been prepared for the exclusive use of the client and/or their agents. This service was performed in accordance with generally accepted environmental practices. Our conclusions and recommendations are based, in part, upon information provided to us by others; we have not verified the completeness or accuracy of the information provided by others, unless otherwise noted.

During H&P's non-invasive inspection, accessible areas were visually surveyed for the presence of ACM, and painted or coated components. Areas reviewed were limited to those identified by the Client and that could be readily and safely accessed. Our conclusions and recommendations are

based on the results of our testing and cannot be used to form a professional opinion of conditions in other areas beyond those from which the samples were collected. It is possible that inaccessible areas, such as behind walls or above ceilings, may not have been surveyed and therefore conditions in these areas are unknown.

During this study, suspect asbestos samples were submitted for analysis at an NVLAP-accredited laboratory via polarized light microscopy and suspect LBP was analyzed using industry standard methods and practices. As with any similar survey of this nature, actual conditions exist only at the precise locations from which samples were collected. Certain inferences are based on the results of this sampling and related testing to form a professional opinion of conditions in areas beyond those from which the samples were collected. It is also understood that this is a limited survey so that it is possible that concealed materials may be present that were not accessible to us. No other warranty, expressed or implied, is made.

H&P assumes no responsibility regarding response actions initiated as a result of our findings; nor liability for the duties and responsibilities of the Client or building owner with respect to compliance with applicable regulations. Compliance with regulations are the responsibility of the Client or building owner in accordance with local, state, and/or federal requirements.

Closing

Should you have any questions please contact Greg Whitt at (540) 521-1008 or via email at g.whitt@handp.com or Mary Beth Wriston at 540-588-0941 or via email at m.wriston@handp.com. We appreciate the opportunity to serve as your environmental consultant.

Sincerely,

HURT & PROFFITT, INC



Gregory L. Whitt
Environmental/Industrial Hygiene Manager
Roanoke Office



Roy Wriston
Environmental/Industrial Hygiene Senior
Roanoke Office

Appendices:

- Appendix I - Photo Logs
- Appendix II - Site Sketches
- Appendix III - Asbestos Laboratory Analysis Report and Chain-of-Custody Forms
- Appendix IV – Lead Paint Laboratory Analysis Report and Chain-of-Custody Forms

APPENDIX I

Photo Log

2140845-Chemical Storage Building 1



Exterior of Building

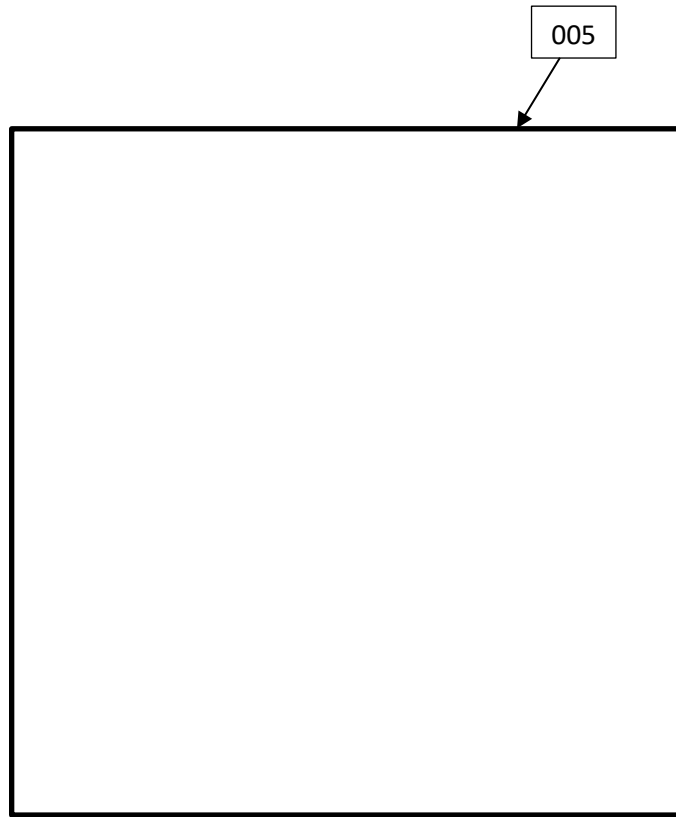


Interior of Building

APPENDIX II

Site Sketches

Asbestos Sample Locations of Building #2140845



Positive sample locations in red

APPENDIX III

Asbestos Analysis Bulk Report

Chain of Custody Forms



The Identification Specialists

Analysis Report
prepared for
Hurt & Proffitt, Inc.

Report Date: 10/12/2023

Project Name: VDOT - Airport

Project #: 2023-1662-3623

SanAir ID#: 23055676



NVLAP LAB CODE 200870-0

10501 Trade Court | North Chesterfield, Virginia 23236
888.895.1177 | 804.897.1177 | fax: 804.897.0070 | IAQ@SanAir.com | SanAir.com



SanAir ID Number

23055676

FINAL REPORT

10/12/2023 10:46:24 AM

Name: Hurt & Proffitt, Inc.
Address: 2524 Langhorne Road
Lynchburg, VA 24501
Phone: 434-841-3893 (c)

Project Number: 2023-1662-3623
P.O. Number:
Project Name: VDOT - Airport
Collected Date: 10/5/2023
Received Date: 10/6/2023 10:40:00 AM

Dear K Hundley,

We at SanAir would like to thank you for the work you recently submitted. The 15 sample(s) were received on Friday, October 06, 2023 via UPS. The final report(s) is enclosed for the following sample(s): 001-RFSH-A, 001-RFSH-B, 001-RFSH-C, 002-RFFLT-A, 002-RFFLT-B, 002-RFFLT-C, 003-RFSH-A, 003-RFSH-B, 003-RFSH-C, 004-CLSH-A, 004-CLSH-B, 004-CLSH-C, 005-WLL-A, 005-WLL-B, 005-WLL-C.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

A handwritten signature in black ink that reads "Sandra Sobrino".

Sandra Sobrino
Asbestos & Materials Laboratory Manager
SanAir Technologies Laboratory

Final Report Includes:

- Cover Letter
- Analysis Pages
- Disclaimers and Additional Information

Sample conditions:

- 15 samples in Good condition.



1551 Oakridge Dr. STE B
Powhatan, VA 23139
804.897.1177 / 888.895.1177
Fax 804.897.0070
sanair.com

Asbestos
Chain of Custody
Form 140, Rev 1, 1/20/2017

SanAir ID Number

73055676

Company: <u>HUNT & PROFFITT INC</u>		Project #: <u>2623 1662-3623</u>		Collect by: <u>K HUNDLEY</u>
Address: <u>2524 BANGHARVE RD</u>		Project Name: <u>VDOT-AIRPORT</u>		Phone #:
City, St., Zip: <u>LYNCHBURG VA 24501</u>		Date Collected: <u>10/5/23</u>		Fax #:
State of Collection: <u>VA</u> Account #:		P.O. Number:		Email: <u>GWHITCHAMP.com</u>

Bulk			Air			Soil		
AB3B	PLM EPA 600/R-93/116	<input checked="" type="checkbox"/>	ABA	PCM NIOSH 7400	<input type="checkbox"/>	ABSE	PLM EPA 600/R-93/116 (Qual.)	<input type="checkbox"/>
	Positive Stop	<input checked="" type="checkbox"/>	ABA-2	OSHA w/TWA*	<input type="checkbox"/>	Vermiculite		
ABEPA	PLM EPA 400 Point Count	<input type="checkbox"/>	ABTEM	TEM AHERA	<input type="checkbox"/>	ABSP	PLM CARB 435 (LOD <1%)	<input type="checkbox"/>
ABBITK	PLM EPA 1000 Point Count	<input type="checkbox"/>	ABATN	TEM NIOSH 7402	<input type="checkbox"/>	ABSPI	PLM CARB 435 (LOD 0.25%)	<input type="checkbox"/>
ABBEH	PLM EPA NOB**	<input type="checkbox"/>	ABT2	TEM Level II	<input type="checkbox"/>	ABSP2	PLM CARB 435 (LOD 0.1%)	<input type="checkbox"/>
ABBCII	TEM Chatfield**	<input type="checkbox"/>	Other:		<input type="checkbox"/>	Dust		
ABBTM	TEM EPA NOB**	<input type="checkbox"/>	New York ELAP			ABWA	TEM Wipe ASTM D-6480	<input type="checkbox"/>
ABQ	PLM Qualitative	<input type="checkbox"/>	PLM NY	PLM EPA 600/M4-82-020	<input type="checkbox"/>	ABDMV	TEM Microvac ASTM D-5755	<input type="checkbox"/>
			ABEPA2	NY ELAP 198.1	<input type="checkbox"/>	Matrix Other		
			ABENY	NY ELAP 198.6 PLM NOB	<input type="checkbox"/>			
			ABBNY	NY ELAP 198.4 TEM NOB	<input type="checkbox"/>			

** Available on 24-hr. to 5-day TAT

Water	
ABIE	EPA 100.2 <input type="checkbox"/>

Turn Around Times	3 HR (4 HR TEM) <input type="checkbox"/>	6 HR (8HR TEM) <input type="checkbox"/>	12 HR <input type="checkbox"/>	24 HR <input type="checkbox"/>
	<input type="checkbox"/> 2 Days	<input type="checkbox"/> 3 Days	<input type="checkbox"/> 4 Days	<input checked="" type="checkbox"/> 5 Days

Special Instructions

Sample #	Sample Identification/Location	Volume or Area	Sample Date	Flow Rate*	Start - Stop Time*
001-RKSH-ABC	2140836 - STORAGE BLDG 1 - ^{SHED} ROOF	150 SF			
002-AFFLT - "	" - " - 12 FELT	"			
003-RKSH - "	2140821 - OIL HOUSE STORAGE - ROOF SHED	500 SF			
004- CLSH - 4	" - " - CEILING	300 SF			
005-WLL-ABC	2140845 - CHEM STORAGE BLDG 1 - WALL LIAER	200 SF			

Relinquished by	Date	Time	Received by	Date	Time
K HUNDLEY	10/5/23	PM	240	10/6/23	10:40 AM

If no technician is provided, then the primary contact for your account will be selected. Unless scheduled, the turnaround time for all samples received after 3 pm EST Friday will begin at 8 am Monday morning. Weekend or holiday work must be scheduled ahead of time and is charged for rush turnaround time. SanAir covers Standard Overnight FedEx shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.

Page 1 of 1

TRIANGLE ENVIRONMENTAL SERVICE CENTER, INC.

13509 East Boundary Road, Suite B, Midlothian, VA 23112
804-739-1751 • fax: 804-739-1753

BULK ASBESTOS SAMPLE ANALYSIS SUMMARY

CLIENT: SanAir Technologies Laboratory, Inc.
10501 Trade Court
North Chesterfield, VA 23236

TESC LOGIN #: 231009B

DATE OF RECEIPT: 10/9/2023
DATE OF ANALYSIS: 10/11/2023
DATE OF REPORT: 10/11/2023

CLIENT JOB/ #: 23055676

JOB SITE:

ANALYST: B. Trimmer

TESC SAMPLE #	CLIENT SAMPLE ID & GROSS DESCRIPTION	ESTIMATED % ASBESTOS	NON ASBESTOS % FIBERS	NON FIBROUS % MATERIALS
1	001-RFSH-A / Black tar-like	NAD	20% Fiberglass	80%
2	001-RFSH-B / Black tar-like	NAD	20% Fiberglass	80%
3	001-RFSH-C / Black tar-like	NAD	20% Fiberglass	80%
4	002-RFFLT-A / Black fibers	NAD	98% Cellulose	2%
5	002-RFFLT-B / Black fibers	NAD	98% Cellulose	2%
6	002-RFFLT-C / Black fibers	NAD	98% Cellulose	2%
7	003-RFSH-A / Black tar-like	NAD	20% Fiberglass	80%
8	003-RFSH-B / Black tar-like	NAD	20% Fiberglass	80%

Samples are analyzed in accordance with "EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method for the Determination of Asbestos in Bulk Insulation Samples", EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials. None Detected: not detected at/or below the detected limit of method (Reporting limit: 1% Asbestos). Sodium Chloride is analyzed for quality control blank. TESC recommends by point count or Transmission Electron Microscopy (TEM), for materials regulated by the EPA NESHAP (National Emission Standards for Hazardous Air Pollutants) and found to contain less than ten percent (<10%) asbestos by Polarized Light Microscopy (PLM). Both services are available for an additional fee. This report must not be reproduced except in full with approval of Triangle Environmental Service Center, Inc. This test report relates only to the item(s) tested. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

NVLAP Lab Code: 200794-0

[LEGEND NAD=No Asbestos Detected, Lino.=Linoleum, JC=Joint Compound]

Reviewed By Authorized Signatory:



Feng Jiang, MS Senior Geologist, Laboratory Director
Yuedong Fang, Senior Geologist

TRIANGLE ENVIRONMENTAL SERVICE CENTER, INC.

13509 East Boundary Road, Suite B, Midlothian, VA 23112
804-739-1751 • fax: 804-739-1753

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CLIENT: SanAir Technologies Laboratory, Inc.
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JOB SITE:

ANALYST: B. Trimmer

TESC SAMPLE #	CLIENT SAMPLE ID & GROSS DESCRIPTION	ESTIMATED % ASBESTOS	NON ASBESTOS % FIBERS	NON FIBROUS % MATERIALS
9	003-RFSH-C / Black tar-like	NAD	20% Fiberglass	80%
10A	004-CLSH-A - Drywall / White powder, brown fibers	NAD	20% Cellulose	80%
10B	004-CLSH-A - Joint Compound / White powder	NAD		100%
11A	004-CLSH-B - Drywall / White powder, brown fibers	NAD	20% Cellulose	80%
11B	004-CLSH-B - Joint Compound / White powder	NAD		100%
12A	004-CLSH-C - Drywall / White powder, brown fibers	NAD	20% Cellulose	80%
12B	004-CLSH-C - Joint Compound / White powder	NAD		100%
13	005-WLL-A / Black tar-like	NAD	20% Synthetic	80%

Samples are analyzed in accordance with "EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method for the Determination of Asbestos in Bulk Insulation Samples", EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials. None Detected: not detected at/or below the detected limit of method (Reporting limit: 1% Asbestos). Sodium Chloride is analyzed for quality control blank. TESC recommends by point count or Transmission Electron Microscopy (TEM), for materials regulated by the EPA NESHAP (National Emission Standards for Hazardous Air Pollutants) and found to contain less than ten percent (<10%) asbestos by Polarized Light Microscopy (PLM). Both services are available for an additional fee. This report must not be reproduced except in full with approval of Triangle Environmental Service Center, Inc. This test report relates only to the item(s) tested. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

NVLAP Lab Code: 200794-0

[LEGEND NAD=No Asbestos Detected, Lino.=Linoleum, JC=Joint Compound]

Reviewed By Authorized Signatory:



Feng Jiang, MS Senior Geologist, Laboratory Director
Yuedong Fang, Senior Geologist

TRIANGLE ENVIRONMENTAL SERVICE CENTER, INC.

13509 East Boundary Road, Suite B, Midlothian, VA 23112
804-739-1751 • fax: 804-739-1753

BULK ASBESTOS SAMPLE ANALYSIS SUMMARY

CLIENT: SanAir Technologies Laboratory, Inc.
10501 Trade Court
North Chesterfield, VA 23236

TESC LOGIN #: 231009B

DATE OF RECEIPT: 10/9/2023
DATE OF ANALYSIS: 10/11/2023
DATE OF REPORT: 10/11/2023

CLIENT JOB/ #: 23055676

JOB SITE:

ANALYST: B. Trimmer

TESC SAMPLE #	CLIENT SAMPLE ID & GROSS DESCRIPTION	ESTIMATED % ASBESTOS	NON ASBESTOS % FIBERS	NON FIBROUS % MATERIALS
14	005-WLL-B / Black tar-like	NAD	20% Synthetic	80%
15	005-WLL-C / Black tar-like	NAD	20% Synthetic	80%

Total Samples/Layers Analyzed: 18

Samples are analyzed in accordance with "EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method for the Determination of Asbestos in Bulk Insulation Samples", EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials. None Detected: not detected at/or below the detected limit of method (Reporting limit: 1% Asbestos). Sodium Chloride is analyzed for quality control blank. TESC recommends by point count or Transmission Electron Microscopy (TEM), for materials regulated by the EPA NESHAP (National Emission Standards for Hazardous Air Pollutants) and found to contain less than ten percent (<10%) asbestos by Polarized Light Microscopy (PLM). Both services are available for an additional fee. This report must not be reproduced except in full with approval of Triangle Environmental Service Center, Inc. This test report relates only to the item(s) tested. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

NVLAP Lab Code: 200794-0

[LEGEND NAD=No Asbestos Detected, Lino.=Linoleum, JC=Joint Compound]

Reviewed By Authorized Signatory:



Feng Jiang, MS Senior Geologist, Laboratory Director
Yuedong Fang, Senior Geologist

TESC LOGIN NUMBER:

231009B

TRIANGLE ENVIRONMENTAL SERVICE CENTER

13509 East Boundary Road, Suite B • Midlothian • VA • 23112 • Tel: 804-739-1751 • Fax: 804-739-1753

CHAIN OF CUSTODY FORM

LAB CUSTOMER: SanAir Technologies Laboratory, Inc.

ADDRESS: 10501 Trade Court

CITY, STATE, ZIP: N. Chesterfield VA 23236

TAT: 2 Hour: 6 Hour: 24 Hour: 48 Hour: 3 Day: 5 Day:

CONTACT METHOD: Phone: 804-897-1177 Fax:

DATE: 10/6/23

CONTACT NAME: Sandra Sobrino

PROJECT #: 23055676

PROJECT SITE: iag@sanair.com; ssobrinoo@sanair.com

Sample number	Sample Date	Asbestos							Lead							Other Metals				Air Quality/Mold				Comments							
		Bulk ID by PLM	PCM Fiber Count	PLM Point Count 400	PLM Point Count 1000	PLM Gravimetric	CARB 435 (Soil only)	TEM AHERA Air	TEM Bulk Chatfield	Air	Paint(% & PPM)	Soil(PPM)	Wipe	TCLP (Pb)	Waster Water	Drinking Water (Pb)	TCLP RCRA 8	CAM 17	Welding Fume	Toxic Metal Profile	Biocassette	Slide	Surface Tape		Surface Swab	Bulk	Air Volume (L)	Wipe Area (ft ²)	Scrape Area (cm ²)		
001 - RFSH-A	10/5/23	X																											Positive Step		
001 - RFSH-B		X																													
001 - RFSH-C		X																													
002 - RFFLT-A		X																													
002 - RFFLT-B		X																													
002 - RFFLT-C		X																													
003 - RFSH-A		X																													
003 - RFSH-B		X																													
003 - RFSH-C		X																													
004 - CLSH-A		X																													
004 - CLSH-B		X																													
004 - CLSH-C		X																													
005 - WLL-A		X																													
005 - WLL-B		X																													
005 - WLL-C		X																													
Released by <i>Tamara Pannaus</i>		Signature: <i>Sandra Sobrino</i>																							Date/Time: 10/6/23 10:40am						
Received by		Signature: <i>PN</i>																							Date/Time: 10/4 8:30						

Prepared by TESC

Pages: 1 of 1

APPENDIX IV

Lead Paint Analysis Report

Chain of Custody Forms



The Identification Specialists

Analysis Report
prepared for
Hurt & Proffitt, Inc.

Report Date: 10/13/2023

Project Name: VDOT-Airport

Project #: 20231662-3624

SanAir ID#: 23055790



10501 Trade Court | North Chesterfield, Virginia 23236
888.895.1177 | 804.897.1177 | fax: 804.897.0070 | IAQ@SanAir.com | SanAir.com



SanAir ID Number

23055790

FINAL REPORT

10/13/2023 9:31:37 AM

Name: Hurt & Proffitt, Inc.

Address: 2524 Langhorne Road

Lynchburg, VA 24501

Phone: 434-841-3893 (c)

Project Number: 20231662-3624

P.O. Number:

Project Name: VDOT-Airport

Collected Date: 10/5/2023

Received Date: 10/6/2023 10:40:00 AM

Dear Ken Hundley,

We at SanAir would like to thank you for the work you recently submitted. The 5 sample(s) were received on Friday, October 06, 2023 via UPS. The final report(s) is enclosed for the following sample(s): L-01, L-02, L-03, L-04, L-05.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

A handwritten signature in black ink, appearing to read "Abisola Kasali".

Abisola Kasali
Metals Laboratory Director
SanAir Technologies Laboratory

Final Report Includes:

- Cover Letter
- Analysis on Test Family AA
- Disclaimers and Additional Information

Sample conditions:

- 5 samples in Good condition.



SanAir ID Number
23055790
FINAL REPORT
10/13/2023 9:31:37 AM

Name: Hurt & Proffitt, Inc.
Address: 2524 Langhorne Road
Lynchburg, VA 24501
Phone: 434-841-3893 (c)

Project Number: 20231662-3624
P.O. Number:
Project Name: VDOT-Airport
Collected Date: 10/5/2023
Received Date: 10/6/2023 10:40:00 AM


Analyst: Butler, Jillian
Test Method: SW846/M3050B/7000B

Lead Paint Analysis

PAINT Sample	Description	µg Pb In Sample	Sample Size (grams)	Calculated RL	Sample Results	Sample Results
23055790 - 1	L-01 2140836-Storage Bldg 1-Brown Paint Ext	10	0.1097	91.2	94 µg/g (ppm)	0.009 % By Weight
23055790 - 2	L-02 2140821-Oil House Storage-Tan Paint-Throughout	< 10	0.1145	87.3	<87.3 µg/g (ppm)	<0.009 % By Weight
23055790 - 3	L-03 2140821-Oil House Storage-Brown & 2 Doors/Frames	20	0.1046	95.6	195.5 µg/g (ppm)	0.020 % By Weight
23055790 - 4	L-04 2140821-Oil House Storage-White- 2 Ceilings	< 10	0.1121	89.2	<89.2 µg/g (ppm)	<0.009 % By Weight
23055790 - 5	L-05 2140849-Sprender Rack 1-Brown-I Beams	863	0.1024	97.7	8430 µg/g (ppm)	0.843 % By Weight

Method Reporting Limit <10 µg/0.1 g paint
Sample L-01 contained substrate.

Signature: 
Date: 10/9/2023

Reviewed: 
Date: 10/9/2023

Disclaimer

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AIHA LAP, LLC Lab ID: LAP-162952

Commonwealth of VA Department of General Services DCLS, VELAP Laboratory ID#460251

New York State Department of Health Laboratory ID No: 11983

California State Environmental Laboratory Accreditation Program Certificate No: 2915

State of Connecticut Department of Public Health Environmental Laboratory Registration Number: PH-0105

New Jersey Department of Environment Protection Environmental Laboratory Certification ID# VA014

Ohio Department of Health Environmental Lead Laboratory Approval Number E10049

State of Rhode Island Department of Health Environmental Lead Laboratory No LAO00371

23055790

Company: <u>HURT & PROFFITT INC</u>		Project #: <u>20231662-3624</u>	Phone #: <u>226-613-4225</u>
Address: <u>2524 LANGHORNE Rd</u>		Project Name: <u>VDOT - AIRPORT</u>	Phone #:
City, St., Zip: <u>LYNCHBURG VA 24501</u>		Date Collected: <u>10/5/23</u>	Fax #:
Samples Collected By: <u>K HUNDLEY</u>		P.O. Number:	Email: <u>SHANTEH@SDP.COM</u>
Account #:			Email:

Matrix Types

Metals Analysis Types

<input type="checkbox"/> Air	<input type="checkbox"/> Aqueous	<input type="checkbox"/> Bulk	Total Concentration of Lead <input checked="" type="checkbox"/> Total Concentration of RCRA 8 Metals <input type="checkbox"/> TCLP for Lead <input type="checkbox"/> TCLP for RCRA 8 Metals <input type="checkbox"/> TCLP Full (w/ Organics) <input type="checkbox"/>	<input type="checkbox"/> ICP-total concentration of metals (please list metals): <input type="checkbox"/> Other:
<input checked="" type="checkbox"/> Paint	<input type="checkbox"/> Sludge	<input type="checkbox"/> Soil		
<input type="checkbox"/> Dust	<input type="checkbox"/> Wipe	<input type="checkbox"/> Water, DW		
<input type="checkbox"/> Wastewater				
<input type="checkbox"/> Other:				

*Turn Around Times	Same Day <input type="checkbox"/>	1 Day <input type="checkbox"/>	2 days <input type="checkbox"/>	3 Days <input type="checkbox"/>
	<input checked="" type="checkbox"/> Standard (5 day)	<input type="checkbox"/> Full TCLP (10d)		

*Courier charge for same day and 1 day TAT for offsite work.

Sample #	Sample Identification/Location	Flow Rate	Start Time	Stop Time	Volume (L) or Area (Sq ft)
L-01	2140836-STORAGE BLDG 1 - BROWN PAINT EXT.				1800 SF
L-02	2140821-OIL HOUSE STORAGE - TAO PAINT - THRUOUT				1200 SF
L-03	" - " - BROWN - 2 DOWNS/FRAMES				2 DOWNS/FRAMES
L-04	" - " - WHITE - 2 CEILINGS				300 SF
L-05	2140849-SPREADER RACK 1 - BROWN - I BEAMS				42 I-BEAMS

Special Instructions	
----------------------	--

Relinquished by	Date	Time	Received by	Date	Time
<u>K HUNDLEY</u>	<u>10/5/23</u>	<u>PM</u>	<u>12m</u>	<u>10/6/23</u>	<u>10:40am</u>

Unless scheduled, the turn around time for all samples received after 3 pm will begin at 8 am the next business morning.
Weekend or Holiday work must be scheduled ahead of time and is charged at 150% of the Rush TAT rate
There is a minimum charge of \$100 for weekend work. SanAir covers Standard Overnight FedEx shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.

November 7, 2023

Virginia Department of Transportation
Central Office
1401 East Broad Street
Richmond, Virginia 23219

Attention: Robert Curran, Capital Outlay Asbestos/Lead Coordinator
Email: robert.curran@vdot.virginia.gov / Phone: 804-786-6724

Subject: Task Order #16: Asbestos and Lead Based Paint Inspection Services
Building 2140849-Spreader Rack 1
Airport AHQ
4830 Thirlane Road
Roanoke, Virginia 24019
H&P Project: 20231662

Mr. Curran:

Hurt & Proffitt, Inc. (H&P) was requested to conduct limited sampling of suspect asbestos containing materials and lead based painted components from **Building 2140849** located at the Airport AHQ in Roanoke, Virginia. The sampling was performed by H&P representative Mr. Ken Hundley (Virginia Asbestos Inspector License number is 3303 001516) on October 5, 2023. This letter and attachments represent H&P's report for the above-referenced project.

1.0 Building Description

The structure is one story and is spreader rack 1 and is constructed of wood with metal roofing.

2.0 Asbestos Survey Procedures and Findings

Suspected asbestos containing materials were not observed on the structure during our review, so no samples were collected.

3.0 Applicable Regulations

Following are some applicable regulations pertaining to asbestos containing materials.

3.1 EPA/NESHAP Regulations for Asbestos Containing Materials

The U.S. Environmental Protection Agency promulgated the National Emission Standards for Hazardous Air Pollutants (NESHAP) [40 CFR Part 61], which addresses the application, removal, and disposal of asbestos-containing materials (ACM). Under NESHAP the following categories are defined for asbestos-containing materials:

Friable - When dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Non-friable - When dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Category I Non-friable ACM - Packings, gaskets, resilient floor coverings, and asphalt roofing products containing more than 1% asbestos.

Category II Non-friable ACM – Any material, excluding Category I Non-friable ACM, which contains more than 1% asbestos.

Regulated Asbestos Containing Material (RACM) – One of the following:

1. Friable ACM
2. Category I Non-friable ACM that has become friable.
3. Category I Non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading.
4. Category II Non-friable ACM that has a high probability of becoming, or has become, friable by the forces expected to act on the material in the course of demolition or renovation operations.

Under NESHAP, the following actions are required:

1. Prior to the commencement of demolition or renovation activities, the building owner must inspect the affected facility or part of the facility where the demolition or renovation activities will occur for the presence of asbestos.
2. Remove all RACM from the facility before any activity begins that would break up, dislodge, or similarly disturb the material or preclude access for subsequent removal.
3. RACM need not be removed if:
 - a) It is Category I non-friable ACM that is not in poor condition.
 - b) It is on a facility component that is encased in concrete or other similar material and is adequately wet whenever exposed.

- c) It was not accessible for testing and was therefore not discovered until after demolition began and because of the demolition the material cannot be safely removed.
- d) It is Category II non-friable ACM and the probability is low that the material will become crumbled, pulverized, or reduced to powder during demolition.

Note: Based on our experience, we recommend that all ACM be removed prior to renovation or demolition due to the fact that disturbance can damage them, create potential exposure to workers and occupants and make them friable. This recommendation is made as a best practice to reduce potential exposure and limit liability.

3.2 OSHA

The Occupational Safety and Health Administration (OSHA) regulates employee exposure to asbestos under 29 CFR 1926.1101 and 29 CFR 1926.1001. Work associated with known or suspect asbestos containing materials (ACM), including trace (<1%) levels of asbestos, must be conducted according to these regulations in addition to the noted EPA regulations where applicable.

If the materials that have been identified as asbestos containing will be disturbed or are in poor condition, it is recommended that the asbestos be removed by an appropriately trained and licensed asbestos abatement contractor in accordance with Virginia, EPA and OSHA regulations.

If work is performed that will impact suspect materials that have not been sampled, it is recommended that they be sampled by a Virginia licensed Asbestos Inspector prior to disturbance. We note that during renovation or demolition activities, it is not uncommon to reveal materials that were not accessible during the survey or their presence could not otherwise be known.

4.0 Lead In Paint Sampling and Analysis Results

The procedure used to obtain representative samples of coatings present on structural components was by collection of dried paint film in general accordance with the methods described in the ASTM E 1729-05 standard. The samples were analyzed by EPA Method 7000B by an NVLAP (101882-0) accredited laboratory for total lead concentration. Based on the nature of this survey, when one component tests positive for the presence of lead in paint all similar painted components must be assumed to be positive, unless additional testing is performed. The results are listed below in Table I. Copies of the Laboratory Certificate of Analysis and Chain of Custody form are included as an attachment.

Table II –Lead in Paint Sample Analysis Results

Sample No.	Sample Locations	Color	Substrate	Pb (ug/g - ppm)*
L-05	Beams	Brown	Steel	8,430

*ppm: parts per million; which is equal to µg/g

4.1 Lead in Paint Sample Analysis Conclusions

Based on the results of laboratory analysis of the representative paint film samples, lead was detected in the paint samples from:

- Brown painted steel exterior beams.

5.0 Regulatory Compliance for Lead

H&P recommends that the contractor adhere to all applicable EPA regulations regarding disposal requirements and OSHA regulations for employee exposure.

OSHA Regulations

Based on the results of analysis, lead is present in the brown exterior steel beams. OSHA regulations for lead exposure do apply since when a painted or coated surface is disturbed, it could generate lead in dust greater than the action level exposure concentration of 30 ug/m³ established by the OSHA *“Lead Exposure in Construction Rule”* (29 CFR 1926.62). **The OSHA standard gives no guidance on acceptable levels of lead in coatings at which no exposure to airborne lead (above the action level) would be expected;** however, OSHA defines airborne concentrations and lists specific work practices which may create a lead hazard. Therefore, personnel exposure monitoring should be performed during any removal or demolition process to establish worker exposure levels which can be used to determine appropriate personnel protection and environmental controls for the specific work practice and material type. In accordance with OSHA requirements, the Contractor performing the work will be required to conduct this monitoring.

EPA Regulations

For disposal of construction/demolition debris that have lead, the EPA requires the generator perform testing for lead content of the waste stream to determine proper disposal in accordance with the requirements of 40 CFR 261.11, Criteria for Listing Hazardous Waste.

6.0 Limitations

This report summarizes the results of our sample collection and analysis of the suspect ACM and lead painted materials at the VDOT facility based on our understanding of the requested scope of work. The findings prepared by H&P are based upon our observations and the analytical analysis of the samples collected at the time of our field inspection. The services performed were provided in accordance with generally accepted environmental industry standard practices. No warranty, expressed or implied, is made. Our observations, conclusions and recommendations are based upon conditions readily visible at the site at the time of our visit, the results of testing and analysis and information provided to us by others.

Our conclusions and recommendations are based on the guidelines presented by the EPA, Commonwealth of Virginia and OSHA. Any conditions discovered which deviate from the data contained in this report should be presented to us for our evaluation. This report has been prepared for the exclusive use of the client and/or their agents. This service was performed in accordance with generally accepted environmental practices. Our conclusions and recommendations are based, in part, upon information provided to us by others; we have not verified the completeness or accuracy of the information provided by others, unless otherwise noted.

During H&P's non-invasive inspection, accessible areas were visually surveyed for the presence of ACM, and painted or coated components. Areas reviewed were limited to those identified by the Client and that could be readily and safely accessed. Our conclusions and recommendations are based on the results of our testing and cannot be used to form a professional opinion of conditions in other areas beyond those from which the samples were collected. It is possible that inaccessible areas, such as behind walls or above ceilings, may not have been surveyed and therefore conditions in these areas are unknown.

During this study, suspect asbestos samples were submitted for analysis at an NVLAP-accredited laboratory via polarized light microscopy and suspect LBP was analyzed using industry standard methods and practices. As with any similar survey of this nature, actual conditions exist only at the precise locations from which samples were collected. Certain inferences are based on the results of this sampling and related testing to form a professional opinion of conditions in areas beyond those from which the samples were collected. It is also understood that this is a limited survey so that it is possible that concealed materials may be present that were not accessible to us. No other warranty, expressed or implied, is made.

H&P assumes no responsibility regarding response actions initiated as a result of our findings; nor liability for the duties and responsibilities of the Client or building owner with respect to compliance with applicable regulations. Compliance with regulations are the responsibility of the Client or building owner in accordance with local, state, and/or federal requirements.

Closing

Should you have any questions please contact Greg Whitt at (540) 521-1008 or via email at g.whitt@handp.com or Mary Beth Wriston at 540-588-0941 or via email at m.wriston@handp.com. We appreciate the opportunity to serve as your environmental consultant.

Sincerely,

HURT & PROFFITT, INC



Gregory L. Whitt
Environmental/Industrial Hygiene Manager
Roanoke Office



Roy Wriston
Environmental/Industrial Hygiene Senior
Roanoke Office

Appendices:

Appendix I - Photo Logs

Appendix II - Site Sketches

Appendix III - Asbestos Laboratory Analysis Report and Chain-of-Custody Forms

Appendix IV – Lead Laboratory Analysis Report and Chain-of-Custody Forms

APPENDIX I

Photo Log

2140849-Spreader Rack 1



Exterior of Building

APPENDIX II

Site Sketches

Asbestos Sample Locations of Building #2140849



No Suspect Materials Observed

Positive sample locations in red

APPENDIX IV

Lead Analysis Report

Chain of Custody Forms



The Identification Specialists

Analysis Report
prepared for
Hurt & Proffitt, Inc.

Report Date: 10/13/2023

Project Name: VDOT-Airport

Project #: 20231662-3624

SanAir ID#: 23055790



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Sincerely,

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Abisola Kasali
Metals Laboratory Director
SanAir Technologies Laboratory

Final Report Includes:
- Cover Letter
- Analysis on Test Family AA
- Disclaimers and Additional Information

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Test Method: SW846/M3050B/7000B

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Method Reporting Limit <10 $\mu\text{g}/0.1\text{ g}$ paint
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Signature:

Date: 10/9/2023

Reviewed:

Date: 10/9/2023

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City, St., Zip: <u>LYNCHBURG VA 24501</u>		Date Collected: <u>10/5/23</u>	Fax #:
Samples Collected By: <u>K HUNDLEY</u>		P.O. Number:	Email: <u>GHANTE@AEP.COM</u>
Account #:			Email:

Matrix Types

Metals Analysis Types

<input type="checkbox"/> Air	<input type="checkbox"/> Aqueous	<input type="checkbox"/> Bulk	<input checked="" type="checkbox"/> Total Concentration of Lead <input checked="" type="checkbox"/> Total Concentration of RCRA 8 Metals <input type="checkbox"/> ICP-total concentration of metals (please list metals): <input type="checkbox"/> TCLP for Lead <input type="checkbox"/> TCLP for RCRA 8 Metals <input type="checkbox"/> TCLP Full (w/ Organics)
<input checked="" type="checkbox"/> Paint	<input type="checkbox"/> Sludge	<input type="checkbox"/> Soil	
<input type="checkbox"/> Dust	<input type="checkbox"/> Wipe	<input type="checkbox"/> Water, DW	
<input type="checkbox"/> Wastewater <input type="checkbox"/> Other:			

*Turn Around Times	Same Day <input type="checkbox"/>	1 Day <input type="checkbox"/>	2 days <input type="checkbox"/>	3 Days <input type="checkbox"/>
	<input checked="" type="checkbox"/> Standard (5 day)	<input type="checkbox"/> Full TCLP (10d)		

*Courier charge for same day and 1 day TAT for offsite work.

Sample #	Sample Identification/Location	Flow Rate	Start Time	Stop Time	Volume (L) or Area (Sq ft)
L-01	2140836-STORAGE BLDG 1 - BROWN PAINT EXT.				1800 SF
L-02	2140821-OIL HOUSE STORAGE - TAO PAINT - THRUOUT				1200 SF
L-03	" - " - BROWN - 2 DOWNS/FRAMES				2 DOWNS/FRAMES
L-04	" - " - WHITE - 2 CEILINGS				300 SF
L-05	2140849-SPREADER RACK 1 - BROWN - I BEAMS				42 I-BEAMS

Special Instructions	
----------------------	--

Relinquished by	Date	Time	Received by	Date	Time
K HUNDLEY	10/5/23	PM	12m	10/6/23	10:40 am

Unless scheduled, the turn around time for all samples received after 3 pm will begin at 8 am the next business morning.
Weekend or Holiday work must be scheduled ahead of time and is charged at 150% of the Rush TAT rate
There is a minimum charge of \$100 for weekend work. SanAir covers Standard Overnight FedEx shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.



November 7, 2023

Virginia Department of Transportation
Central Office
1401 East Broad Street
Richmond, Virginia 23219

Attention: Robert Curran, Capital Outlay Asbestos/Lead Coordinator
Email: robert.curran@vdot.virginia.gov / Phone: 804-786-6724

Subject: Task Order #16: Asbestos and Lead Based Paint Inspection Services
Building 2140836-Storage Building 1
Airport AHQ
4830 Thirlane Road
Roanoke, Virginia 24019
H&P Project: 20231662

Mr. Curran:

Hurt & Proffitt, Inc. (H&P) was requested to conduct limited sampling of suspect asbestos containing materials and lead based painted components from **Building 2140836** located at the Airport AHQ in Roanoke, Virginia. The sampling was performed by H&P representative Mr. Ken Hundley (Virginia Asbestos Inspector License number is 3303 001516) on October 5, 2023. This letter and attachments represent H&P's report for the above-referenced project.

1.0 Building Description

The structure is one story and is the Storage Building 1 and is constructed of cmu block with shingle roofing.

2.0 Asbestos Survey Procedures and Findings

The survey included collection and submittal of three (3) individual samples of suspect asbestos containing materials (ACM) that were submitted for analysis for asbestos. The sampling was limited to non-invasive means and was performed in accordance with VDOT requirements and state and federal regulations. The survey was conducted on the reasonably and safely accessible portions of the building.

The suspect asbestos samples were submitted for analysis by EPA Method No. 600/R-93/116 and 600/M4-82-020 (polarized light microscopy (PLM)). All samples were analyzed by SanAir

Technologies Laboratory of Powhatan, Virginia, a NVLAP accredited laboratory licensed to perform asbestos bulk analysis within the State of Virginia. The sampling results are shown in the following table. Copies of the laboratory Asbestos Analysis Bulk Report and Chain of Custody forms are included as an attachment to this report.

Table I – Building 2140836 Sample Analysis Results

Sample #	Sample Type	Lab Description.	Chain of Custody Description	Results	Condition	Quantity
001-RFSH-A	Shingle	Black Tar-Like	Exterior	NAD	Fair	150 Ft ²
001-RFSH-B	Shingle	Black Tar-Like	Exterior	NAD	Fair	
001-RFSH-C	Shingle	Black Tar-Like	Exterior	NAD	Fair	

None Detected: No Asbestos Detected

3.0 Analysis Results

Based on the results of laboratory analysis, asbestos was not identified in the materials sampled during this survey.

3.1 Presumed Asbestos Containing Materials

During the conduct of this survey, sampling was limited to those materials which were within the areas designated by the client, which were safely accessible, and which were able to be sampled without damaging systems or structures. As such, **other materials not represented in this survey should be presumed to be positive, unless sampling is conducted and they are shown to be negative for asbestos.**

4.0 Applicable Regulations

Following are some applicable regulations pertaining to asbestos containing materials.

4.1 EPA/NESHAP Regulations for Asbestos Containing Materials

The U.S. Environmental Protection Agency promulgated the National Emission Standards for Hazardous Air Pollutants (NESHAP) [40 CFR Part 61], which addresses the application, removal, and disposal of asbestos-containing materials (ACM). Under NESHAP the following categories are defined for asbestos-containing materials:

Friable - When dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Non-friable - When dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Category I Non-friable ACM - Packings, gaskets, resilient floor coverings, and asphalt roofing products containing more than 1% asbestos.

Category II Non-friable ACM – Any material, excluding Category I Non-friable ACM, which contains more than 1% asbestos.

Regulated Asbestos Containing Material (RACM) – One of the following:

1. Friable ACM
2. Category I Non-friable ACM that has become friable.
3. Category I Non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading.
4. Category II Non-friable ACM that has a high probability of becoming, or has become, friable by the forces expected to act on the material in the course of demolition or renovation operations.

Under NESHAP, the following actions are required:

1. Prior to the commencement of demolition or renovation activities, the building owner must inspect the affected facility or part of the facility where the demolition or renovation activities will occur for the presence of asbestos.
2. Remove all RACM from the facility before any activity begins that would break up, dislodge, or similarly disturb the material or preclude access for subsequent removal.
3. RACM need not be removed if:
 - a) It is Category I non-friable ACM that is not in poor condition.
 - b) It is on a facility component that is encased in concrete or other similar material and is adequately wet whenever exposed.
 - c) It was not accessible for testing and was therefore not discovered until after demolition began and because of the demolition the material cannot be safely removed.
 - d) It is Category II non-friable ACM and the probability is low that the material will become crumbled, pulverized, or reduced to powder during demolition.

Note: Based on our experience, we recommend that all ACM be removed prior to renovation or demolition due to the fact that disturbance can damage them, create potential exposure to workers and occupants and make them friable. This recommendation is made as a best practice to reduce potential exposure and limit liability.

4.2 OSHA

The Occupational Safety and Health Administration (OSHA) regulates employee exposure to asbestos under 29 CFR 1926.1101 and 29 CFR 1926.1001. Work associated with known or suspect asbestos containing materials (ACM), including trace (<1%) levels of asbestos, must be conducted according to these regulations in addition to the noted EPA regulations where applicable.

If the materials that have been identified as asbestos containing will be disturbed or are in poor condition, it is recommended that the asbestos be removed by an appropriately trained and licensed asbestos abatement contractor in accordance with Virginia, EPA and OSHA regulations.

If work is performed that will impact suspect materials that have not been sampled, it is recommended that they be sampled by a Virginia licensed Asbestos Inspector prior to disturbance. We note that during renovation or demolition activities, it is not uncommon to reveal materials that were not accessible during the survey or their presence could not otherwise be known.

5.0 Lead In Paint Sampling and Analysis Results

The procedure used to obtain representative samples of coatings present on structural components was by collection of dried paint film in general accordance with the methods described in the ASTM E 1729-05 standard. The samples were analyzed by EPA Method 7000B by an NVLAP (101882-0) accredited laboratory for total lead concentration. Based on the nature of this survey, when one component tests positive for the presence of lead in paint all similar painted components must be assumed to be positive, unless additional testing is performed. The results are listed below in Table I. Copies of the Laboratory Certificate of Analysis and Chain of Custody form are included as an attachment.

Table II –Lead in Paint Sample Analysis Results

Sample No.	Sample Locations	Color	Substrate	Pb (ug/g - ppm)*
L-01	Exterior	Brown	CMU	94

*ppm: parts per million; which is equal to µg/g

4.1 Lead in Paint Sample Analysis Conclusions

Based on the results of laboratory analysis of the representative paint film samples, lead was detected in the paint samples from:

- Brown painted exterior walls.

6.0 Regulatory Compliance for Lead

H&P recommends that the contractor adhere to all applicable EPA regulations regarding disposal requirements and OSHA regulations for employee exposure.

OSHA Regulations

Based on the results of analysis, lead is present in the brown doors/frames. OSHA regulations for lead exposure do apply since when a painted or coated surface is disturbed, it could generate lead in dust greater than the action level exposure concentration of 30 ug/m³ established by the OSHA "*Lead Exposure in Construction Rule*" (29 CFR 1926.62). **The OSHA standard gives no guidance on acceptable levels of lead in coatings at which no exposure to airborne lead (above the action level) would be expected;** however, OSHA defines airborne concentrations and lists specific work practices which may create a lead hazard. Therefore, personnel exposure monitoring should be performed during any removal or demolition process to establish worker exposure levels which can be used to determine appropriate personnel protection and environmental controls for the specific work practice and material type. In accordance with OSHA requirements, the Contractor performing the work will be required to conduct this monitoring.

EPA Regulations

For disposal of construction/demolition debris that have lead, the EPA requires the generator perform testing for lead content of the waste stream to determine proper disposal in accordance with the requirements of 40 CFR 261.11, Criteria for Listing Hazardous Waste.

7.0 Limitations

This report summarizes the results of our sample collection and analysis of the suspect ACM and lead painted materials at the VDOT facility based on our understanding of the requested scope of work. The findings prepared by H&P are based upon our observations and the analytical analysis of the samples collected at the time of our field inspection. The services performed were provided in accordance with generally accepted environmental industry standard practices. No warranty, expressed or implied, is made. Our observations, conclusions and recommendations

are based upon conditions readily visible at the site at the time of our visit, the results of testing and analysis and information provided to us by others.

Our conclusions and recommendations are based on the guidelines presented by the EPA, Commonwealth of Virginia and OSHA. Any conditions discovered which deviate from the data contained in this report should be presented to us for our evaluation. This report has been prepared for the exclusive use of the client and/or their agents. This service was performed in accordance with generally accepted environmental practices. Our conclusions and recommendations are based, in part, upon information provided to us by others; we have not verified the completeness or accuracy of the information provided by others, unless otherwise noted.

During H&P's non-invasive inspection, accessible areas were visually surveyed for the presence of ACM, and painted or coated components. Areas reviewed were limited to those identified by the Client and that could be readily and safely accessed. Our conclusions and recommendations are based on the results of our testing and cannot be used to form a professional opinion of conditions in other areas beyond those from which the samples were collected. It is possible that inaccessible areas, such as behind walls or above ceilings, may not have been surveyed and therefore conditions in these areas are unknown.

During this study, suspect asbestos samples were submitted for analysis at an NVLAP-accredited laboratory via polarized light microscopy and suspect LBP was analyzed using industry standard methods and practices. As with any similar survey of this nature, actual conditions exist only at the precise locations from which samples were collected. Certain inferences are based on the results of this sampling and related testing to form a professional opinion of conditions in areas beyond those from which the samples were collected. It is also understood that this is a limited survey so that it is possible that concealed materials may be present that were not accessible to us. No other warranty, expressed or implied, is made.

H&P assumes no responsibility regarding response actions initiated as a result of our findings; nor liability for the duties and responsibilities of the Client or building owner with respect to compliance with applicable regulations. Compliance with regulations are the responsibility of the Client or building owner in accordance with local, state, and/or federal requirements.

Closing

Should you have any questions please contact Greg Whitt at (540) 521-1008 or via email at g.whitt@handp.com or Mary Beth Wriston at 540-588-0941 or via email at m.wriston@handp.com. We appreciate the opportunity to serve as your environmental consultant.

Sincerely,

HURT & PROFFITT, INC



Gregory L. Whitt
Environmental/Industrial Hygiene Manager
Roanoke Office



Roy Wriston
Environmental/Industrial Hygiene Senior
Roanoke Office

Appendices:

Appendix I - Photo Logs

Appendix II - Site Sketches

Appendix III - Asbestos Laboratory Analysis Report and Chain-of-Custody Forms

Appendix IV – Lead Paint Laboratory Analysis Report and Chain-of-Custody Forms

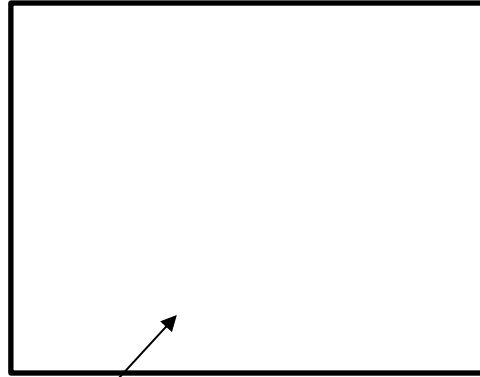
APPENDIX I

Photo Log

APPENDIX II

Site Sketches

Asbestos Sample Locations of Building #2140836



001

Positive sample locations in red

APPENDIX III

Asbestos Analysis Bulk Report

Chain of Custody Forms



The Identification Specialists

Analysis Report
prepared for
Hurt & Proffitt, Inc.

Report Date: 10/12/2023

Project Name: VDOT - Airport

Project #: 2023-1662-3623

SanAir ID#: 23055676



NVLAP LAB CODE 200870-0

10501 Trade Court | North Chesterfield, Virginia 23236
888.895.1177 | 804.897.1177 | fax: 804.897.0070 | IAQ@SanAir.com | SanAir.com



SanAir ID Number

23055676

FINAL REPORT

10/12/2023 10:46:24 AM

Name: Hurt & Proffitt, Inc.
Address: 2524 Langhorne Road
Lynchburg, VA 24501
Phone: 434-841-3893 (c)

Project Number: 2023-1662-3623
P.O. Number:
Project Name: VDOT - Airport
Collected Date: 10/5/2023
Received Date: 10/6/2023 10:40:00 AM

Dear K Hundley,

We at SanAir would like to thank you for the work you recently submitted. The 15 sample(s) were received on Friday, October 06, 2023 via UPS. The final report(s) is enclosed for the following sample(s): 001-RFSH-A, 001-RFSH-B, 001-RFSH-C, 002-RFFLT-A, 002-RFFLT-B, 002-RFFLT-C, 003-RFSH-A, 003-RFSH-B, 003-RFSH-C, 004-CLSH-A, 004-CLSH-B, 004-CLSH-C, 005-WLL-A, 005-WLL-B, 005-WLL-C.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

A handwritten signature in black ink that reads "Sandra Sobrino".

Sandra Sobrino
Asbestos & Materials Laboratory Manager
SanAir Technologies Laboratory

Final Report Includes:

- Cover Letter
- Analysis Pages
- Disclaimers and Additional Information

Sample conditions:

- 15 samples in Good condition.



1551 Oakridge Dr. STE B
Powhatan, VA 23139
804.897.1177 / 888.895.1177
Fax 804.897.0070
sanair.com

Asbestos
Chain of Custody
Form 140, Rev 1, 1/20/2017

SanAir ID Number

73055676

Company: <u>HUNT & PROFFITT INC</u>	Project #: <u>2623 1662-3623</u>	Collect by: <u>K HUNDLEY</u>
Address: <u>2524 BANGHARVE RD</u>	Project Name: <u>VDOT-AIRPORT</u>	Phone #:
City, St., Zip: <u>LYNCHBURG VA 24501</u>	Date Collected: <u>10/5/23</u>	Fax #:
State of Collection: <u>VA</u>	Account #:	Email: <u>GWHITCHAMP.com</u>

Bulk			Air			Soil		
AB3B	PLM EPA 600/R-93/116	<input checked="" type="checkbox"/>	ABA	PCM NIOSH 7400	<input type="checkbox"/>	ABSE	PLM EPA 600/R-93/116 (Qual.)	<input type="checkbox"/>
	Positive Stop	<input checked="" type="checkbox"/>	ABA-2	OSHA w/TWA*	<input type="checkbox"/>	Vermiculite		
ABEPA	PLM EPA 400 Point Count	<input type="checkbox"/>	ABTEM	TEM AHERA	<input type="checkbox"/>	ABSP	PLM CARB 435 (LOD <1%)	<input type="checkbox"/>
ABBITK	PLM EPA 1000 Point Count	<input type="checkbox"/>	ABATN	TEM NIOSH 7402	<input type="checkbox"/>	ABSPI	PLM CARB 435 (LOD 0.25%)	<input type="checkbox"/>
ABBEH	PLM EPA NOB**	<input type="checkbox"/>	ABT2	TEM Level II	<input type="checkbox"/>	ABSP2	PLM CARB 435 (LOD 0.1%)	<input type="checkbox"/>
ABBCII	TEM Chatfield**	<input type="checkbox"/>	Other:		<input type="checkbox"/>	Dust		
ABBTM	TEM EPA NOB**	<input type="checkbox"/>	New York ELAP			ABWA	TEM Wipe ASTM D-6480	<input type="checkbox"/>
ABQ	PLM Qualitative	<input type="checkbox"/>	PLM NY	PLM EPA 600/M4-82-020	<input type="checkbox"/>	ABDMV	TEM Microvac ASTM D-5755	<input type="checkbox"/>
			ABEPA2	NY ELAP 198.1	<input type="checkbox"/>	Matrix		
			ABENY	NY ELAP 198.6 PLM NOB	<input type="checkbox"/>	Other		
			ABBNY	NY ELAP 198.4 TEM NOB	<input type="checkbox"/>			

** Available on 24-hr. to 5-day TAT

Water	
ABIE	EPA 100.2 <input type="checkbox"/>

Turn Around Times	3 HR (4 HR TEM) <input type="checkbox"/>	6 HR (8HR TEM) <input type="checkbox"/>	12 HR <input type="checkbox"/>	24 HR <input type="checkbox"/>
	<input type="checkbox"/> 2 Days	<input type="checkbox"/> 3 Days	<input type="checkbox"/> 4 Days	<input checked="" type="checkbox"/> 5 Days

Special Instructions

Sample #	Sample Identification/Location	Volume or Area	Sample Date	Flow Rate*	Start - Stop Time*
001-RKSH-ABC	2140836 - STORAGE BLDG 1 - ^{SHED} ROOF	150 SF			
002-AFFLT - "	" - " - " - 12 FELT	"			
003-RKSH - "	2140821 - OIL HOUSE STORAGE - ROOF SHED	500 SF			
004- CLSH - 4	" - " - " - CEILING	300 SF			
CLSH					
005-WLL-ABC	2140845 - CHEM STORAGE BLDG 1 - WALL LIAER	200 SF			

Relinquished by	Date	Time	Received by	Date	Time
K HUNDLEY	10/5/23	PM	240	10/6/23	10:40 AM

If no technician is provided, then the primary contact for your account will be selected. Unless scheduled, the turnaround time for all samples received after 3 pm EST Friday will begin at 8 am Monday morning. Weekend or holiday work must be scheduled ahead of time and is charged for rush turnaround time. SanAir covers Standard Overnight FedEx shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.

Page 1 of 1

TRIANGLE ENVIRONMENTAL SERVICE CENTER, INC.

13509 East Boundary Road, Suite B, Midlothian, VA 23112
804-739-1751 • fax: 804-739-1753

BULK ASBESTOS SAMPLE ANALYSIS SUMMARY

CLIENT: SanAir Technologies Laboratory, Inc.
10501 Trade Court
North Chesterfield, VA 23236

TESC LOGIN #: 231009B

DATE OF RECEIPT: 10/9/2023
DATE OF ANALYSIS: 10/11/2023
DATE OF REPORT: 10/11/2023

CLIENT JOB/ #: 23055676

JOB SITE:

ANALYST: B. Trimmer

TESC SAMPLE #	CLIENT SAMPLE ID & GROSS DESCRIPTION	ESTIMATED % ASBESTOS	NON ASBESTOS % FIBERS	NON FIBROUS % MATERIALS
1	001-RFSH-A / Black tar-like	NAD	20% Fiberglass	80%
2	001-RFSH-B / Black tar-like	NAD	20% Fiberglass	80%
3	001-RFSH-C / Black tar-like	NAD	20% Fiberglass	80%
4	002-RFFLT-A / Black fibers	NAD	98% Cellulose	2%
5	002-RFFLT-B / Black fibers	NAD	98% Cellulose	2%
6	002-RFFLT-C / Black fibers	NAD	98% Cellulose	2%
7	003-RFSH-A / Black tar-like	NAD	20% Fiberglass	80%
8	003-RFSH-B / Black tar-like	NAD	20% Fiberglass	80%

Samples are analyzed in accordance with "EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method for the Determination of Asbestos in Bulk Insulation Samples", EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials. None Detected: not detected at/or below the detected limit of method (Reporting limit: 1% Asbestos). Sodium Chloride is analyzed for quality control blank. TESC recommends by point count or Transmission Electron Microscopy (TEM), for materials regulated by the EPA NESHAP (National Emission Standards for Hazardous Air Pollutants) and found to contain less than ten percent (<10%) asbestos by Polarized Light Microscopy (PLM). Both services are available for an additional fee. This report must not be reproduced except in full with approval of Triangle Environmental Service Center, Inc. This test report relates only to the item(s) tested. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

NVLAP Lab Code: 200794-0

[LEGEND NAD=No Asbestos Detected, Lino.=Linoleum, JC=Joint Compound]

Reviewed By Authorized Signatory:



Feng Jiang, MS Senior Geologist, Laboratory Director
Yuedong Fang, Senior Geologist

TRIANGLE ENVIRONMENTAL SERVICE CENTER, INC.

13509 East Boundary Road, Suite B, Midlothian, VA 23112
804-739-1751 • fax: 804-739-1753

BULK ASBESTOS SAMPLE ANALYSIS SUMMARY

CLIENT: SanAir Technologies Laboratory, Inc.
10501 Trade Court
North Chesterfield, VA 23236

TESC LOGIN #: 231009B

DATE OF RECEIPT: 10/9/2023
DATE OF ANALYSIS: 10/11/2023
DATE OF REPORT: 10/11/2023

CLIENT JOB/ #: 23055676

JOB SITE:

ANALYST: B. Trimmer

TESC SAMPLE #	CLIENT SAMPLE ID & GROSS DESCRIPTION	ESTIMATED % ASBESTOS	NON ASBESTOS % FIBERS	NON FIBROUS % MATERIALS
9	003-RFSH-C / Black tar-like	NAD	20% Fiberglass	80%
10A	004-CLSH-A - Drywall / White powder, brown fibers	NAD	20% Cellulose	80%
10B	004-CLSH-A - Joint Compound / White powder	NAD		100%
11A	004-CLSH-B - Drywall / White powder, brown fibers	NAD	20% Cellulose	80%
11B	004-CLSH-B - Joint Compound / White powder	NAD		100%
12A	004-CLSH-C - Drywall / White powder, brown fibers	NAD	20% Cellulose	80%
12B	004-CLSH-C - Joint Compound / White powder	NAD		100%
13	005-WLL-A / Black tar-like	NAD	20% Synthetic	80%

Samples are analyzed in accordance with "EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method for the Determination of Asbestos in Bulk Insulation Samples", EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials. None Detected: not detected at/or below the detected limit of method (Reporting limit: 1% Asbestos). Sodium Chloride is analyzed for quality control blank. TESC recommends by point count or Transmission Electron Microscopy (TEM), for materials regulated by the EPA NESHAP (National Emission Standards for Hazardous Air Pollutants) and found to contain less than ten percent (<10%) asbestos by Polarized Light Microscopy (PLM). Both services are available for an additional fee. This report must not be reproduced except in full with approval of Triangle Environmental Service Center, Inc. This test report relates only to the item(s) tested. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

NVLAP Lab Code: 200794-0

[LEGEND NAD=No Asbestos Detected, Lino.=Linoleum, JC=Joint Compound]

Reviewed By Authorized Signatory:



Feng Jiang, MS Senior Geologist, Laboratory Director
Yuedong Fang, Senior Geologist

TRIANGLE ENVIRONMENTAL SERVICE CENTER, INC.

13509 East Boundary Road, Suite B, Midlothian, VA 23112
804-739-1751 • fax: 804-739-1753

BULK ASBESTOS SAMPLE ANALYSIS SUMMARY

CLIENT: SanAir Technologies Laboratory, Inc.
10501 Trade Court
North Chesterfield, VA 23236

TESC LOGIN #: 231009B

DATE OF RECEIPT: 10/9/2023
DATE OF ANALYSIS: 10/11/2023
DATE OF REPORT: 10/11/2023

CLIENT JOB/ #: 23055676

JOB SITE:

ANALYST: B. Trimmer

TESC SAMPLE #	CLIENT SAMPLE ID & GROSS DESCRIPTION	ESTIMATED % ASBESTOS	NON ASBESTOS % FIBERS	NON FIBROUS % MATERIALS
14	005-WLL-B / Black tar-like	NAD	20% Synthetic	80%
15	005-WLL-C / Black tar-like	NAD	20% Synthetic	80%

Total Samples/Layers Analyzed: 18

Samples are analyzed in accordance with "EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method for the Determination of Asbestos in Bulk Insulation Samples", EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials. None Detected: not detected at/or below the detected limit of method (Reporting limit: 1% Asbestos). Sodium Chloride is analyzed for quality control blank. TESC recommends by point count or Transmission Electron Microscopy (TEM), for materials regulated by the EPA NESHAP (National Emission Standards for Hazardous Air Pollutants) and found to contain less than ten percent (<10%) asbestos by Polarized Light Microscopy (PLM). Both services are available for an additional fee. This report must not be reproduced except in full with approval of Triangle Environmental Service Center, Inc. This test report relates only to the item(s) tested. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

NVLAP Lab Code: 200794-0

[**LEGEND** NAD=No Asbestos Detected, Lino.=Linoleum, JC=Joint Compound]

Reviewed By Authorized Signatory:



Feng Jiang, MS Senior Geologist, Laboratory Director
Yuedong Fang, Senior Geologist

TESC LOGIN NUMBER:

2310009B

TRIANGLE ENVIRONMENTAL SERVICE CENTER

13509 East Boundary Road, Suite B • Midlothian • VA • 23112 • Tel: 804-739-1751 • Fax: 804-739-1753

CHAIN OF CUSTODY FORM

LAB CUSTOMER: SanAir Technologies Laboratory, Inc.

ADDRESS: 10501 Trade Court

CITY, STATE, ZIP: N. Chesterfield VA 23236

TAT: 2 Hour: 6 Hour: 24 Hour: 48 Hour: 3 Day: 5 Day:

CONTACT METHOD: Phone: 804-897-1177 Fax:

DATE: 10/6/23

CONTACT NAME: Sandra Sobrino

PROJECT #: 23055676

PROJECT SITE:

Email: iag@sanair.com; ssobrino@sanair.com

Sample number	Sample Date	Asbestos							Lead							Other Metals				Air Quality/Mold				Comments							
		Bulk ID by PLM	PCM Fiber Count	PLM Point Count 400	PLM Point Count 1000	PLM Gravimetric	CARB 435 (Soil only)	TEM AHERA Air	TEM Bulk Chatfield	Air	Paint(% & PPM)	Soil(PPM)	Wipe	TCLP (Pb)	Waster Water	Drinking Water (Pb)	TCLP RCRA 8	CAM 17	Welding Fume	Toxic Metal Profile	Biocassette	Slide	Surface Tape		Surface Swab	Bulk	Air Volume (L)	Wipe Area (ft ²)	Scrape Area (cm ²)		
001 - RFSH-A	10/5/23	X																											Positive Step		
001 - RFSH-B		X																													
001 - RFSH-C		X																													
002 - RFFLT-A		X																													
002 - RFFLT-B		X																													
002 - RFFLT-C		X																													
003 - RFSH-A		X																													
003 - RFSH-B		X																													
003 - RFSH-C		X																													
004 - CLSH-A		X																													
004 - CLSH-B		X																													
004 - CLSH-C		X																													
005 - WLL-A		X																													
005 - WLL-B		X																													
005 - WLL-C		X																													
Released by <i>Tamara Pannaus</i>		Signature: <i>Tamara Pannaus</i>																							Date/Time: 10/6/23 10:40am						
Received by		Signature:																							Date/Time: 10/4 8:30						

Prepared by TESC

Pages: 1 of 1

APPENDIX IV

Lead Paint Analysis Report

Chain of Custody Forms



The Identification Specialists

Analysis Report
prepared for
Hurt & Proffitt, Inc.

Report Date: 10/13/2023

Project Name: VDOT-Airport

Project #: 20231662-3624

SanAir ID#: 23055790



10501 Trade Court | North Chesterfield, Virginia 23236
888.895.1177 | 804.897.1177 | fax: 804.897.0070 | IAQ@SanAir.com | SanAir.com



SanAir ID Number
23055790
FINAL REPORT
10/13/2023 9:31:37 AM

Name: Hurt & Proffitt, Inc.
Address: 2524 Langhorne Road
Lynchburg, VA 24501
Phone: 434-841-3893 (c)

Project Number: 20231662-3624
P.O. Number:
Project Name: VDOT-Airport
Collected Date: 10/5/2023
Received Date: 10/6/2023 10:40:00 AM

Dear Ken Hundley,

We at SanAir would like to thank you for the work you recently submitted. The 5 sample(s) were received on Friday, October 06, 2023 via UPS. The final report(s) is enclosed for the following sample(s): L-01, L-02, L-03, L-04, L-05.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

A handwritten signature in black ink, appearing to read "Abisola Kasali".

Abisola Kasali
Metals Laboratory Director
SanAir Technologies Laboratory

Final Report Includes:
- Cover Letter
- Analysis on Test Family AA
- Disclaimers and Additional Information

Sample conditions:
- 5 samples in Good condition.



SanAir ID Number
23055790
FINAL REPORT
10/13/2023 9:31:37 AM

Name: Hurt & Proffitt, Inc.
Address: 2524 Langhorne Road
Lynchburg, VA 24501
Phone: 434-841-3893 (c)

Project Number: 20231662-3624
P.O. Number:
Project Name: VDOT-Airport
Collected Date: 10/5/2023
Received Date: 10/6/2023 10:40:00 AM


Analyst: Butler, Jillian
Test Method: SW846/M3050B/7000B

Lead Paint Analysis

PAINT Sample	Description	µg Pb In Sample	Sample Size (grams)	Calculated RL	Sample Results	Sample Results
23055790 - 1	L-01 2140836-Storage Bldg 1-Brown Paint Ext	10	0.1097	91.2	94 µg/g (ppm)	0.009 % By Weight
23055790 - 2	L-02 2140821-Oil House Storage-Tan Paint-Throughout	< 10	0.1145	87.3	<87.3 µg/g (ppm)	<0.009 % By Weight
23055790 - 3	L-03 2140821-Oil House Storage-Brown & 2 Doors/Frames	20	0.1046	95.6	195.5 µg/g (ppm)	0.020 % By Weight
23055790 - 4	L-04 2140821-Oil House Storage-White- 2 Ceilings	< 10	0.1121	89.2	<89.2 µg/g (ppm)	<0.009 % By Weight
23055790 - 5	L-05 2140849-Sprender Rack 1-Brown-I Beams	863	0.1024	97.7	8430 µg/g (ppm)	0.843 % By Weight

Method Reporting Limit <10 µg/0.1 g paint
Sample L-01 contained substrate.

Signature: 
Date: 10/9/2023

Reviewed: 
Date: 10/9/2023

Disclaimer

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AIHA LAP, LLC Lab ID: LAP-162952

Commonwealth of VA Department of General Services DCLS, VELAP Laboratory ID#460251

New York State Department of Health Laboratory ID No: 11983

California State Environmental Laboratory Accreditation Program Certificate No: 2915

State of Connecticut Department of Public Health Environmental Laboratory Registration Number: PH-0105

New Jersey Department of Environment Protection Environmental Laboratory Certification ID# VA014

Ohio Department of Health Environmental Lead Laboratory Approval Number E10049

State of Rhode Island Department of Health Environmental Lead Laboratory No LAO00371

23055790

Company: <u>HURT & PROFFITT INC</u>		Project #: <u>20231662-3624</u>	Phone #: <u>226-613-4225</u>
Address: <u>2524 LANGHORNE Rd</u>		Project Name: <u>VDOT - AIRPORT</u>	Phone #:
City, St., Zip: <u>LYNCHBURG VA 24501</u>		Date Collected: <u>10/5/23</u>	Fax #:
Samples Collected By: <u>K HUNDLEY</u>		P.O. Number:	Email: <u>GHANTE@AEP.COM</u>
Account #:			Email:

Matrix Types

Metals Analysis Types

<input type="checkbox"/> Air	<input type="checkbox"/> Aqueous	<input type="checkbox"/> Bulk	<input checked="" type="checkbox"/> Total Concentration of Lead <input checked="" type="checkbox"/> Total Concentration of RCRA 8 Metals <input type="checkbox"/> ICP-total concentration of metals (please list metals): <input type="checkbox"/> TCLP for Lead <input type="checkbox"/> TCLP for RCRA 8 Metals <input type="checkbox"/> TCLP Full (w/ Organics)
<input checked="" type="checkbox"/> Paint	<input type="checkbox"/> Sludge	<input type="checkbox"/> Soil	
<input type="checkbox"/> Dust	<input type="checkbox"/> Wipe	<input type="checkbox"/> Water, DW	
<input type="checkbox"/> Wastewater <input type="checkbox"/> Other:			

*Turn Around Times	Same Day <input type="checkbox"/>	1 Day <input type="checkbox"/>	2 days <input type="checkbox"/>	3 Days <input type="checkbox"/>
	<input checked="" type="checkbox"/> Standard (5 day)	<input type="checkbox"/> Full TCLP (10d)		

*Courier charge for same day and 1 day TAT for offsite work.

Sample #	Sample Identification/Location	Flow Rate	Start Time	Stop Time	Volume (L) or Area (Sq ft)
L-01	2140836-STORAGE BLDG 1 - BROWN PAINT EXT.				1800 SF
L-02	2140821-OIL HOUSE STORAGE - TAO PAINT - THRUOUT				1200 SF
L-03	" - " - BROWN - 2 DOWNS/FRAMES				2 DOWNS/FRAMES
L-04	" - " - WHITE - 2 CELL WKS				300 SF
L-05	2140849-SPREADER RACK 1 - BROWN - I BEAMS				42 I-BEAMS

Special Instructions	
----------------------	--

Relinquished by	Date	Time	Received by	Date	Time
<u>K HUNDLEY</u>	<u>10/5/23</u>	<u>PM</u>	<u>12m</u>	<u>10/6/23</u>	<u>10:40am</u>

Unless scheduled, the turn around time for all samples received after 3 pm will begin at 8 am the next business morning.
Weekend or Holiday work must be scheduled ahead of time and is charged at 150% of the Rush TAT rate
There is a minimum charge of \$100 for weekend work. SanAir covers Standard Overnight FedEx shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.

**AIRPORT AHQ CHEMICAL STORAGE BUILDING
SALEM DISTRICT**

APPENDIX B





ECS Mid-Atlantic, LLC

Geotechnical Engineering Report

VDOT – Thirlane Road Chemical Storage Building

4330 Thirlane Road NW
Roanoke, Virginia

ECS Project No. 12:19976

December 22, 2023





December 22, 2023

Mr. Michael Woolwine
Hughes Associates Architects & Engineers
656 Elm Avenue SW
Roanoke, Virginia 24016

ECS Project No. 12:19976

Reference: Geotechnical Engineering Report
VDOT – Thirlane Road Chemical Storage Building
4330 Thirlane Road NW
Roanoke, Virginia

Dear Mr. Woolwine:

ECS Mid-Atlantic, LLC (ECS) has completed the subsurface exploration, laboratory testing, and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our agreed to scope of work. This report presents our understanding of the geotechnical aspects of the project along with the results of the field exploration and laboratory testing conducted, and our design and construction recommendations.

It has been our pleasure to be of service to Hughes Associates Architects & Engineers during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations as well to verify subsurface conditions assumed for this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us.

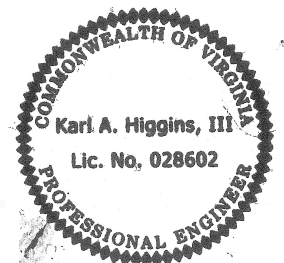
Respectfully submitted,

ECS Mid-Atlantic, LLC

Jordan P. Patterson, EIT
Project Manager
jppatterson@ecslimited.com

Dustin O. Schleifer, PE
Senior Project Engineer
dschleifer@ecslimited.com

This document/plan has been digitally signed and sealed by Karl A. Higgins, III on the date adjacent to seal. Printed copies of this document/plan are not considered signed and sealed and the signature must be verified on electronic copies.



Karl A. Higgins III, PE, DGE
Chief Engineer
khiggins@ecslimited.com

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APPENDICES

Appendix A – Drawings & Reports

- Site Location Diagram
- Boring Location Diagram
- Subsurface Cross-Sections

Appendix B – Field Operations

- Reference Notes for Boring Logs
- Subsurface Exploration Procedure: Standard Penetration Testing (SPT)
- Boring Logs B-01 through B-11

Appendix C – Laboratory Testing

- Laboratory Test Results Summary
- Plasticity Chart
- Grain Size Analyses

EXECUTIVE SUMMARY

This Executive Summary is intended as a very brief overview of the primary geotechnical conditions that are expected to affect design and construction. Information gleaned from the Executive Summary should not be utilized in lieu of reading the entire geotechnical report.

- The surficial soils encountered at the site consisted of low plasticity gravelly fill soils and high and low plasticity CLAY, SAND, and GRAVEL residual soils. These soils were encountered in depths ranging from 0.5 to 23 feet below the ground surface. Weathered Rock (WR) was encountered in 5 of 8 of our borings at depths ranging from 9.5 to 25 feet below the ground surface. The subsurface conditions may vary in unexplored areas.
- Existing placed fill was encountered in 4 of 11 of our borings below the gravel/asphalt surface at depths extending to 5.5 feet below existing grades and could be deeper in unexplored areas or in areas between boring locations. This material appears to have been placed with some compactive effort due to the previous site development; however, documentation of compaction testing was not provided at the time of preparing this report. It is recommended that the fill be undercut to suitable natural material in the foundation areas; restore bearing elevations with newly compacted fill.
- The site is underlain by karst (sinkhole) geology. Initial borings indicated a concern for future sinkhole development; however, after additional borings were drilled we determined that the risk of future sinkhole development was low thus no specific foundation requirements are needed.
- The proposed structure can be supported by conventional foundations consisting of column and/or strip footings bearing on the existing soils. The foundations can be designed for an allowable bearing pressure of 2,000 psf based on the anticipated design loads.
- ECS should be provided with the opportunity to review our recommendations and complete additional geotechnical exploration and recommendations based on actual loading conditions and final layout.

Refer to the text of the report for site specific design and construction recommendations.

1.0 INTRODUCTION

The purpose of this study was to provide geotechnical information for the design of a one-story chemical storage building in the approximate location of an existing building and a concrete pad. The structure is a pre-manufactured, steel arch dome with metal roof and siding. The building is supported by perimeter footings only. The recommendations developed for this report are based on project information supplied by you.

Our services were provided in accordance with our Proposal No. 12:15484-PR, dated April 4, 2023, as authorized by you on August 21, 2023, which includes our Terms and Conditions of Service. Discuss supplemental approval of additional work.

This report contains the procedures and results of our subsurface exploration and laboratory testing programs, review of existing site conditions, engineering analyses, and recommendations for the design and construction of the project.

The report includes the following items.

- A brief review and description of our field and laboratory test procedures and the results of testing conducted
- A review of surface topographical features and site conditions
- A review of area and site geologic conditions
- A review of subsurface soil/rock stratigraphy with pertinent physical properties
- Final soil exploration test boring logs
- Recommendations for site preparation and construction of compacted fills, including an evaluation of on-site soils for use as compacted fills and identification of potentially unsuitable soils and/or soils exhibiting excessive moisture at the time of sampling
- Recommended foundation type(s)
- Recommendations for seismic site classification in accordance with the International Building Code (IBC 2018)
- Recommendations for slab-on-grade construction

2.0 PROJECT INFORMATION

2.1 PROJECT LOCATION/CURRENT SITE USE/PAST SITE USE

The site is located at 4330 Thirlane Road NW within the corporate city limits of Roanoke, Virginia. At the time of our visit, the ground surface was covered by asphalt. The overall site is bounded to the north and south by existing commercial facilities; to the east by Thirlane Road NW; and to the west by Route 220 Highway.



Figure 2.1.1. Site Location

The eastern half of the site contains an existing pre-engineered metal building adjacent to the proposed concrete pad footprint. The terrain across this half of the site is relatively flat with ground surfaces ranging from approximately +1107 to +1108 feet, msl.

The western half of the site contains an existing storage/canopy structure. The terrain across this half of the site is flat with a ground surface elevation of approximately +1106 feet, msl.

2.2 PROPOSED CONSTRUCTION

The following information explains our understanding of the planned development including proposed buildings and related infrastructure.

SUBJECT	DESIGN INFORMATION / ASSUMPTIONS
Building Footprint	Approximately 7,738 square feet in plan view
# of Stories	One story above grade
Usage	Chemical Storage
Framing	pre-manufactured structural steel arch dome with metal siding
Column Loads	none
Wall Loads*	20 kips per linear foot (klf) maximum
Lowest Finish Floor Elevation	EL. 1109 ft

*Wall loads provided by client in standard VDOT drawing details. If final design loads exceed our assumed loads, this report needs to be revised to update our foundation recommendations, bearing capacity, and settlement calculations.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

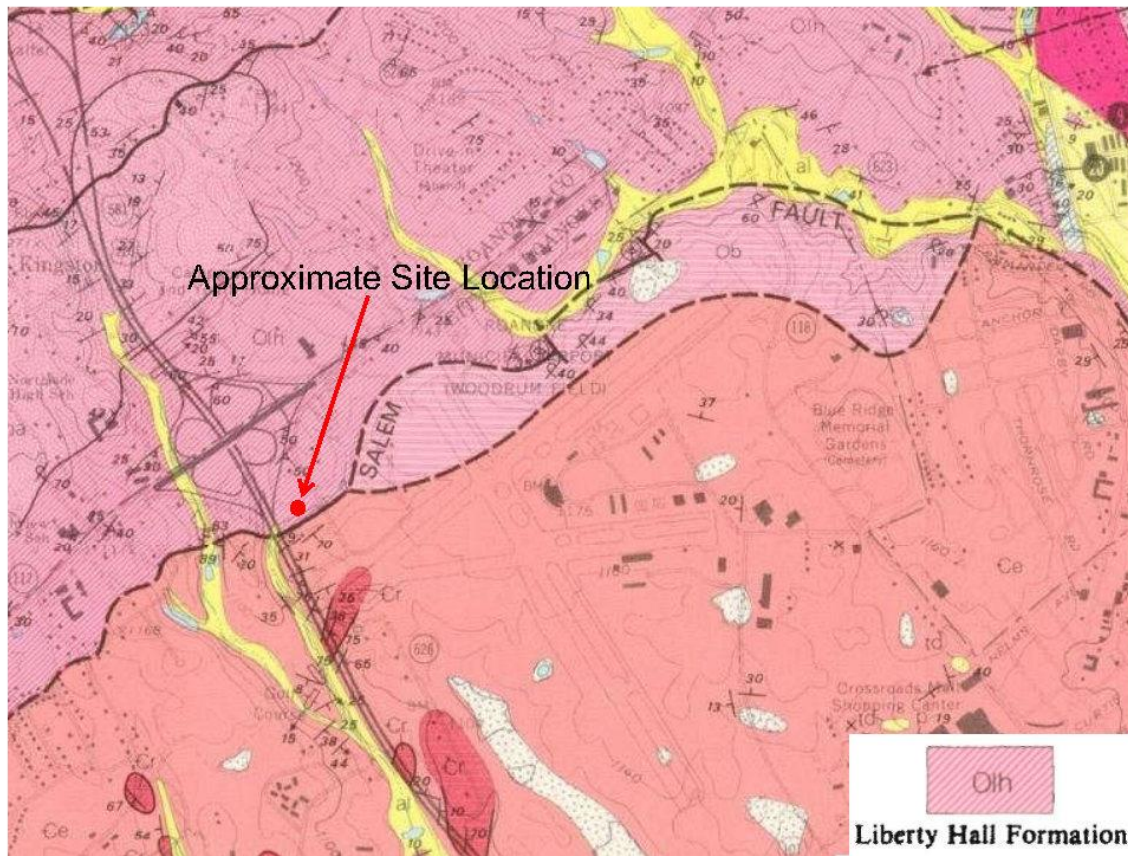
Our exploration procedures are explained in greater detail in Appendix B including the insert titled Subsurface Exploration Procedures. Our scope of work included drilling eight (8) borings. Initial borings indicated a concern for future sinkhole development, specifically near boring B-05. We were authorized to drill three more borings around B-05 bringing the total to 11. Our borings were located with a handheld GPS unit while referencing Google Earth aerial imaging and estimating angles from existing site features. Their approximate locations are shown on the Boring Location Diagram in Appendix A.

3.1 SITE GEOLOGY

Based on our review of the “Geology of the Roanoke and Stewartsville quadrangles, Virginia” (Virginia Division of Mineral Resources, 1981), the project site is located in the Roanoke Valley of the Valley and Ridge Province in Southwestern Virginia. Specifically, geologic mapping indicates that the project site is underlain by the Liberty Hall Formation (Olh).

The Liberty Hall Formation consists of a succession of rather evenly banded beds of fine-grained dark blue limestone and darker, more argillaceous limestone that weathers to a shaly material. These are carbonate rocks that have the potential to form sinkholes, or what is referred to as karst topography. Upward in the formation calcareous shale predominates and limestone beds are less frequent. The thickness of this formation is approximately 1000 feet (USGS DDS-6; Reston GNULX).

The boundary between soil and rock is not sharply defined. A transitional zone termed "weathered rock" is normally found overlying the parent bedrock. Weathered Rock (WR) is defined, for engineering purposes, as residual material with Standard Penetration resistance greater than 60 blows per foot (bpf). Because weathering is facilitated by fractures, joints, and the presence of less resistant rock types, the profile of the WR and hard rock is typically irregular and erratic, even over short horizontal distances. Also, it is not unusual to find lenses and natural floating boulders of hard rock in zones of WR within the soil mantle, well above the general bedrock level.



3.2 SUBSURFACE CHARACTERIZATION

The subsurface conditions encountered were generally consistent with published geological mapping. The following sections provide generalized characterizations of the soil and rock strata. Please note that the ground surface elevations were not surveyed by a licensed surveyor; these elevations are approximate based on the plan provided by you; therefore, elevation ranges are approximate +/- 1 foot. Please refer to the boring logs in Appendix B.

Approximate Depth (ft)	Stratum	Description	Ranges of SPT ⁽¹⁾ N-values (bpf)
0-0.75 (Surface cover)	n/a	Asphalt (1 inch), Gravel (2 to 8 inches)	N/A
0.17-5.5	I	FILL, Medium Dense to Dense CLAYEY GRAVEL (GC) with varying amounts of sand and asphalt, Dry to Moist; Dense GRAVEL (GP) with varying amounts of sand and asphalt, Dry; Loose to Medium Dense POORLY GRADED GRAVEL WITH CLAY AND SAND (GP-GC), Moist	8 to 47
0.5-23	II	Residuum, Very Soft to Stiff, FAT CLAY (CH) with varying amounts of sand, gravel, and rock fragments, Moist to Wet; Loose to Very Dense, CLAYEY GRAVEL (GC) with varying amounts of sand, Moist; Very Loose to Stiff CLAYEY SAND (SC) with varying amounts of gravel; Moist to Wet	WOH (0) to 38
9.5-25	III	Weathered Rock Sampled as Clayey Gravel (WR), moist, Very Dense	60+

Notes:

- (1) Standard Penetration Testing
- (2) WOH = Weight of Hammer or zero

A graphical presentation of the subsurface conditions is shown on the Subsurface Cross Section Diagram(s) included in Appendix A.

3.3 GROUNDWATER OBSERVATIONS

Groundwater seepage into our borings was not observed during our exploration at the depths explored. Groundwater was not observed in the borings drilled at the time of our work. Variations in the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors.

3.4 LABORATORY TESTING

The laboratory testing consisted of selected tests performed on samples obtained during our field exploration operations. Classification and index property tests were performed on representative soil samples. The laboratory testing program included natural moisture content tests (ASTM D2216), grain size analyses tests (ASTM D6913), and Atterberg Limits tests (ASTM D4318). The results of all laboratory testing conducted are included in the Appendix of this report.

Each sample was visually classified on the basis of texture and plasticity in accordance with ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures) and including USCS classification symbols, and ASTM D2487 Standard Practice for Classification for Engineering Purposes (Unified Soil Classification System (USCS)). After classification, the samples were grouped in the major zones noted on the boring logs in Appendix B. The group symbols for each soil type are indicated in parentheses along with the soil descriptions. The stratification lines between strata on the logs are approximate; in situ, the transitions may be gradual.

4.0 DESIGN RECOMMENDATIONS

4.1 KARST RISK COMMENTARY

Based on our site reconnaissance, karst features were not observed in close vicinity of the proposed development. However, the site is mapped to be underlain by geologic parent rock which is known to be carbonate in nature. There are mapped karst features less than half a mile of the site.

The subsurface conditions encountered in the soil test borings consist of residual soils of varying strength and moisture, as well as an erratic karst bedrock surface. In addition, the soil strength profile encountered in boring B-05 within the proposed building footprint decreased significantly with depth (i.e., reverse weathering, a karst indicator). These conditions are indicative of residual soils underlain by karst bedrock, which is subject to sinkhole development. Due to the initial concerns related to boring B-05, ECS remobilized to the site and drilled three additional borings near this location (B-09 through B-11). The preponderance of subsurface data indicates that the site has a low risk of sinkhole development thus no specific or unusual foundation recommendations are needed.

ECS cannot guarantee that future karst activity will not become evident due to the dissolution of bedrock generally being a very slow process that occurs over geologic time.

Risks associated with developing in Karst can include the formation of sinkholes that may form beneath buildings, roadways, utility lines, stormwater management ponds, dams, and other manmade structures. These features can occur as a gradual erosion of soils into the subsurface causing settlement damage to structures over a long period of time, or rapidly in the case of sudden cover collapse sinkhole as has been witnessed in the recent past in other areas of the country.

When developing in karst prone geology, there is always a risk that karst hazards may impact the project regardless of the extent of exploration, either during construction, or years and decades after the completion of construction. Creating new drainage channels and impoundments for stormwater management activities during land development, collection of groundwater in utility pipelines, leaking utilities, and pumping of groundwater for mining or water supply purposes are some human influences that have led to the development of unsuspected karst problems. Additionally, karst features do not always surface directly above the physical karst feature. Lateral propagation of a karst feature originating outside of the building footprint can be revealed at the ground surface within the building footprint.

Specific recommendations for earthwork and civil design measures that, if followed, can reduce the potential for human enhanced karst hazards are presented in this report. It should be clearly understood that the total elimination of hazards associated with karst is not practical. Even after implementing the recommendations contained within this report, karst hazards remain possible and will remain possible for the life of the development.

4.2 FOUNDATIONS

The surficial soils encountered at the site consisted of low plasticity gravelly fill soils and high and low plasticity FAT CLAY (CH), LEAN CLAY (CL), CLAYEY SAND (SC), and CLAYEY GRAVEL (GC) residual soils. These soils were encountered at depths ranging from 0.5 to 23 feet below the ground surface and may vary in unexplored areas. Weathered rock was encountered in five of eight of our borings at depths ranging from 9.5 to 25 feet below existing grades and may vary in unexplored areas.

The fill soils within the proposed building footprint were encountered in depths extending to 5.5 feet below the ground surface and may be deeper in unexplored areas or encountered in areas between boring locations. Based upon the lack of documentation of compaction within the fill, it is recommended that the fill be undercut to suitable natural material for support of the building (foundation subgrades only). Based upon the topography of the site and the relatively shallow depth of the fill soils encountered, some of the existing fill soils may be removed during foundation excavation operations; however, some locations may require additional undercut. An ECS representative should observe the undercut to confirm fill removal, extents of existing fill, and an adequate bearing stratum.

Provided subgrades and Structural Fills are prepared as recommended in this report, the proposed structure can be supported by shallow foundations including column footings and continuous wall footings. The parameters used in our foundation analysis were obtained from the construction document provided by you entitled “Prototype Chemical Storage Buildings 3,000 ton”, dated August 4, 2022, and prepared by VDOT. We recommend the foundation design use the following parameters:

Design Parameter	Wall Footing
Net Allowable Bearing Pressure ⁽¹⁾	2,000 psf
Acceptable Bearing Soil Material	Newly Compacted Fill or Stratum II
Minimum Width	3 feet (however plans show much wider footings)
Minimum Exterior Footing Depth (below final exterior grade) ⁽²⁾	30 inches
Estimated Total Settlement ⁽³⁾	Less than 1- inch
Estimated Differential Settlement ⁽⁴⁾	Less than ¾ inches

Notes:

- (1) Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
- (2) For bearing considerations with expansive soil concerns.
- (3) Based on assumed structural loads. If final loads are different, ECS must be contacted to update foundation recommendations and settlement calculations.
- (4) Based on maximum column/wall loads and variability in borings. Differential settlement can be re-evaluated once the foundation plans are more complete.

Potential Undercuts: Most of the soils at the foundation bearing elevation are anticipated to be suitable for support of the proposed structure. If soft or unsuitable soils are observed at the footing bearing elevations, the unsuitable soils should be undercut and removed. Any undercut should be backfilled with lean concrete ($f'_c \geq 200$ psi at 28 days) or compacted VDOT No. 21-A Stone up to the original design bottom of footing elevation; the original footing shall be constructed at the designed footing elevations. Due to karst potential on the site, we do not recommend the use of VDOT No. 57 Stone for undercut backfilling.

The foundations are also subject to lateral loads. Below is a table of engineering parameters needed to evaluate lateral loads on foundations.

SOIL PARAMETER	ESTIMATED VALUE
Coefficient of Passive Earth Pressure (K_p)	2.6
Soil Moist Unit Weight (γ)	110 pcf
Interface Friction Angle [Concrete on Soil] (ϕ_i)	17°
Sliding Friction Coefficient [Concrete on Soil] (μ)	0.30
Passive equivalent fluid pressure	286H (psf)

4.3 SLABS ON GRADE

Provided subgrades and structural fills are prepared as discussed herein, the proposed floor slabs can be constructed as Ground Supported Slabs (or Slab-On-Grade). Based on a lowest finished floor elevation of EL. 1109 feet, it appears that the slabs will bear on newly compacted fill or Stratum I. The following graphic depicts our soil-supported slab recommendations:

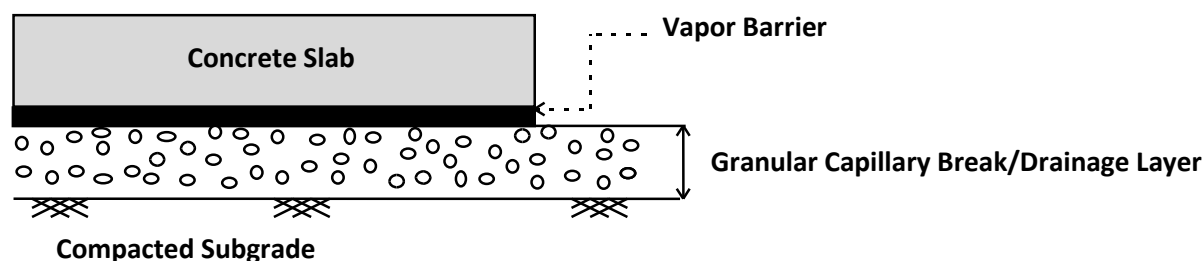


Figure 4.2.1

1. Drainage Layer Thickness: 4 inches
2. Drainage Layer Material: GRAVEL (GP, GW), SAND (SP, SW)

Soft or yielding soils may be encountered in some areas. Those soils should be removed and replaced with compacted Structural Fill in accordance with the recommendations included in this report.

Subgrade Modulus: Provided the Structural Fill and Granular Drainage Layer are constructed in accordance with our recommendations, the slab may be designed assuming a modulus of subgrade reaction, k_1 of 200 pci (lbs./cu. inch). The modulus of subgrade reaction value is based on a 1 foot by 1 foot plate load test basis.

Vapor Barrier: Before the placement of concrete, a vapor barrier may be placed on top of the granular drainage layer to provide additional protection against moisture penetration through the floor slab. When a vapor barrier is used, special attention should be given to surface curing of the slab to reduce the potential for uneven drying, curling and/or cracking of the slab. Depending on proposed flooring material types, the structural engineer and/or the architect may choose to eliminate the vapor barrier.

Slab Isolation: Soil-supported slabs should be isolated from the foundations and foundation-supported elements of the structure so that differential movement between the foundations and slab will not induce excessive shear and bending stresses in the floor slab. Where the structural configuration prevents the use of a free-floating slab such as in a drop down footing/monolithic slab configuration, the slab should be designed with suitable reinforcement and load transfer devices to preclude overstressing of the slab.

Slab Subgrade and Existing Fill: We recommend that existing fill be removed to a depth of at least 2 feet below the proposed subgrade elevations, or to suitable natural soils, whichever is shallower, to limit risk of settlement due to undocumented fill and potentially deleterious materials. Once the subgrade is undercut, we recommend that subgrades are proofrolled and prepared in accordance with **Section 5.1 Subgrade Preparation**. Any undercut should be backfilled with structural fill up to the original design subgrade elevation.

4.4 SEISMIC DESIGN CONSIDERATIONS

Seismic Site Classification: The International Building Code (IBC) 2018 requires site classification for seismic design based on the upper 100 feet of a soil profile. At least two methods are utilized in classifying sites, namely the shear wave velocity (v_s) method and the Standard Penetration Resistance (N-value) method. The second method (N-value) was used in classifying this site.

SEISMIC SITE CLASSIFICATION			
Site Class	Soil Profile Name	Shear Wave Velocity, V_s , (ft./s)	N value (bpf)
A	Hard Rock	$V_s > 5,000$ fps	N/A
B	Rock	$2,500 < V_s \leq 5,000$ fps	N/A
C	Very dense soil and soft rock	$1,200 < V_s \leq 2,500$ fps	>50
D	Stiff Soil Profile	$600 \leq V_s \leq 1,200$ fps	15 to 50
E	Soft Soil Profile	$V_s < 600$ fps	<15

Based upon our interpretation of the subsurface conditions, the appropriate Seismic Site Classification is “D” as shown in the preceding table.

Ground Motion Parameters: In addition to the seismic site classification, ECS has determined the design spectral response acceleration parameters following the IBC methodology. The Mapped Responses were estimated from the USGS website <https://www.usgs.gov/natural-hazards/earthquake-hazards/design-ground-motions>. The design responses for the short (0.2 sec, S_{DS}) and 1-second period (S_{D1}) are noted in bold at the far right end of the following table.

GROUND MOTION PARAMETERS [IBC 2018 Method]								
Period (sec)	Mapped Spectral Response Accelerations (g)		Values of Site Coefficient for Site Class		Maximum Spectral Response Acceleration Adjusted for Site Class (g)		Design Spectral Response Acceleration (g)	
Reference	Figures 1613.2.1 (1) & (2)		Tables 1613.2.3 (1) & (2)		Eqs. 16-36 & 16-37		Eqs. 16-38 & 16-39	
0.2	S_s	0.193	F_a	1.6	$S_{MS}=F_a S_s$	0.308	$S_{DS}=2/3 S_{MS}$	0.205
1.0	S_1	0.064	F_v	2.4	$S_{M1}=F_v S_1$	0.153	$S_{D1}=2/3 S_{M1}$	0.102

The Site Class definition should not be confused with the Seismic Design Category designation which the Structural Engineer typically assesses. If a higher site classification is beneficial to the project, we can provide additional testing methods that may yield more favorable results.

5.0 SITE CONSTRUCTION RECOMMENDATIONS

5.1 SUBGRADE PREPARATION

5.1.1 Stripping and Grubbing

The subgrade preparation should consist of stripping all vegetation, rootmat, topsoil, soft or unsuitable materials, and the upper 2 feet of existing fill, from the 5-foot expanded building and 2-foot expanded pavement limits, and 5 feet beyond the toe of Structural Fills. Under foundation areas, existing fills may need to be undercut further in accordance with the recommendations contained within **Section 4.2 Foundations**. The site was covered with gravel and topsoil or organic laden soils were not encountered. ECS should be retained to verify that topsoil (if present under the gravel layer), existing fill, and unsuitable surficial materials have been removed prior to the placement of structural fill or construction of structures.

5.1.2 Proofrolling

Prior to fill placement or other construction on subgrades, the subgrades should be evaluated by an ECS field technician. The exposed subgrade should be thoroughly proofrolled with construction equipment having a minimum axle load of 10 tons [e.g. fully loaded tandem-axle dump truck]. Proofrolling should be traversed in two perpendicular directions with overlapping passes of the vehicle under the observation of an ECS technician. This procedure is intended to assist in identifying any localized yielding materials.

Where proofrolling identifies areas that are unstable or “pumping” subgrade those areas should be repaired prior to the placement of any subsequent Structural Fill or other construction materials. Methods of stabilization include undercutting, moisture conditioning, or chemical stabilization. The situation should be discussed with ECS to determine the appropriate procedure. Test pits may be excavated to explore the shallow subsurface materials to help in determining the cause of the observed unstable materials, and to assist in the evaluation of appropriate remedial actions to stabilize the subgrade.

5.2 EARTHWORK OPERATIONS

5.2.1 High Plasticity Soils

High plasticity soils generally not present at anticipated excavation levels.

5.2.2 Structural Fill

Prior to placement of Structural Fill, representative bulk samples (about 50 pounds) of on-site and/or off-site borrow should be submitted to ECS for laboratory testing, which will typically include Atterberg limits, natural moisture content, grain-size distribution, and moisture-density relationships (i.e., Proctors) for compaction. Import materials should be tested prior to being hauled to the site to determine if they meet project specifications. Alternatively, Proctor data from other accredited laboratories can be submitted if the test results are within the last 90 days.

Satisfactory Structural Fill Materials: Materials satisfactory for use as Structural Fill should consist of inorganic soils with the following engineering properties and compaction requirements.

STRUCTURAL FILL INDEX PROPERTIES	
Subject	Property
Building and Pavement Areas (On site or Imported Soils)	LL < 50, PI<25
Max. Particle Size	4 inches
Max. organic content	3% by dry weight

STRUCTURAL FILL COMPACTION REQUIREMENTS	
Subject	Requirement
Compaction Standard	Standard Proctor, ASTM D698
Required Compaction	95% of Max. Dry Density
Moisture Content	+/-3 % points of the soil's optimum value
Loose Thickness	8 inches prior to compaction

On-Site Borrow Suitability: The shallow natural soils are suitable for reuse as compacted fill.

Fill Placement: Fill materials should not be placed on frozen soils, on frost-heaved soils, and/or on excessively wet soils. Borrow fill materials should not contain frozen materials at the time of placement, and all frozen or frost-heaved soils should be removed prior to placement of Structural Fill or other fill soils and aggregates. Excessively wet soils or aggregates should be scarified, aerated, and moisture conditioned.

5.2.3 Existing Man-Placed Fill

Fill Content: Existing fill consisting primarily of POORLY GRADED GRAVEL WITH CLAY AND SAND (GP-GC), CLAYEY GRAVEL (GC), and POORLY GRADED GRAVEL (GP) with varying amounts of sand and clay was encountered in 4 of 11 borings at depths extending to 5.5 feet below existing grades. The depth of this fill material could be deeper in unexplored areas or may be encountered in areas not yet explored. The material appeared to have been placed with compactive effort; however, no compaction data has been provided at the time of preparing this report.

Fill Removal in Building Areas: All existing fill should be removed from below the planned building foundation areas. The undercut should also extend outward from the planned foundation edges at a 1H:1V ratio beyond the foundation based on the depth of the undercut. ECS personnel should confirm that the undercut has been suitably accomplished. The excavation should be backfilled with properly compacted structural fill in accordance with the recommendations of this report. In **Section 4.2 Foundations** we provide additional recommendations for foundations. An undercut to natural material in these areas will help alleviate the risk of excessive settlement within the planned development.

Pavement Areas: Existing fill in pavement areas should be evaluated as described in **Section 5.1.2 Proofrolling** to identify unstable materials. Where soils are observed to yield during proofrolling, undercuts may be performed to stable materials below and backfilled with compacted select fill.

5.3 FOUNDATION AND SLAB OBSERVATIONS

Protection of Foundation Excavations: Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, foundation concrete should be placed the same day that excavations are made. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 1 to 3-inch thick “mud mat” of “lean” concrete should be placed on the bearing soils before the placement of reinforcing steel.

Footing Subgrade Observations: Most of the soils at the foundation bearing elevation are anticipated to be suitable for support of the proposed structure. It is important to have ECS observe the foundation subgrade prior to placing foundation concrete, to confirm the bearing soils are what was anticipated.

Slab Subgrade Verification: Prior to placement of a drainage layer, the subgrade should be prepared in accordance with the recommendations found in **Section 5.1.2 Proofrolling**.

5.4 UTILITY INSTALLATIONS

Utility Subgrades: The soils encountered in our exploration are expected to be generally suitable for support of utility pipes. The pipe subgrades should be observed and probed for stability by ECS. Any loose or unsuitable materials encountered should be removed and replaced with suitable compacted Structural Fill, or pipe stone bedding material.

Utility Backfilling: The granular bedding material (VDOT #21-A stone) should be at least 4 inches thick, but not less than that specified by the civil engineer's project drawings and specifications. We recommend that the bedding materials be placed up to the springline of the pipe. Fill placed for support of the utilities, as well as backfill over the utilities, should satisfy the requirements for Structural Fill and Fill Placement.

Excavation Safety: All excavations and slopes should be constructed and maintained in accordance with OSHA excavation safety standards. The contractor is solely responsible for designing, constructing, and maintaining stable temporary excavations and slopes. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. ECS is providing this information solely as a service to our client. ECS is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

6.0 CLOSING

ECS has prepared this report to guide the geotechnical-related design and construction aspects of the project. We performed these services in accordance with the standard of care expected of professionals in the industry performing similar services on projects of like size and complexity at this time in the region. No other representation, expressed or implied, and no warranty or guarantee is included or intended in this report.

The description of the proposed project is based on information provided to ECS by our client. If any of this information is inaccurate or changes, either because of our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted so we can review our recommendations and provide additional or alternate recommendations that reflect the proposed construction.

We recommend that ECS review the project plans and specifications so we can confirm that those plans/specifications are in accordance with the recommendations of this geotechnical report.

Field observations, and quality assurance testing during earthwork and foundation installation are an extension of, and integral to, the geotechnical design. We recommend that ECS be retained to apply our expertise throughout the geotechnical phases of construction, and to provide consultation and recommendation should issues arise.

ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

APPENDIX A – Diagrams & Reports

Site Location Diagram
Boring Location Diagram
Subsurface Cross-Sections

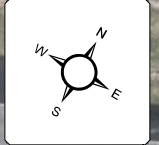


SITE LOCATION DIAGRAM **VDOT - THIRLANE ROAD CHEMICAL STORAGE BUILDING**

4330 THIRLANE ROAD NW, ROANOKE, VIRGINIA
HUGHES ASSOCIATES ARCHITECTS & ENGINEERS

ENGINEER DOS
SCALE AS NOTED
PROJECT NO. 12:19976
FIGURE 1 OF 1
DATE 9/6/2023

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors



Legend



Approximate September 2023 Boring Locations



Approximate December 2023 Boring Locations

Approximate Cross-Section Locations



BORING LOCATION DIAGRAM VDOT - THIRLANE ROAD CHEMICAL STORAGE BUILDING

4330 THIRLANE ROAD NW, ROANOKE, VIRGINIA
HUGHES ASSOCIATES ARCHITECTS & ENGINEERS

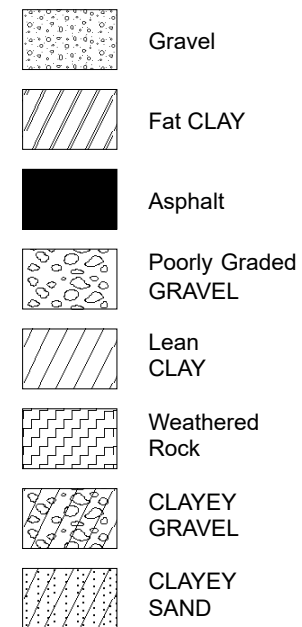
ENGINEER
DOS

SCALE
AS NOTED

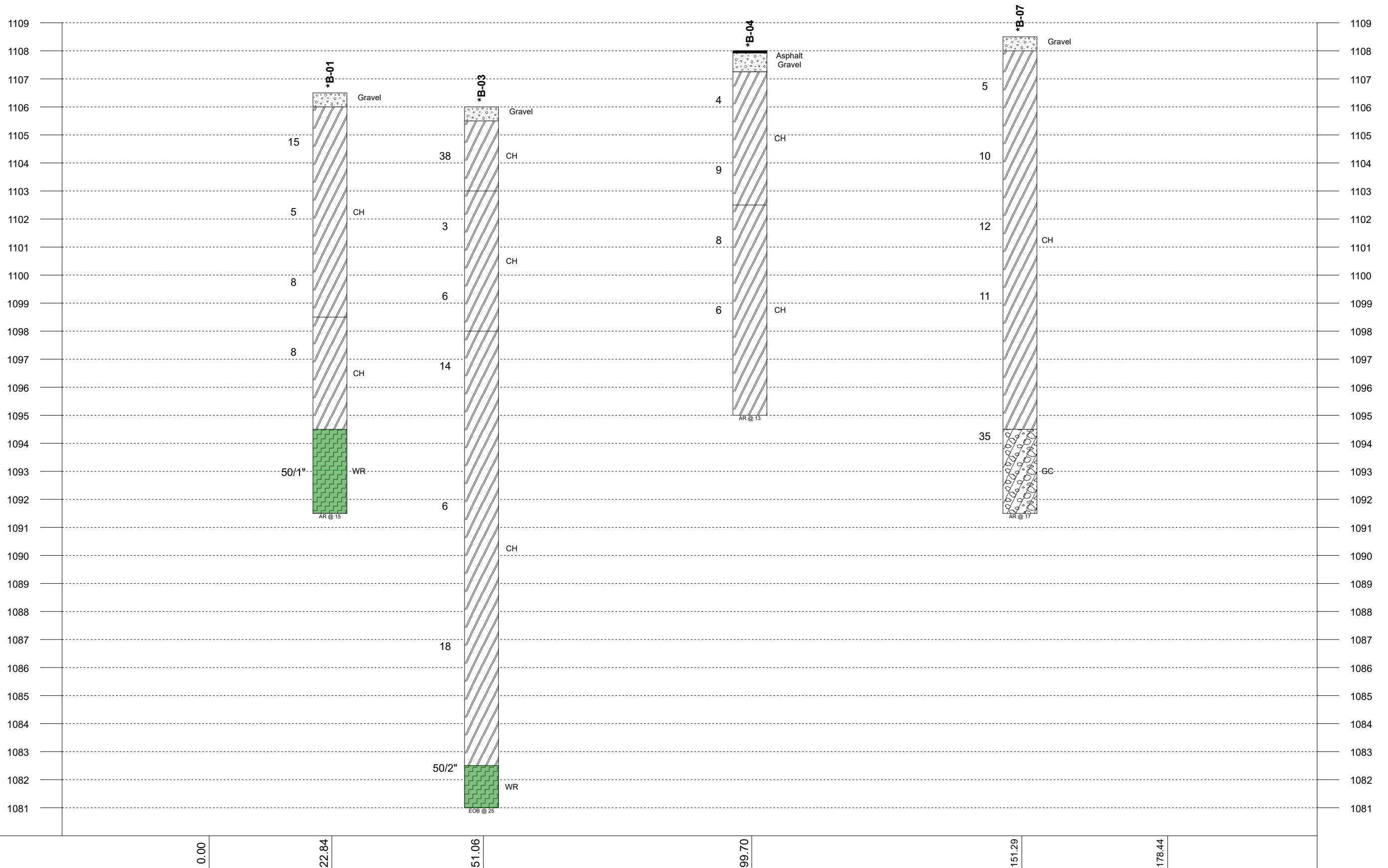
PROJECT NO.
12:19976

FIGURE
1 OF 1




DATE
12/14/2023



1080.00



1- EOB: END OF BORING AR: AUGER REFUSAL SR: SAMPLER REFUSAL.
2- THE NUMBER BELOW THE STRIPS IS THE DISTANCE ALONG THE BASELINE.
3- SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
4- STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586).

Plastic Limit	Water Content	Liquid Limit
X	●	△
[FINES CONTENT %]		
	BOTTOM OF CASING	
	LOSS OF CIRCULATION	
	CALIBRATED PENETROMETER	

▽	WL (First Encountered)	
▼	WL (Completion)	
▽	WL (Estimated Seasonal High Water)	
▽	WL (Stabilized)	

Fill
Possible Fill
Probable Fill
Rock

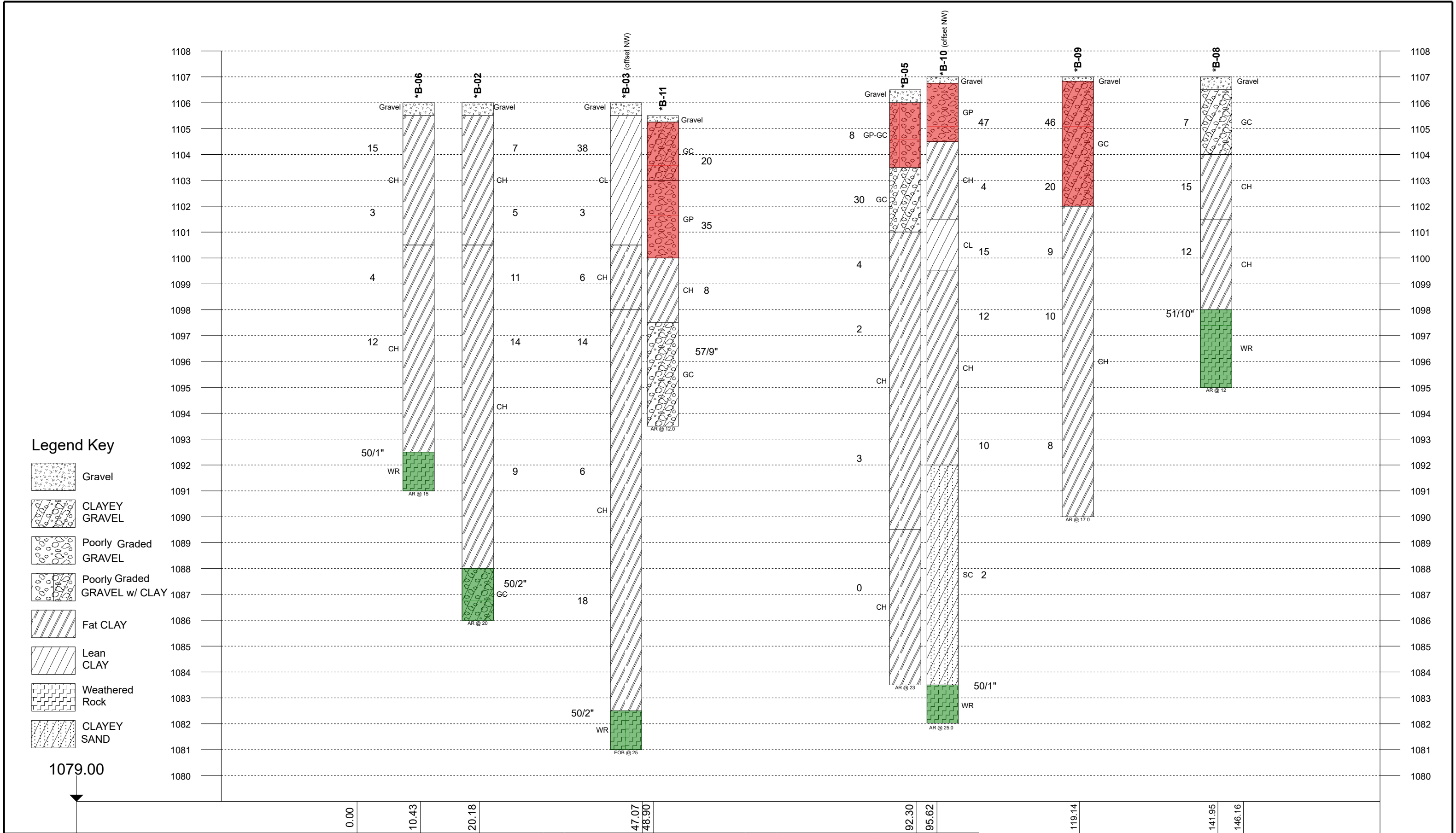


VDOT - Thirlane Road Chemical Storage Building

Hughes Associates Architects & Engineers

4330 Thirlane Road NW, Roanoke, Virginia, 24019

Project No:	12:19976	Date:	12/14/2023
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Notes:

1- EOB: END OF BORING AR: AUGER REFUSAL SR: SAMPLER REFUSAL.
2- THE NUMBER BELOW THE STRIPS IS THE DISTANCE ALONG THE BASELINE.
3- SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
4- STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586).

Plastic Limit	Water Content	Liquid Limit
X	●	△
[FINES CONTENT %]		
▬	BOTTOM OF CASING	
▬	LOSS OF CIRCULATION	
○	CALIBRATED PENETROMETER	

▽	WL (First Encountered)	Fill
▼	WL (Completion)	Possible Fill
▽	WL (Estimated Seasonal High Water)	Probable Fill
▽	WL (Stabilized)	Rock

GENERALIZED SUBSURFACE PROFILE

Cross-Section B-B'

VDOT - Thirlane Road Chemical Storage Building

Hughes Associates Architects & Engineers

4330 Thirlane Road NW, Roanoke, Virginia, 24019

Project No: 12:19976 Date: 12/19/2023

APPENDIX B – Field Operations

Reference Notes for Boring Logs

Subsurface Exploration Procedure: Standard Penetration Testing (SPT)

Boring Logs B-01 through B-11



REFERENCE NOTES FOR BORING LOGS

MATERIAL^{1,2}

	ASPHALT
	CONCRETE
	GRAVEL
	TOPSOIL
	VOID
	BRICK
	AGGREGATE BASE COURSE
	GW WELL-GRADED GRAVEL gravel-sand mixtures, little or no fines
	GP POORLY-GRADED GRAVEL gravel-sand mixtures, little or no fines
	GM SILTY GRAVEL gravel-sand-silt mixtures
	GC CLAYEY GRAVEL gravel-sand-clay mixtures
	SW WELL-GRADED SAND gravelly sand, little or no fines
	SP POORLY-GRADED SAND gravelly sand, little or no fines
	SM SILTY SAND sand-silt mixtures
	SC CLAYEY SAND sand-clay mixtures
	ML SILT non-plastic to medium plasticity
	MH ELASTIC SILT high plasticity
	CL LEAN CLAY low to medium plasticity
	CH FAT CLAY high plasticity
	OL ORGANIC SILT or CLAY non-plastic to low plasticity
	OH ORGANIC SILT or CLAY high plasticity
	PT PEAT highly organic soils

DRILLING SAMPLING SYMBOLS & ABBREVIATIONS

SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	RD	Rock Bit Drilling
WS	Wash Sample	RC	Rock Core, NX, BX, AX
BS	Bulk Sample of Cuttings	REC	Rock Sample Recovery %
PA	Power Auger (no sample)	RQD	Rock Quality Designation %
HSA	Hollow Stem Auger		

PARTICLE SIZE IDENTIFICATION

DESIGNATION	PARTICLE SIZES
Boulders	12 inches (300 mm) or larger
Cobbles	3 inches to 12 inches (75 mm to 300 mm)
Gravel: Coarse	¾ inch to 3 inches (19 mm to 75 mm)
Fine	4.75 mm to 19 mm (No. 4 sieve to ¾ inch)
Sand: Coarse	2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)
Medium	0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)
Fine	0.074 mm to 0.425 mm (No. 200 to No. 40 sieve)
Silt & Clay ("Fines")	<0.074 mm (smaller than a No. 200 sieve)

COHESIVE SILTS & CLAYS

UNCONFINED COMPRESSION STRENGTH, QP ⁴	SPT ⁵ (BPF)	CONSISTENCY ⁷ (COHESIVE)
<0.25	<2	Very Soft
0.25 - <0.50	2 - 4	Soft
0.50 - <1.00	5 - 8	Firm
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

RELATIVE AMOUNT ⁷	COARSE GRAINED (%) ⁸	FINE GRAINED (%) ⁸
Trace	≤5	≤5
With	10 - 20	10 - 25
Adjective (ex: "Silty")	25 - 45	30 - 45

GRAVELS, SANDS & NON-COHESIVE SILTS

SPT ⁵	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

WATER LEVELS⁶

	WL (First Encountered)
	WL (Completion)
	WL (Seasonal High Water)
	WL (Stabilized)

FILL AND ROCK

FILL	POSSIBLE FILL	PROBABLE FILL	ROCK

¹Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

²To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

³Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].

⁴Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

⁵Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf). SPT correlations per 7.4.2 Method B and need to be corrected if using an auto hammer.

⁶The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.

⁷Minor deviation from ASTM D 2488-17 Note 14.

⁸Percentages are estimated to the nearest 5% per ASTM D 2488-17.



SUBSURFACE EXPLORATION PROCEDURE: STANDARD PENETRATION TESTING (SPT) ASTM D 1586 Split-Barrel Sampling




Standard Penetration Testing, or **SPT**, is the most frequently used subsurface exploration test performed worldwide. This test provides samples for identification purposes, as well as a measure of penetration resistance, or N-value. The N-Value, or blow counts, when corrected and correlated, can approximate engineering properties of soils used for geotechnical design and engineering purposes.



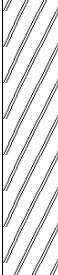





SPT Procedure:

- Involves driving a hollow tube (split-spoon) into the ground by dropping a 140-lb hammer a height of 30-inches at desired depth
- Recording the number of hammer blows required to drive split-spoon a distance of 18-24 inches (in 3 or 4 Increments of 6 inches each)
- Auger is advanced* and an additional SPT is performed
- One SPT typically performed for every two to five feet. An approximate 1.5 inch diameter soil sample is recovered.







**Drilling Methods May Vary—* The predominant drilling methods used for SPT are open hole fluid rotary drilling and hollow-stem auger drilling.




CLIENT: Hughes Associates Architects & Engineers				PROJECT NO.: 12:19976		BORING NO.: B-01		SHEET: 1 of 1		
PROJECT NAME: VDOT - Thirlane Road Chemical Storage Building				DRILLER/CONTRACTOR: Blue Ridge Drilling, Inc.						
SITE LOCATION: 4330 Thirlane Road NW, Roanoke, Virginia, 24019								LOSS OF CIRCULATION 		
LATITUDE: 37.324940		LONGITUDE: -79.986459		STATION:		SURFACE ELEVATION: 1106.5		BOTTOM OF CASING 		

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT		ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % [FINES CONTENT] %			
									20	40	60	80	100	RQD	REC	1
	S-01	SS	18	11	Gravel Thickness[6.00"] (SC) Residuum, CLAYEY SAND WITH GRAVEL, orange brown, moist, stiff to firm			13-11-4 (15)		15				20	32	
5	S-02	SS	18	17	(CH) FAT CLAY WITH SAND, contains rock fragments, orange brown, moist, firm		1102	2-2-3 (5)		5				15.8		
	S-03	SS	18	16			1097	3-3-5 (8)		8					36.1	
10	S-04	SS	18	16			1097	2-3-5 (8)		8						
15	S-05	SS	1	0	(WR) WEATHERED ROCK sampled as FAT CLAY WITH SAND, orange brown, moist, very hard		1092	50/1" (50/1")		50						
					AUGER REFUSAL AT 15 FT											
20							1087									
25							1082									
30							1077									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

 WL (First Encountered)	Dry	BORING STARTED:	Sep 07 2023	CAVE IN DEPTH:	2.80
 WL (Completion)	Dry	BORING COMPLETED:	Sep 07 2023	HAMMER TYPE:	Auto
 WL (Seasonal High Water)		EQUIPMENT:	CME45	LOGGED BY:	LNB
 WL (Stabilized)		DRILLING METHOD: 2 1/4" HSA			




GEOTECHNICAL BOREHOLE LOG

CLIENT: Hughes Associates Architects & Engineers				PROJECT NO.: 12:19976		BORING NO.: B-02		SHEET: 1 of 1		
PROJECT NAME: VDOT - Thirlane Road Chemical Storage Building				DRILLER/CONTRACTOR: Blue Ridge Drilling, Inc.						
SITE LOCATION: 4330 Thirlane Road NW, Roanoke, Virginia, 24019								LOSS OF CIRCULATION 		
LATITUDE: 37.324826		LONGITUDE: -79.986378		STATION:		SURFACE ELEVATION: 1106.0		BOTTOM OF CASING 		





DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT		ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % [FINES CONTENT] %	
									20 40 60 80 100		RQD REC		10 20 30 40 50	
					Gravel Thickness[6.00"]									
5	S-01	SS	18	15	(CH) Residuum, SANDY FAT CLAY, light brown to dark brown, moist, firm		1101	3-4-3 (7)	⊗7					21.5
	S-02	SS	18	17				5-2-3 (5)	⊗5					17.5
	S-03	SS	18	13	(CH) FAT CLAY WITH SAND, orange brown, moist, stiff			4-4-7 (11)	⊗11					
10	S-04	SS	18	16			1096	4-6-8 (14)	⊗14					
15	S-05	SS	18	12			1091	3-3-6 (9)	⊗9					
20	S-06	SS	2	2	(WR) WEATHERED ROCK sampled as CLAYEY GRAVEL, light gray, moist, very dense		1086	50/2" (50/2")	⊗50/2"					
					AUGER REFUSAL AT 20 FT									
25							1081							
30							1076							

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL			
<div> <div></div> WL (First Encountered) </div>	Dry	BORING STARTED: Sep 06 2023	CAVE IN DEPTH: 4.40
<div> <div></div> WL (Completion) </div>	Dry	BORING COMPLETED: Sep 06 2023	HAMMER TYPE: Auto
<div> <div></div> WL (Seasonal High Water) </div>		EQUIPMENT: CME45	DRILLING METHOD: 2 1/4" HSA
<div> <div></div> WL (Stabilized) </div>		LOGGED BY: LNB	




GEOTECHNICAL BOREHOLE LOG

CLIENT: Hughes Associates Architects & Engineers				PROJECT NO.: 12:19976		BORING NO.: B-03		SHEET: 1 of 1		
PROJECT NAME: VDOT - Thirlane Road Chemical Storage Building				DRILLER/CONTRACTOR: Blue Ridge Drilling, Inc.						
SITE LOCATION: 4330 Thirlane Road NW, Roanoke, Virginia, 24019								LOSS OF CIRCULATION 		
LATITUDE: 37.324894		LONGITUDE: -79.986319		STATION:		SURFACE ELEVATION: 1106.0		BOTTOM OF CASING 		

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % [FINES CONTENT] %	
									STANDARD PENETRATION BLOWS/FT	RECOVERY	1	2
					Gravel Thickness[6.00"]							
5	S-01	SS	18	18	(CL) Residuum, LEAN CLAY WITH SAND, trace gravel, red brown and light gray, moist, hard to soft		1101	9-21-17 (38)	38		5.1	
	S-02	SS	18	18				1-2-1 (3)	3		17	21.6
	S-03	SS	18	16	(CH) FAT CLAY WITH SAND, trace gravel, orange brown, moist, firm			1-2-4 (6)	6		44	77.4%
10	S-04	SS	18	18	(CH) FAT CLAY WITH SAND, contains rock fragments, orange brown to light gray, moist, stiff to firm		1096	4-6-8 (14)	14			
15	S-05	SS	18	16			1091	2-2-4 (6)	6			
20	S-06	SS	18	0			1086	WOH- WOH-18 (18)	18			
25	S-07	SS	2	0	(WR) WEATHERED ROCK sampled as FAT CLAY WITH SAND, orange brown to light gray, moist, very hard END OF BORING AT 25 FT		1081	50/2" (50/2")	50/2"			
30							1076					

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL			
 WL (First Encountered)	Dry	BORING STARTED:	Sep 06 2023
 WL (Completion)	Dry	BORING COMPLETED:	Sep 06 2023
 WL (Seasonal High Water)		EQUIPMENT:	CME45
 WL (Stabilized)		LOGGED BY:	LNB
		CAVE IN DEPTH:	4.30
		HAMMER TYPE:	Auto
		DRILLING METHOD:	2 1/4" HSA

GEOTECHNICAL BOREHOLE LOG




CLIENT: Hughes Associates Architects & Engineers				PROJECT NO.: 12:19976		BORING NO.: B-04		SHEET: 1 of 1		
PROJECT NAME: VDOT - Thirlane Road Chemical Storage Building				DRILLER/CONTRACTOR: Blue Ridge Drilling, Inc.						
SITE LOCATION: 4330 Thirlane Road NW, Roanoke, Virginia, 24019								LOSS OF CIRCULATION 		
LATITUDE: 37.325022		LONGITUDE: -79.986208		STATION:		SURFACE ELEVATION: 1108.0		BOTTOM OF CASING 		









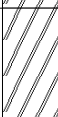

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT		ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % [FINES CONTENT] %	
									20	40	60	80	100	RQD
					Asphalt Thickness[1.00"]									
	S-01	SS	18	16	Gravel Thickness[8.00"]			3-3-1 (4)	4					15.0
5	S-02	SS	18	15	(CL) Residuum, SANDY LEAN CLAY, red brown to orange brown, trace gravel, moist, soft to stiff		1103	2-4-5 (9)	9					20.1
	S-03	SS	18	18				3-4-4 (8)	8					44 [59.3%]
10	S-04	SS	18	18			1098	1-2-4 (6)	6					
					AUGER REFUSAL AT 13 FT									
15							1093							
20							1088							
25							1083							
30							1078							





THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

<div><input checked="" type="checkbox"/></div> WL (First Encountered) <div>Dry</div>	BORING STARTED: Sep 07 2023	CAVE IN DEPTH: 4.00
<div><input checked="" type="checkbox"/></div> WL (Completion) <div>Dry</div>	BORING COMPLETED: Sep 07 2023	HAMMER TYPE: Auto
<div><input checked="" type="checkbox"/></div> WL (Seasonal High Water) <div></div>	EQUIPMENT: CME45	LOGGED BY: LNB
<div><input checked="" type="checkbox"/></div> WL (Stabilized) <div></div>	DRILLING METHOD: 2 1/4" HSA	




GEOTECHNICAL BOREHOLE LOG

CLIENT: Hughes Associates Architects & Engineers				PROJECT NO.: 12:19976		BORING NO.: B-05		SHEET: 1 of 1		
PROJECT NAME: VDOT - Thirlane Road Chemical Storage Building				DRILLER/CONTRACTOR: Blue Ridge Drilling, Inc.						
SITE LOCATION: 4330 Thirlane Road NW, Roanoke, Virginia, 24019								LOSS OF CIRCULATION 		
LATITUDE: 37.324859		LONGITUDE: -79.986119		STATION:		SURFACE ELEVATION: 1106.5		BOTTOM OF CASING 		

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % [FINES CONTENT] %	
									STANDARD PENETRATION BLOWS/FT	RECOVERY	WATER CONTENT %	FINES CONTENT %
					Gravel Thickness[6.00"]							
5	S-01	SS	18	6	(GP-GC FILL) FILL, POORLY GRADED GRAVEL WITH CLAY AND SAND, dark brown, moist, Loose to Medium Dense		1102	7-5-3 (8)			12	33
	S-02	SS	18	12	(GC) CLAYEY GRAVEL WITH SAND, contains rock fragments, dark brown, moist, medium dense			12-10-20 (30)				
	S-03	SS	18	16	(CH) FAT CLAY WITH SAND, orange brown, moist, soft			2-1-3 (4)			32.2	
10	S-04	SS	18	6			1097	1-1-1 (2)			41.0	
15	S-05	SS	18	8			1092	WOH-2-1 (3)			33.3	
20	S-06	SS	18	12	(CH) FAT CLAY WITH SAND, orange brown, wet, very soft		1087	WOH-WOH-WOH (0)				
25					AUGER REFUSAL AT 23 FT		1082					
30							1077					

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL			
 WL (First Encountered)	Dry	BORING STARTED:	Sep 06 2023
 WL (Completion)	Dry	BORING COMPLETED:	Sep 06 2023
 WL (Seasonal High Water)		EQUIPMENT:	CME45
 WL (Stabilized)		LOGGED BY:	LNB
CAVE IN DEPTH:		4.10	
HAMMER TYPE:		Auto	
DRILLING METHOD:		2 1/4" HSA	




GEOTECHNICAL BOREHOLE LOG




CLIENT: Hughes Associates Architects & Engineers				PROJECT NO.: 12:19976		BORING NO.: B-06		SHEET: 1 of 1		
PROJECT NAME: VDOT - Thirlane Road Chemical Storage Building				DRILLER/CONTRACTOR: Blue Ridge Drilling, Inc.						
SITE LOCATION: 4330 Thirlane Road NW, Roanoke, Virginia, 24019								LOSS OF CIRCULATION 		
LATITUDE: 37.324740		LONGITUDE: -79.986358		STATION:		SURFACE ELEVATION: 1106.0		BOTTOM OF CASING 		

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT		ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % [FINES CONTENT] %	
									20	40	60	80	100	RQD
					Gravel Thickness[6.00"]									
5	S-01	SS	18	12	(CH) Residuum, SANDY FAT CLAY, trace gravel, dark brown, moist, stiff to soft			7-7-8 (15)						
	S-02	SS	18	11			1101	1-2-1 (3)						
	S-03	SS	18	18	(CH) FAT CLAY WITH SAND, orange brown, moist, soft to stiff			2-2-2 (4)						
10	S-04	SS	18	12			1096	2-4-8 (12)						
15	S-05	SS	1	0	(WR) WEATHERED ROCK sampled as FAT CLAY WITH SAND, orange brown, moist, very hard AUGER REFUSAL AT 15 FT		1091	50/1" (50/1")						
20							1086							
25							1081							
30							1076							





THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL			
<input checked="" type="checkbox"/> WL (First Encountered)	Dry	BORING STARTED:	Sep 06 2023
<input checked="" type="checkbox"/> WL (Completion)	Dry	BORING COMPLETED:	Sep 06 2023
<input checked="" type="checkbox"/> WL (Seasonal High Water)		EQUIPMENT:	CME45
<input checked="" type="checkbox"/> WL (Stabilized)		LOGGED BY:	LNB
		CAVE IN DEPTH:	3.70
		HAMMER TYPE:	Auto
		DRILLING METHOD:	2 1/4" HSA

GEOTECHNICAL BOREHOLE LOG




CLIENT: Hughes Associates Architects & Engineers				PROJECT NO.: 12:19976		BORING NO.: B-07		SHEET: 1 of 1		
PROJECT NAME: VDOT - Thirlane Road Chemical Storage Building				DRILLER/CONTRACTOR: Blue Ridge Drilling, Inc.						
SITE LOCATION: 4330 Thirlane Road NW, Roanoke, Virginia, 24019								LOSS OF CIRCULATION 		
LATITUDE: 37.325094		LONGITUDE: -79.986061		STATION:		SURFACE ELEVATION: 1108.5		BOTTOM OF CASING 		

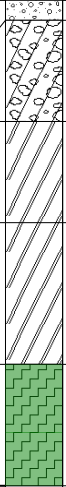
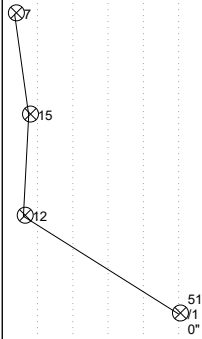
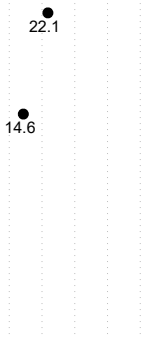
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT		ROCK QUALITY DESIGNATION & RECOVERY		LIQUID LIMIT X PLASTIC LIMIT		CALIBRATED PENETROMETER TSF		WATER CONTENT % [FINES CONTENT] %				
									20	40	60	80	100	RQD	REC	1	2	3	4	5	10
5	S-01	SS	18	16	Gravel Thickness[6.00"] (CL) Residuum, LEAN CLAY WITH SAND, red brown, moist, firm to stiff		1104	4-2-3 (5)	5									14	30	17.4	75.8%
	S-02	SS	18	11				4-4-6 (10)	10												
	S-03	SS	18	15	(CH) Residuum, FAT CLAY WITH SAND, red brown to orange brown, moist, soft to stiff		1099	3-4-8 (12)	12												
10	S-04	SS	18	18				3-5-6 (11)	11												
15	S-05	SS	18	12	(GC) CLAYEY GRAVEL WITH SAND, light gray, moist, dense		1094	5-16-19 (35)	35												
					AUGER REFUSAL AT 17 FT																
20																					
25																					
30																					

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL





<div> WL (First Encountered)</div> <div> WL (Completion)</div> <div> WL (Seasonal High Water)</div> <div> WL (Stabilized)</div>	<div>Dry</div> <div>Dry</div>	<div>BORING STARTED: Sep 07 2023</div> <div>BORING COMPLETED: Sep 07 2023</div> <div>EQUIPMENT: CME45</div>	<div>CAVE IN DEPTH: 4.40</div> <div>HAMMER TYPE: Auto</div> <div>DRILLING METHOD: 2 1/4" HSA</div>
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GEOTECHNICAL BOREHOLE LOG




CLIENT: Hughes Associates Architects & Engineers				PROJECT NO.: 12:19976		BORING NO.: B-08		SHEET: 1 of 1		
PROJECT NAME: VDOT - Thirlane Road Chemical Storage Building				DRILLER/CONTRACTOR: Blue Ridge Drilling, Inc.						
SITE LOCATION: 4330 Thirlane Road NW, Roanoke, Virginia, 24019								LOSS OF CIRCULATION 		
LATITUDE: 37.324917		LONGITUDE: -79.985963		STATION:		SURFACE ELEVATION: 1107.0		BOTTOM OF CASING 		

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT		ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % [FINES CONTENT] %	
									20	40	60	80	100	RQD
5	S-01	SS	18	12	Gravel Thickness[6.00"] (GC) Residuuum, CLAYEY GRAVEL WITH SAND, dark gray, moist, loose		1102	3-4-3 (7)		22.1		14.6		
	S-02	SS	18	14	(CH) SANDY FAT CLAY, trace gravel, orange brown, moist, stiff			4-8-7 (15)						
	S-03	SS	18	15	(CH) FAT CLAY WITH SAND, contains rock fragments, orange brown, moist to wet, stiff			3-6-6 (12)						
	S-04	SS	16	12	(WR) WEATHERED ROCK sampled as FAT CLAY WITH SAND, orange brown, moist to wet, very hard			3-1-50/4" (51/10")						
10	AUGER REFUSAL AT 12 FT						1097							
15							1092							
20							1087							
25							1082							
30							1077							

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

 WL (First Encountered)	Dry	BORING STARTED: Sep 07 2023	CAVE IN DEPTH: 3.20
 WL (Completion)		BORING COMPLETED: Sep 07 2023	HAMMER TYPE: Auto
 WL (Seasonal High Water)		EQUIPMENT: CME45	LOGGED BY:
 WL (Stabilized)			DRILLING METHOD: 2 1/4" HSA




GEOTECHNICAL BOREHOLE LOG







CLIENT: Hughes Associates Architects & Engineers				PROJECT NO.: 12:19976		BORING NO.: B-09		SHEET: 1 of 1		
PROJECT NAME: VDOT - Thirlane Road Chemical Storage Building				DRILLER/CONTRACTOR: Blue Ridge Drilling, Inc.						
SITE LOCATION: 4330 Thirlane Road NW, Roanoke, Virginia, 24019								LOSS OF CIRCULATION 		
LATITUDE: 37.324882		LONGITUDE: -79.986029		STATION:		SURFACE ELEVATION: 1107.0		BOTTOM OF CASING 		

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT		ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % [FINES CONTENT] %	
									20	40	60	80	100	RQD
					Gravel Thickness[2.00"]									
5	S-1	SS	18	15	(GC FILL) FILL, CLAYEY GRAVEL, contains slight asphalt, gray to black, moist, dense to medium dense			13-28-18 (46)						
	S-2	SS	18	16				4-4-16 (20)						
	S-3	SS	18	16	(CH) Residuum, FAT CLAY, trace gravel, orange brown, moist, stiff to firm		1102	1-3-6 (9)						
10	S-4	SS	18	18				3-4-6 (10)						
15	S-5	SS	18	18				3-3-5 (8)						
					AUGER REFUSAL AT 17.0 FT									
20														
25														
30														





THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL			
<div> <div></div> <div>WL (First Encountered)</div> </div> <div> <div></div> <div>WL (Completion)</div> </div> <div> <div></div> <div>WL (Seasonal High Water)</div> </div> <div> <div></div> <div>WL (Stabilized)</div> </div>	<div> <div>Dry</div> </div> <div> <div>Dry</div> </div>	<div> <div>BORING STARTED:</div> <div>Dec 07 2023</div> </div> <div> <div>BORING COMPLETED:</div> <div>Dec 07 2023</div> </div> <div> <div>EQUIPMENT:</div> <div>CME45C</div> </div>	<div> <div>CAVE IN DEPTH:</div> <div>3.10</div> </div> <div> <div>HAMMER TYPE:</div> <div>Auto</div> </div> <div> <div>LOGGED BY:</div> <div>JPP</div> </div> <div> <div>DRILLING METHOD:</div> <div>2 1/4" HSA</div> </div>

GEOTECHNICAL BOREHOLE LOG




CLIENT: Hughes Associates Architects & Engineers				PROJECT NO.: 12:19976		BORING NO.: B-10		SHEET: 1 of 1		
PROJECT NAME: VDOT - Thirlane Road Chemical Storage Building				DRILLER/CONTRACTOR: Blue Ridge Drilling, Inc.						
SITE LOCATION: 4330 Thirlane Road NW, Roanoke, Virginia, 24019								LOSS OF CIRCULATION 		
LATITUDE: 37.324944		LONGITUDE: -79.986163		STATION:		SURFACE ELEVATION: 1107.0		BOTTOM OF CASING 		

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % [FINES CONTENT] %	
									 STANDARD PENETRATION BLOWS/FT 20 40 60 80 100  RQD  REC	 LIQUID LIMIT  PLASTIC LIMIT  CALIBRATED PENETROMETER TSF 1 2 3 4 5		
											10 20 30 40 50	10 20 30 40 50
					Gravel Thickness[3.00"]							
5	S-1	SS	18	18	(GP FILL) FILL, GRAVEL, contains slight asphalt, gray, dry, dense			7-18-29 (47)				
	S-2	SS	18	18	(CH) Residuum, FAT CLAY WITH SAND, light brown, moist, soft		1102	2-2-2 (4)				
	S-3	SS	18	18	(CL) LEAN CLAY WITH GRAVEL, trace sand, orange brown, moist, stiff			4-7-8 (15)				
10	S-4	SS	18	18	(CH) FAT CLAY, trace sand, orange brown, moist, stiff		1097	3-5-7 (12)				
15	S-5	SS	18	18	(SC) CLAYEY SAND WITH GRAVEL, light brown, wet, very loose		1092	2-4-6 (10)				
20	S-6	SS	18	18			1087	2-1-1 (2)				
25	S-7	SS	1	0	(WR) WEATHERED ROCK [NO RECOVERY], very dense AUGER REFUSAL AT 25.0 FT		1082	50/1" (50/1")				
30							1077					

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

 WL (First Encountered)	Dry	BORING STARTED:	Dec 07 2023	CAVE IN DEPTH:	5.90
 WL (Completion)	Dry	BORING COMPLETED:	Dec 07 2023	HAMMER TYPE:	Auto
 WL (Seasonal High Water)		EQUIPMENT:	CME-45C	LOGGED BY:	JPP
 WL (Stabilized)				DRILLING METHOD:	2 1/4" HSA

GEOTECHNICAL BOREHOLE LOG

CLIENT: Hughes Associates Architects & Engineers				PROJECT NO.: 12:19976		BORING NO.: B-11		SHEET: 1 of 1		
PROJECT NAME: VDOT - Thirlane Road Chemical Storage Building				DRILLER/CONTRACTOR: Blue Ridge Drilling, Inc.						
SITE LOCATION: 4330 Thirlane Road NW, Roanoke, Virginia, 24019								LOSS OF CIRCULATION 		
LATITUDE: 37.324819		LONGITUDE: -79.986261		STATION:		SURFACE ELEVATION: 1105.5		BOTTOM OF CASING 		

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % [FINES CONTENT] %	
									STANDARD PENETRATION BLOWS/FT	RECOVERY	1	2
					Gravel Thickness[3.00"]							
5	S-1	SS	18	16	(GC FILL) FILL, CLAYEY GRAVEL WITH SAND, gray, dry moist, medium dense		1101	13-10-10 (20)				
	S-2	SS	18	18	(GP FILL) FILL, GRAVEL WITH SAND, gray, dry, dense			9-20-15 (35)				
	S-3	SS	18	18	(CH) Residuum, FAT CLAY, medium brown, moist, firm			2-3-5 (8)				
10	S-4	SS	15	13	(GC) CLAYEY GRAVEL WITH SAND, gray to medium brown, moist, very dense		1096	2-7-50/3" (57/9")				
					AUGER REFUSAL AT 12.0 FT							
15							1091					
20							1086					
25							1081					
30							1076					

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

<div><input checked="" type="checkbox"/></div> WL (First Encountered) Dry	<div><input checked="" type="checkbox"/></div> WL (Completion) Dry	BORING STARTED: Dec 07 2023	CAVE IN DEPTH: 2.60
<div><input checked="" type="checkbox"/></div> WL (Seasonal High Water)	<div><input checked="" type="checkbox"/></div> WL (Stabilized)	BORING COMPLETED: Dec 07 2023	HAMMER TYPE: Auto
		EQUIPMENT: CME-45C	LOGGED BY: JPP
DRILLING METHOD: 2 1/4" HSA			

GEOTECHNICAL BOREHOLE LOG

APPENDIX C – Laboratory Testing

Laboratory Test Results Summary

Plasticity Chart

Grain Size Analyses

Laboratory Testing Summary

Sample Location	Sample Number	Depth (ft)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
B-01	S-01	1.0-2.5	15.4	SC	32	20	12	31.9					
B-01	S-02	3.5-5.0	15.8										
B-01	S-03	6.0-7.5	36.1										
B-02	S-01	1.0-2.5	21.5										
B-02	S-02	3.5-5.0	17.5										
B-03	S-01	1.0-2.5	5.1										
B-03	S-02	3.5-5.0	21.6	CL	44	17	27	77.4					
B-04	S-01	1.0-2.5	15.0										
B-04	S-02	3.5-5.0	20.1	CL	44	20	24	59.3					
B-05	S-01	1.0-2.5	7.3	GP-GC	33	12	21	7.8					

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: VDOT - Thirlane Road Chemical Storage Building
Client: Hughes Associates Architects & Engineers

Project No.: 12:19976
Date Reported: 9/29/2023



Office / Lab

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(540)362-1202

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SMangione	scrouch	scrouch	

Laboratory Testing Summary

Sample Location	Sample Number	Depth (ft)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
B-05	S-03	6.0-7.5	32.2										
B-05	S-04	8.5-10.0	41.0										
B-05	S-05	13.5-15.0	33.3										
B-06	S-03	6.0-7.5	31.9	CH	69	26	43	91.9					
B-07	S-01	1.0-2.5	17.4	CL	30	14	16	75.8					
B-07	S-03	6.0-7.5	28.4										
B-08	S-01	1.0-2.5	22.1										
B-08	S-02	3.5-5.0	14.6										

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: VDOT - Thirlane Road Chemical Storage Building
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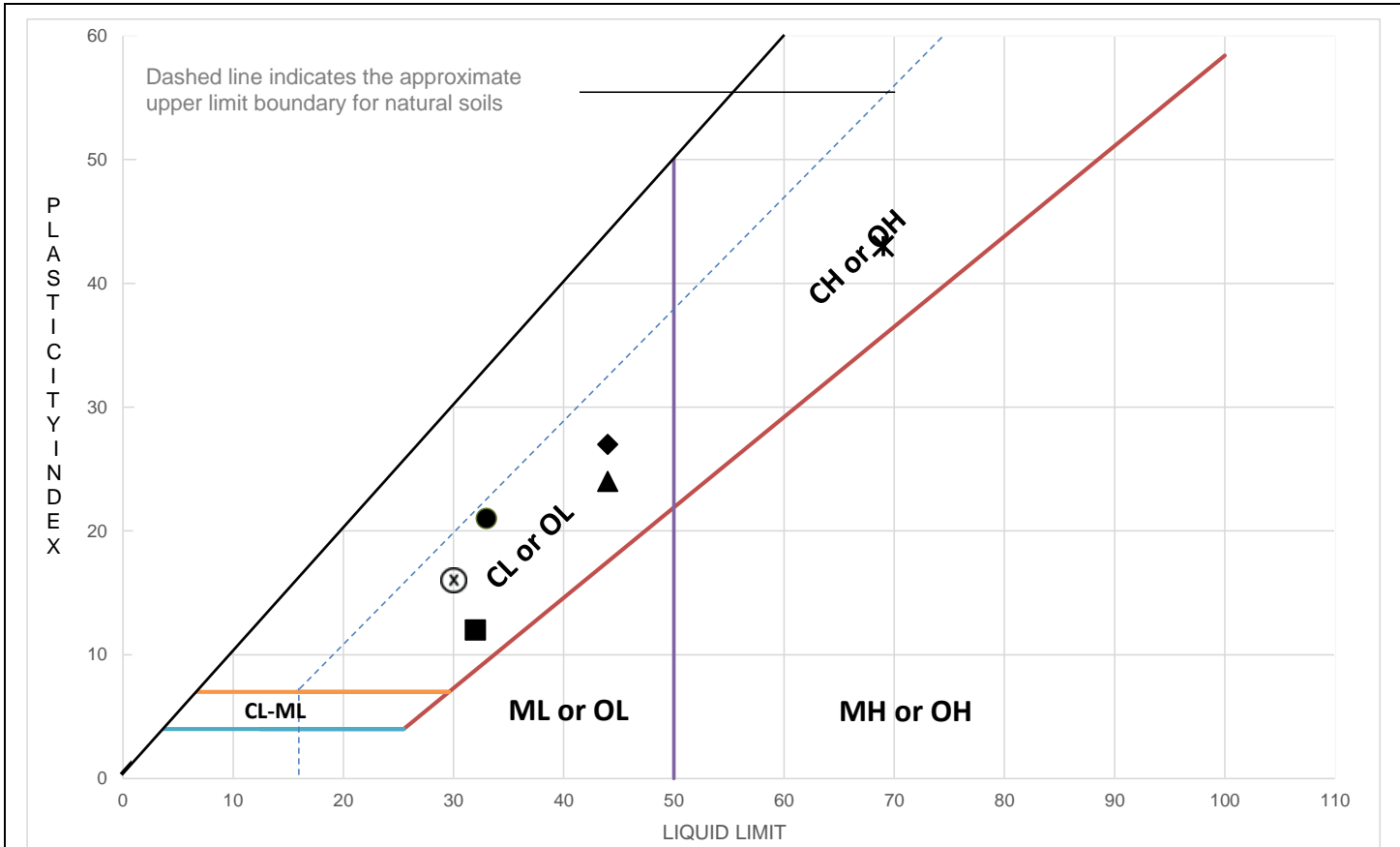
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LIQUID AND PLASTIC LIMITS TEST REPORT



TEST RESULTS (ASTM D4318-10 (MULTIPOINT TEST))

	Sample Location	Sample Number	Sample Depth (ft)	LL	PL	PI	%<#40	%<#200	AASHTO	USCS	Material Description
■	B-01	S-01	1.00-2.50	32	20	12	39.9	31.9	A-2-6	SC	(SC) CLAYEY SAND WITH GRAVEL, brown and grey
◆	B-03	S-02	3.50-5.00	44	17	27	86.3	77.4	A-7-6	CL	(CL) LEAN CLAY WITH SAND, brown
▲	B-04	S-02	3.50-5.00	44	20	24	68.0	59.3	A-7-6	CL	(CL) SANDY LEAN CLAY, brown
●	B-05	S-01	1.00-2.50	33	12	21	11.2	7.8	A-2-6	GP-GC	(GP-GC) POORLY-GRADED GRAVEL WITH CLAY AND SAND, brown and
*	B-06	S-03	6.00-7.50	69	26	43	96.5	91.9	A-7-6	CH	(CH) FAT CLAY, brown
⊗	B-07	S-01	1.00-2.50	30	14	16	88.3	75.8	A-6	CL	(CL) LEAN CLAY WITH SAND, brown

Project: VDOT - Thirlane Road Chemical Storage Building
Client: Hughes Associates Architects & Engineers

Project No.: 12:19976
Date Reported: 9/29/2023



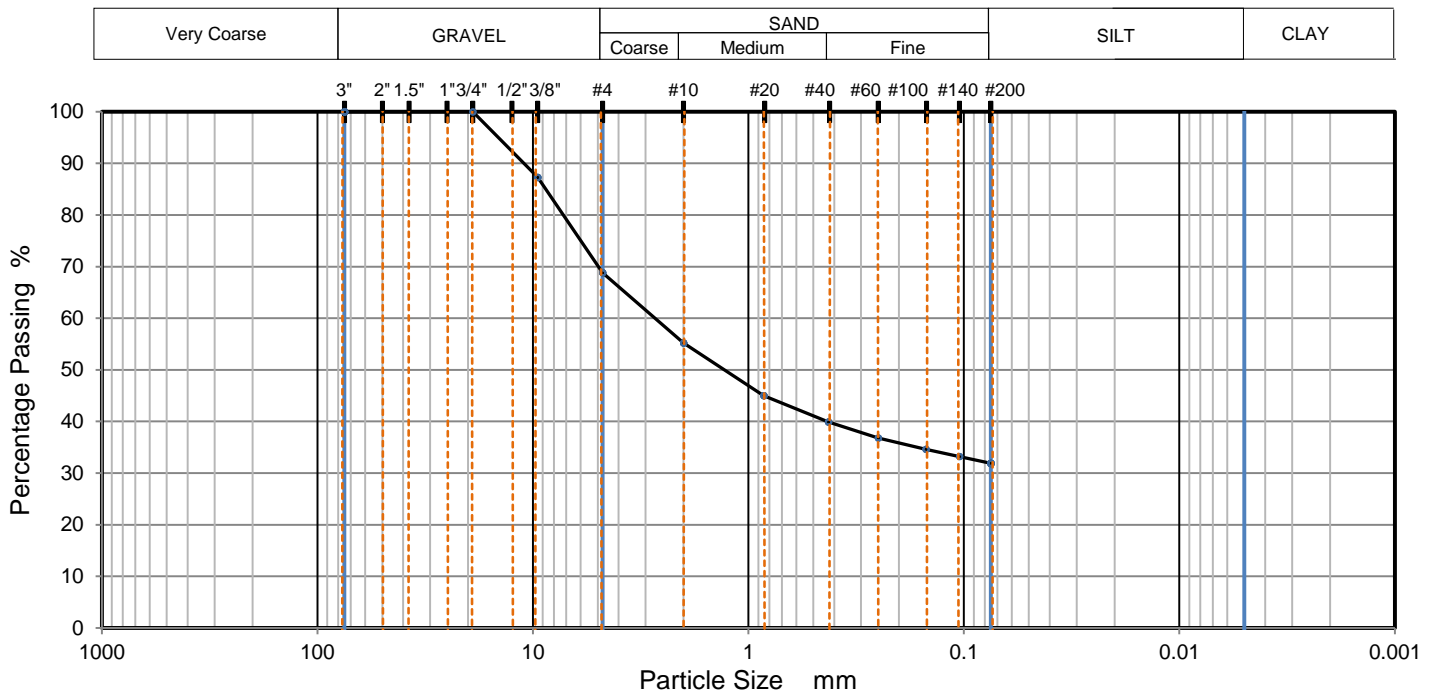
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PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
3/4"	100		
3/8"	87		
#4	69		
#10	55		
#20	45		
#40	40		
#60	37		
#100	35		
#140	33		
#200	32		

Dry Mass of sample, g

114.8

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	31
Coarse Sand, #4 to #10 sieve	14
Medium Sand, #10 to #40	15
Fine Sand, #40 to #200	8
Fines <#200	32

USCS	SC	Liquid Limit	32	D90	11.010	D50	1.293	D10	
AASHTO	A-2-6	Plastic Limit	20	D85	8.716	D30		Cu	
USCS Group Name	Clayey sand with gravel	Plasticity Index	12	D60	2.714	D15		Cc	

Project: VDOT - Thirlane Road Chemical Storage Building
 Client: Hughes Associates Architects & Engineers
 Sample Description: (SC) CLAYEY SAND WITH GRAVEL, brown and grey
 Sample Source: B-01

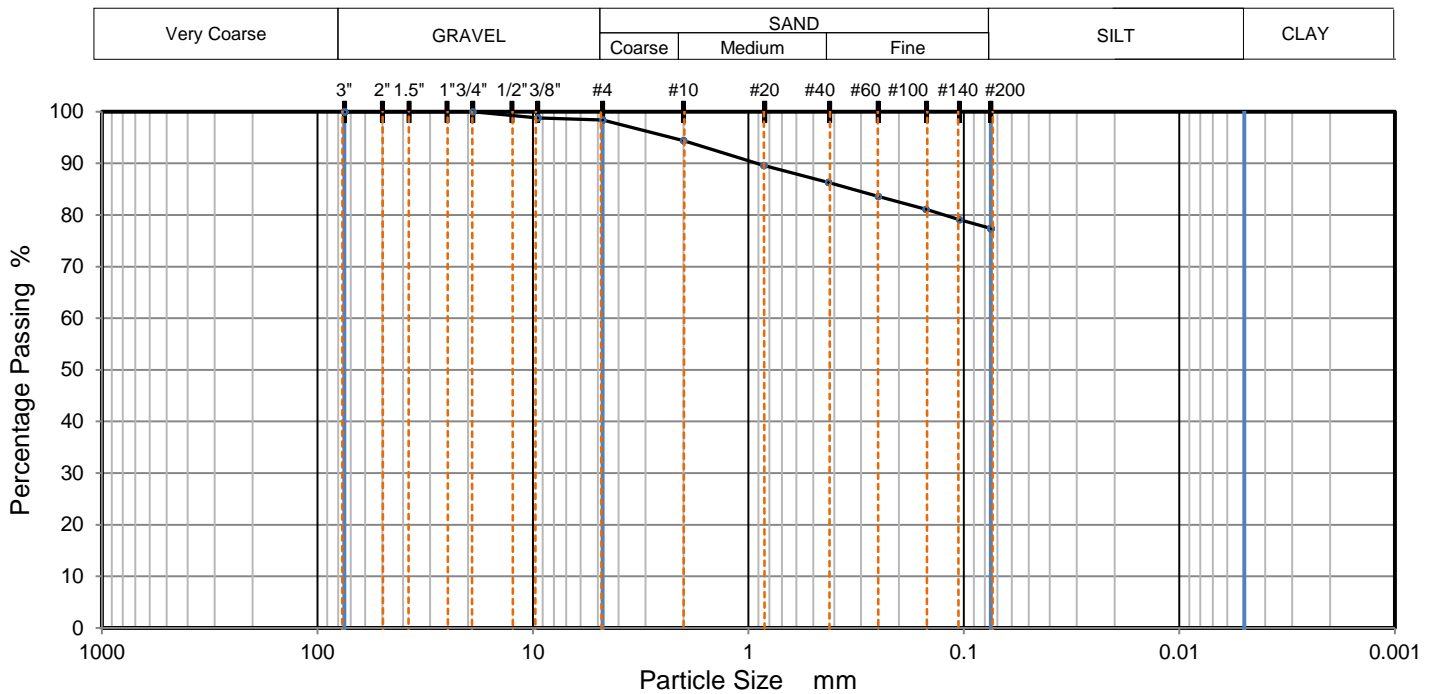
Project No.: 12:19976
 Depth (ft): 1.0 - 2.5
 Sample No.: S-01
 Date Reported: 9/29/2023



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PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
3/4"	100		
3/8"	99		
#4	98		
#10	94		
#20	90		
#40	86		
#60	84		
#100	81		
#140	79		
#200	77		

Dry Mass of sample, g

100.7

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	2
Coarse Sand, #4 to #10 sieve	4
Medium Sand, #10 to #40	8
Fine Sand, #40 to #200	9
Fines <#200	77

USCS	CL	Liquid Limit	44	D90	0.913	D50		D10	
AASHTO	A-7-6	Plastic Limit	17	D85	0.329	D30		Cu	
USCS Group Name	Lean clay with sand	Plasticity Index	27	D60		D15		Cc	

Project: VDOT - Thirlane Road Chemical Storage Building

Project No.: 12:19976

Client: Hughes Associates Architects & Engineers

Depth (ft): 3.5 - 5.0

Sample Description: (CL) LEAN CLAY WITH SAND, brown

Sample No.: S-02

Sample Source: B-03

Date Reported: 9/29/2023



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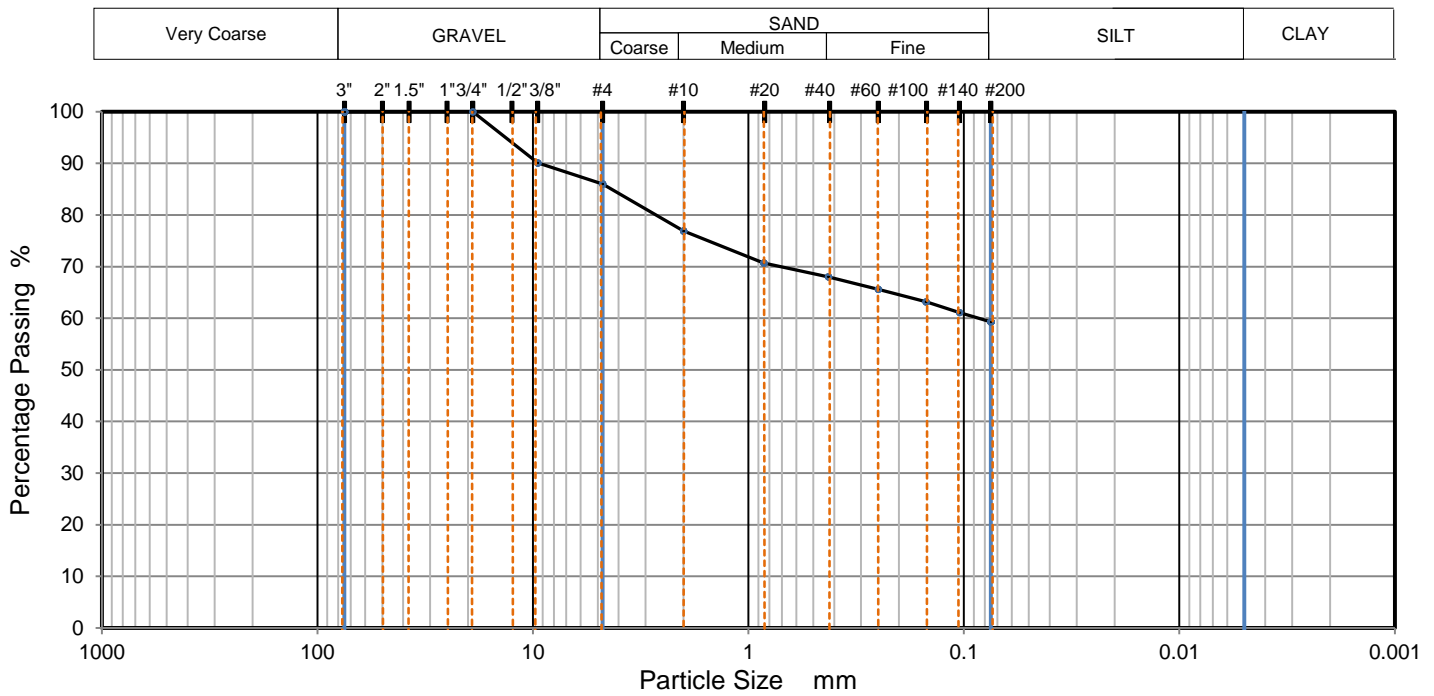
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PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
3/4"	100		
3/8"	90		
#4	86		
#10	77		
#20	71		
#40	68		
#60	66		
#100	63		
#140	61		
#200	59		

Dry Mass of sample, g

87.0

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	14
Coarse Sand, #4 to #10 sieve	9
Medium Sand, #10 to #40	9
Fine Sand, #40 to #200	9
Fines <#200	59

USCS	CL	Liquid Limit	44	D90	9.341	D50		D10	
AASHTO	A-7-6	Plastic Limit	20	D85	4.319	D30		Cu	
USCS Group Name	Sandy lean clay	Plasticity Index	24	D60	0.085	D15		Cc	

Project: VDOT - Thirlane Road Chemical Storage Building

Client: Hughes Associates Architects & Engineers

Sample Description: (CL) SANDY LEAN CLAY, brown

Sample Source: B-04

Project No.: 12:19976

Depth (ft): 3.5 - 5.0

Sample No.: S-02

Date Reported: 9/29/2023



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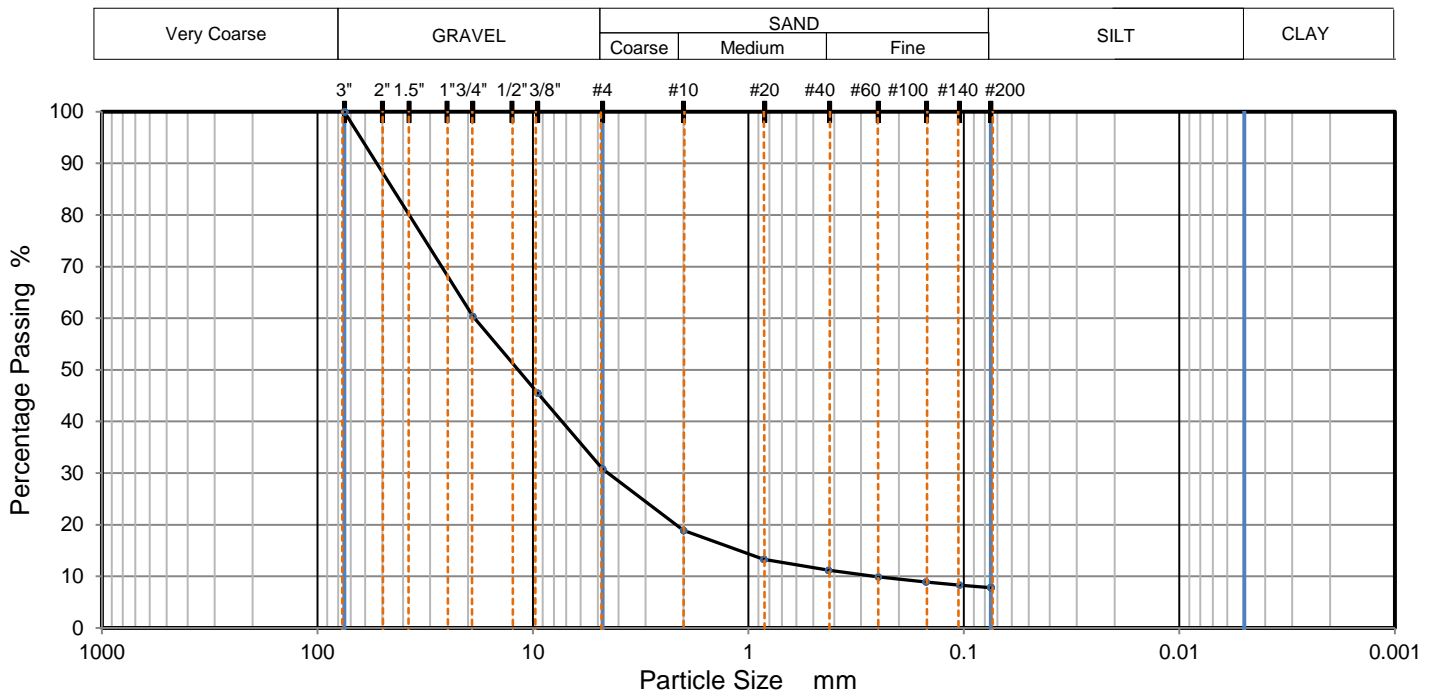
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PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
3/4"	60		
3/8"	46		
#4	31		
#10	19		
#20	13		
#40	11		
#60	10		
#100	9		
#140	8		
#200	8		

Dry Mass of sample, g

58.1

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	69
Coarse Sand, #4 to #10 sieve	12
Medium Sand, #10 to #40	8
Fine Sand, #40 to #200	3
Fines <#200	8

USCS	GP-GC	Liquid Limit	33	D90	53.020	D50	11.710	D10	0.260
AASHTO	A-2-6	Plastic Limit	12	D85	44.580	D30	4.482	Cu	71.621
USCS Group Name	Poorly graded gravel with clay and sand	Plasticity Index	21	D60	18.650	D15	1.102	Cc	4.136

Project: VDOT - Thirlane Road Chemical Storage Building

Project No.: 12:19976

Client: Hughes Associates Architects & Engineers

Depth (ft): 1.0 - 2.5

Sample Description: (GP-GC) POORLY-GRADED GRAVEL WITH CLAY AND S

Sample No.: S-01

Sample Source: B-05

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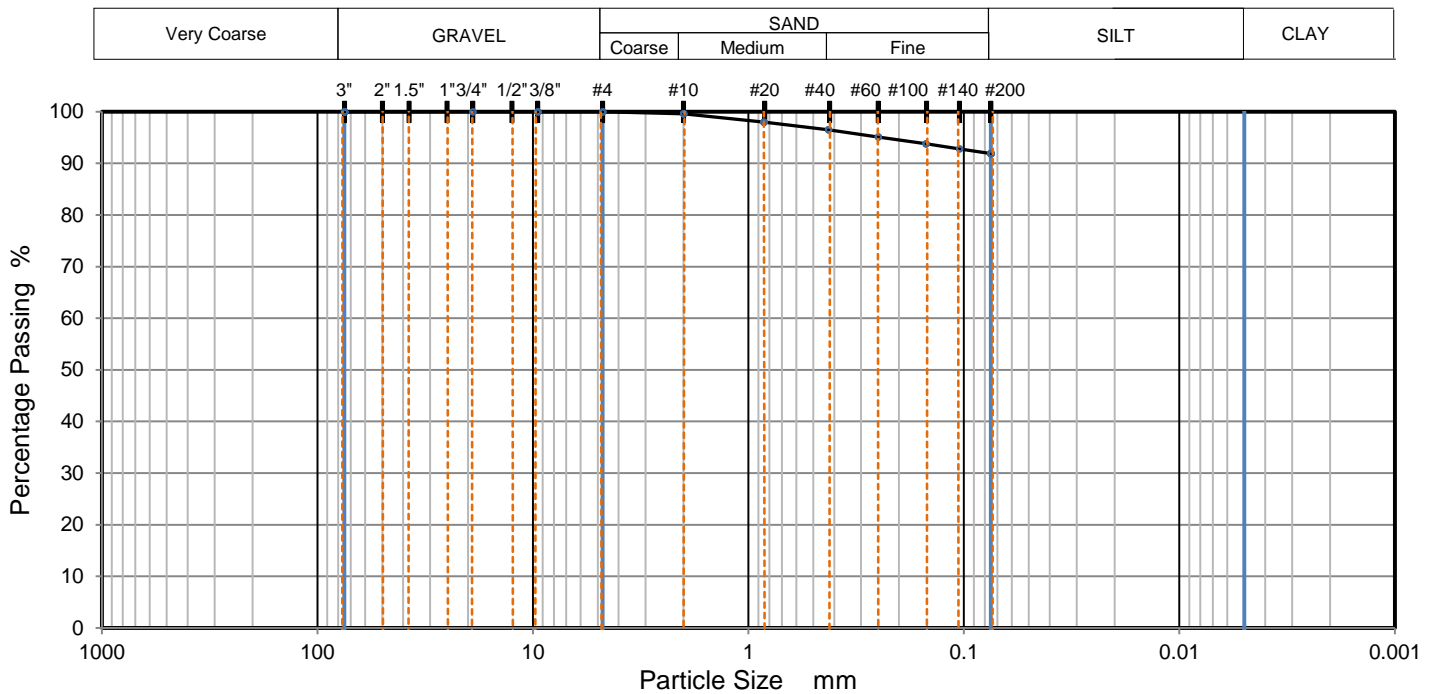
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PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
3/4"	100		
3/8"	100		
#4	100		
#10	100		
#20	98		
#40	97		
#60	95		
#100	94		
#140	93		
#200	92		

Dry Mass of sample, g

85.3

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	0
Coarse Sand, #4 to #10 sieve	0
Medium Sand, #10 to #40	3
Fine Sand, #40 to #200	5
Fines <#200	92

USCS	CH	Liquid Limit	69	D90		D50		D10	
AASHTO	A-7-6	Plastic Limit	26	D85		D30		Cu	
USCS Group Name	Fat clay	Plasticity Index	43	D60		D15		Cc	

Project: VDOT - Thirlane Road Chemical Storage Building

Project No.: 12:19976

Client: Hughes Associates Architects & Engineers

Depth (ft): 6.0 - 7.5

Sample Description: (CH) FAT CLAY, brown

Sample No.: S-03

Sample Source: B-06

Date Reported: 9/29/2023



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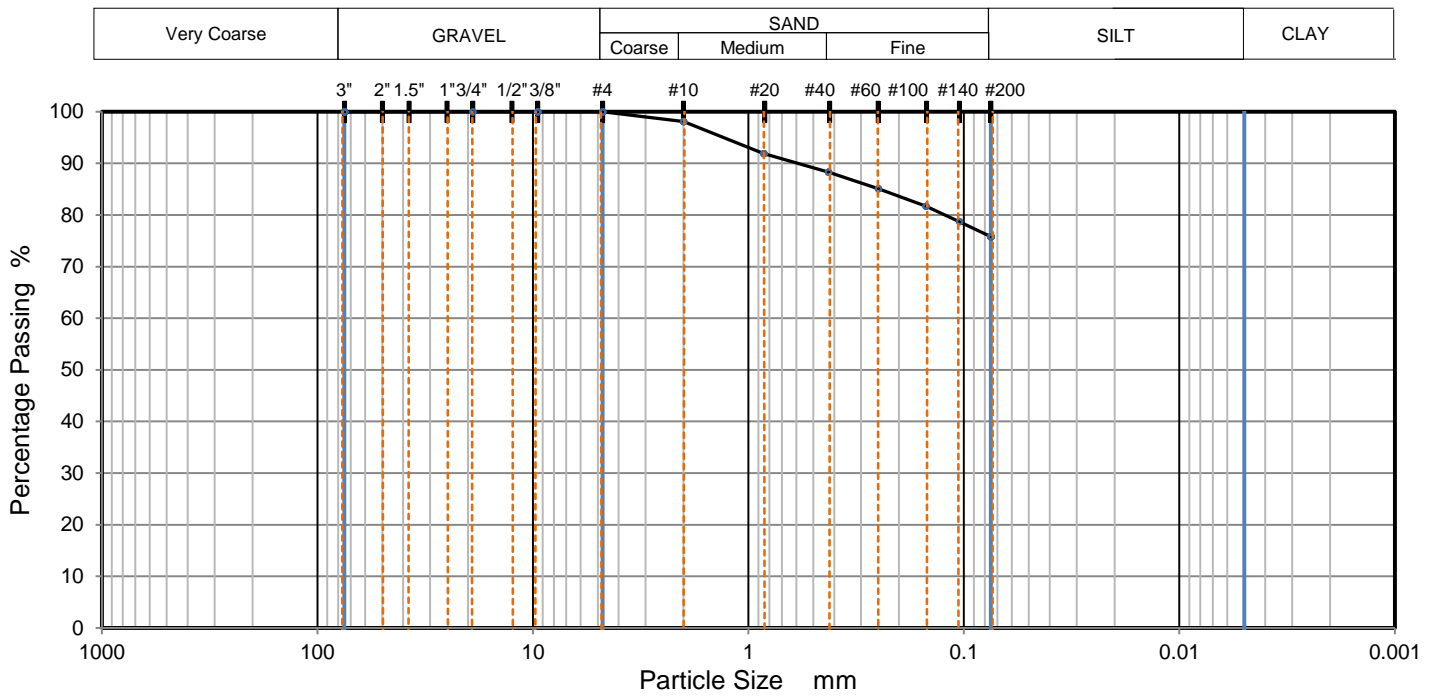
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PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
3/4"	100		
3/8"	100		
#4	100		
#10	98		
#20	92		
#40	88		
#60	85		
#100	82		
#140	79		
#200	76		

Dry Mass of sample, g

107.1

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	0
Coarse Sand, #4 to #10 sieve	2
Medium Sand, #10 to #40	10
Fine Sand, #40 to #200	13
Fines <#200	76

USCS	CL	Liquid Limit	30	D90	0.590	D50		D10	
AASHTO	A-6	Plastic Limit	14	D85	0.246	D30		Cu	
USCS Group Name	Lean clay with sand	Plasticity Index	16	D60		D15		Cc	

Project: VDOT - Thirlane Road Chemical Storage Building

Project No.: 12:19976

Client: Hughes Associates Architects & Engineers

Depth (ft): 1.0 - 2.5

Sample Description: (CL) LEAN CLAY WITH SAND, brown

Sample No.: S-01

Sample Source: B-07

Date Reported: 9/29/2023



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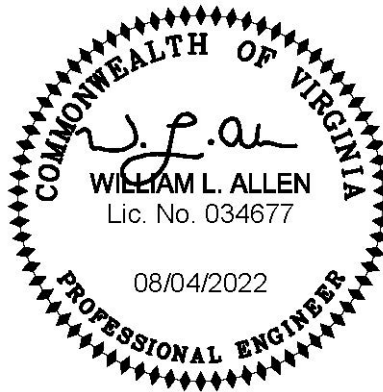
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**AIRPORT AHQ CHEMICAL STORAGE BUILDING
SALEM DISTRICT**

APPENDIX C





SECTION 133421 - FRAME-SUPPORTED MEMBRANE BUILDING

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 design, manufacture, shipping, handling and erection of a structural frame-supported membrane fabric covered building.
- B. The building shall include a membrane tensioned over an arched shape metal framework. The interior of the building shall be clear and free of any structural members and shall provide unobstructed floor space. The building shall be open at one end to allow access of dry chemical loading equipment.

1.3 REFERENCES AND STANDARDS

- A. Terminology Standard: The following standards shall be used where applicable to the building system designed by the manufacturer:
 - 1. AA ADM "Aluminum Design Manual".
 - 2. ANSI / AISC 303 "Code of Standard Practice for Steel Buildings and Bridges".
 - 3. ANSI / AISC 360 "Specification for Structural Steel Buildings".
 - 4. ANSI H35.1 "American National Standard Alloy and Temper Designation Systems for Aluminum".
 - 5. ASCE 7 "Minimum Design Loads for Building and Other Structures".
 - 6. ASTM A36 "Standard Specification for Carbon Structural Steel".
 - 7. ASTM E84-2013A "Test Methods for Surface Burning Characteristics of Building Materials".
 - 8. ASTM A123 "Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products".
 - 9. ASTM A307 "Standard Specification for Carbon Steel Bolts, Studs and Threaded Rod 60,000 psi Tensile Strength".

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10. ASTM F3125 "Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength".
11. ASTM A500 "Standard Specification for Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes".
12. ASTM A563 "Standard Specification for Carbon and Alloy Steel Nuts".
13. ASTM B429 "Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube".
14. ASTM A153 "Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware".
15. ASTM D5199 "Standard Test Method for Measuring the Nominal Thickness of Geosynthetics".
16. ASTM D5034 "Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)".
17. ASTM D5035 "Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)".
18. ASTM D4533 "Standard Test Method for Trapezoid Tearing Strength of Geotextiles".
19. ASTM D3786 "Standard Test Method for Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method".
20. ASTM G151 "Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources".
21. ASTM G90 "Standard Practice for Performing Accelerated Outdoor Weathering of Materials Using Concentrated Natural Sunlight".
22. ASTM D2136 "Standard Test Method for Coated Fabrics—Low-Temperature Bend Test".
23. ASTM B308 "Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles".
24. AWS D1.1 "Structural Welding Code-Steel".
25. NFPA 701 "Standard Methods of Fire Tests for Flame Propagation of Textiles and Films".
26. RCSC's "Specification for Structural Joints Using High-Strength Bolts".

1.4 CODE COMPLIANCE

- A. Design of the Frame-Supported Membrane Building shall comply with requirements of the 2018 Virginia Construction Code (VCC), Part I of the Virginia Uniform Statewide Building Code, effective July 1, 2021. Include all load combinations in accordance with ASCE 7, latest edition. The structure shall be classified as Type IIB construction for non-combustible frame and membrane.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of building system component. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 1. Structural-framing system.
 2. Membrane fabric.
 3. Accessories.

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- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing. Indicate shop welds, and shop and field bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
 - 2. Accessory Drawings: Include details of the following items where applicable:
 - a. Louvers.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Membrane Fabric: Nominal 12 inches long by 12 inches wide.
 - 2. Metal Framing Members: Nominal 12 inches long.
 - 3. All accessories.
- D. Design Submittal: The frame-supported membrane building shall be designed by a Professional Engineer familiar with this type of structure. Calculations shall be prepared for the proposed design and submitted with the Shop Drawings. The calculations shall include structural reactions for all load combinations as identified in ASCE 7 including a summary of reactions for the worst case. Shop drawings, including the calculations, shall be signed and sealed by a professional engineer licensed in the Commonwealth of Virginia. Refer to the Structural Drawings for Engineering Design Criteria including load criteria in accordance with the VCC, additional load criteria, and deflection limits.
- E. Provide certification from the zinc application source that the galvanize specifications have been met.
- F. Maintenance Documents: Include parts list and maintenance schedule. Refer to Division 01 Specifications for presentation format.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified erector, manufacturer, and professional engineer.
- B. Welding certificates.
- C. Frame-supported Membrane Building System Certificates:
 - 1. Letter of Design Certification: Signed and sealed by a qualified professional engineer registered in the Commonwealth of Virginia. Include the following:
 - a. Name and location of Project.
 - b. Order number.
 - c. Project Code: (XXX-XXXXX-XXX).
 - d. Name of manufacturer.
 - e. Name of Contractor.
 - f. Building dimensions including width, length, height, and roof slope.
 - g. Indicate compliance with applicable standards for each building component, including edition dates of each standard.

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- h. Governing building code and year of edition.
 - i. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads.
 - j. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
 - k. Building-Use Category: Indicate category of building use and its effect on load importance factors.
 - D. Erector Certificates: For each product, from manufacturer.
 - E. Manufacturer Certificates: For each product, from manufacturer.
 - F. Material Test Reports: For each of the following products:
 - 1. Structural metal (steel or aluminum) including chemical and physical properties.
 - 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 - 4. Shop primers.
 - 5. Nonshrink grout.
 - G. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for membrane and water sealer coatings.
 - H. Source quality-control reports.
 - I. Field quality-control reports.
 - J. Warranties: Sample of special warranties.
- 1.7 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For metal framing and fabric membrane to include in maintenance manuals.
- 1.8 QUALITY ASSURANCE
- A. Manufacturer Qualifications: A qualified manufacturer.
 - 1. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer licensed in the Commonwealth of Virginia.
 - B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
 - C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code - Steel."

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PROTOTYPE DESIGN PROJECT CODE: 501-B1501-032**

- D. Structural Steel: Comply with ANSI / AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.
- E. Structural Aluminum: Comply with ASTM B429 "Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube".
- F. Fire-Resistance Ratings: Identify products with appropriate markings of applicable testing agency.
 - 1. Membrane:
 - a. NFPA 701 "Standard Methods of Fire Tests for Flame Propagation of Textiles and Films".
 - b. ASTM E84-2013A "Test Methods for Surface Burning Characteristics of Building Materials".

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, membrane, and other manufactured items so as not to be damaged or deformed. Package metal framing for protection during transportation and handling. At no time shall materials be dropped, thrown or dragged.
- B. Unload, store, and erect metal framing in a manner to prevent bending, twisting, and surface damage.
- C. Protect membrane from damage.
- D. Damaged galvanized finish shall be coated with two coats of galvanize repair paint.

1.10 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when weather conditions permit metal framing and membrane to be installed according to manufacturers' written instructions and warranty requirements.

1.11 COORDINATION

- A. Coordinate sizes and locations of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified on structural drawings.

1.12 WARRANTY

- A. Special Warranty on materials.
 - 1. The membrane shall have a minimum 15 year pro-rated warranty against cracking, water permeability, ultra-violet degradation, fading, ripping or puncturing (not caused by the Owner's use of the structure for its intended purpose).
 - 2. The galvanized steel and aluminum framing members shall have a minimum 15 year pro-rated warranty against corrosion, chipping, peeling, bending, warping, splitting, and the like (not caused by the Owner's use of the structure for its intended purpose).

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PROTOTYPE DESIGN PROJECT CODE: 501-B1501-032**

3. Special Project Unconditional Warranty: Unconditional 2-year warranty covering all parts and labor signed and countersigned by Installer/Erector and PMCS Contractor.
4. The manufacturer warrants that all materials are furnished new and of good quality, free from defect in material and workmanship and repairs and that the quality of the materials used shall be such that they conform to the performance requirements specified herein.
5. All warranty agreements shall be signed by authorized representative of the manufacturer.
6. All warranties shall start at Substantial Completion of the project.

1.13 TRAINING

- A. Manufacturer's representative shall conduct a minimum of two (2) hours training for VDOT personnel. Training shall include, but not limited to, adjustment of fabric tension and repair of minor damage to fabric.

PART 2 - PRODUCTS

2.1 FRAME-SUPPORTED MEMBRANE BUILDING SYSTEM PERFORMANCE

- A. Delegated Design: Design of frame-supported membrane building system, including comprehensive engineering analysis shall be accomplished by a qualified professional engineer, using performance requirements and design criteria applicable to building site location.

2.2 STRUCTURAL FRAMING

- A. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes clear-span structural tubing truss rafters; sidewall; and wind bracing.
 1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly.
 2. Frame Configuration: Arch or barrel shape that evenly distributes the stress over the membrane.
- B. Structure for fabric roof shall be hot-dipped galvanized steel framework (batch dip after fabrication) of the manufacturer's standard configuration and meeting the design constraints indicated on the drawings and specified herein. In addition, apply the following design constraints:
 1. Structure shall have a building width (W) to height of arch above top of wall (H) ratio (W/H ratio) of not less than 2.0 and not greater than 3.5.
 2. Structure shall be capable of withstanding the effects of a rainfall up to 4 inches per hour for at least two hours.
 3. Design for a maximum allowable deflection of 1/180 of the clear span width when subject to the design loads and subject to fabric membrane stresses.
 4. Foundation walls shall take into account lateral loads imposed on the walls whereby chemicals are loaded up to 10 feet with a 32 degree slope extending upward to the midpoint of the span.

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5. Load Combinations: Loads shall be applied acting simultaneously with concentrated loads according to the Virginia Uniform Statewide Building Code.
 6. Structure shall not be assumed to be rigid in both main axis.
- C. Provide temporary and permanent bracing, continuous bridging and truss bracing according with the manufacturer's standard details.
- D. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members.
- E. Bolts: Provide hot-dip galvanized bolts for structural-framing components.
- F. Steel Materials:
1. Cold-Formed Hollow Structural Sections: ASTM A500, structural tubing.
 - a. Finish: Hot-dip Galvanized Coating: ASTM A123 (batch dip after fabrication).
 2. Plate or Bar Stock: ASTM A36.
 - a. Finish: Hot-dip Galvanized Coating: ASTM A123 (batch dip after fabrication).
- G. High-Strength Bolts, Nuts, and Washers: ASTM F3125, Grade A325 Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH heavy-hex carbon-steel nuts; and ASTM F436, Type 1 hardened carbon-steel washers.
1. Finish: Hot-dip zinc coating, ASTM A153, Class C.
- H. Non-High-Strength Bolts, Nuts, and Washers: ASTM A307, Grade A carbon-steel, hex-head bolts; ASTM A563 carbon-steel hex nuts; and ASTM F844 (flat) steel washers.
1. Finish: Hot-dip zinc coating, ASTM A153, Class C.
- I. Headed Anchor Rods: ASTM F1554, Grade 55, hot-dip galvanized.
1. Nuts: ASTM A563 heavy-hex carbon steel.
 2. Plate Washers: ASTM A36 carbon steel.
 3. Washers: ASTM F436 hardened carbon steel.
 4. Finish: Hot-dip zinc coating, ASTM A153, Class C.
- J. Aluminum Materials:
1. Aluminum structural components shall be 6061-T6 aluminum alloy: ASTM B308.
 2. Alloy and temper designations shall be in accordance with ANSI H35.1.

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2.3 MEMBRANE ROOF COVERING

- A. Description: The membrane covering shall be fabricated in sections that permit ease of future replacement in sections rather than as one unit. Membrane sections shall overlap to prevent infiltration of water.
- B. Fabric membrane shall not be used to brace the structure.
- C. Fabric shall be non-combustible as set forth in VCC Section 703.5 or meet the fire propagation performance criteria of NFPA 701 and the manufacturer's test protocol in accordance with VCC Section 3102.3.1.
- D. Roof covering shall be a Class C roof assembly per VCC Section 1505.
- E. The membrane fabric shall be UV stabilized, puncture and tear resistant and crack resistant in temperatures down to -67 degrees F.
- F. Materials: The following membrane material will be minimum acceptable for installation over the structural metal frame:

FABRIC TYPE	PVC COATED POLYESTER
Unit weight (oz./sy)	28
Tensile Grab Strength ASTM D751 (lbf)	700
Tongue Tear ASTM D751 (lbf)	275
Trapezoidal Tear ASTM D4533 (lbf)	85

2.4 LOUVERS

- A. Storm-resistant louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L. Wind loads shall be determined based on a uniform pressure listed in the table below in accordance with the site-specific building size and wind speed region, acting inward or outward.
- 4 inches deep, 0.081 inch thick extruded aluminum in accordance with ASTM B 221, Alloy 6063-T5, T-52, or T6.
 - Finish: Kynar, color to match color of building fabric as selected from the manufacturer's full range of colors.

Components and Cladding Wind Pressure for Louvers		
Building	115 MPH Wind Speed Region	130 MPH Wind Speed Region
1000 TON	44 PSF	56 PSF
3000 TON	45 PSF	57 PSF
5000 TON	42 PSF	54 PSF
7000 TON	43 PSF	54 PSF
8000 TON	43 PSF	54 PSF

2.5 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to evaluate product.

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- B. Special Inspector: Owner will engage a qualified special inspector to perform tests and inspections and to submit reports based upon inspection required by the VCC, Site Adaptation Section 014000 Quality Control Services, and as follows. Special inspector will verify that manufacturer maintains detailed fabrication and quality-control procedures and will review the completeness and adequacy of those procedures to perform the Work.
- C. Testing: Test and inspect shop connections for metal buildings according to the following:
 - 1. Bolted Connections: Shop-bolted connections shall be inspected according to RCSC's "Specification for Structural Joints Using High Strength Bolts".
 - 2. Welded Connections: In addition to visual inspection, shop-welded connections shall be tested and inspected according to AWS D1.1.
- D. Product will be considered defective if it does not pass tests and inspections.

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in manufacturer's unopened bundles or containers with labels intact.
- B. Handle and store materials at project site to prevent water damage, staining, or other physical damage. Comply with manufacturer's recommendations for job-site storage, handling, and protection.

3.2 EXAMINATION

- A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Before erection proceeds, verify elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.
- C. Proceed with erection only after unsatisfactory conditions have been corrected.
- D. Wall mounting plates shall have full contact with the wall surface.

3.3 ERECTION OF STRUCTURAL FRAMING

- A. Erect frame-supported membrane building according to manufacturer's written erection instructions and erection drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

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- C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.
- E. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line.
 - 1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using High Strength Bolts" for bolt type and joint type specified.
- F. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
- G. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
 - 1. Tighten rod and cable bracing to avoid sag.

3.4 MEMBRANE INSTALLATION, GENERAL

- A. Examination: Examine primary and secondary framing to verify that membrane support members and anchorages have been installed within alignment tolerances required by manufacturer.
- B. Anchor membrane securely and tightly in place with provisions for thermal and structural movement.
- C. General: Anchor membrane panels and other components of the Work securely in place, with provisions for thermal and structural movement.

3.5 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with other components.
- B. Louvers: Locate and place louver units level, plumb, and at indicated alignment with adjacent work.

3.6 CLEANING AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.

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- B. Louvers: Clean exposed surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.
 - 1. Restore louvers damaged during installation and construction period so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect/Engineer, remove damaged units and replace with new units.

3.7 TRAINING

- A. Conduct training at a mutually agreed upon time. Obtain signatures of trainees and submit as part of the closeout documentation.

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				OWNER'S TEST LAB	A/E OF RECORD	SMOKE CONTROL	PROJECT INSPECTOR	CONTRACTOR / SUPPLIER
FOUNDATIONS								
Soil	Classify & Test Existing Soils & Fill Materials	X	Specs, 1705.6	X (Spot)				
Soil	Compaction Of Fill Materials	X	Specs, 1705.6	X				
Soil	Bearing At Bottom Of Footing Excavations	X	Specs, 1705.6	X (Spot)				
Piles	Driving Records, Tip & Cutoff Elevations		1705.7, 1705.9	X	4			
Piles	Load Test		1705.7	X	4			
Caissons	Drilling, Size, Bearing Conditions, Materials		1705.8, 1705.3	X				
	VDOT Prototype Chemical Storage Building							
CONCRETE CONSTRUCTION								
Concrete	Ready-Mix Plant Quality Control	X	Specs, 1704.2.5		2			X, 1
Concrete	Mix Design Tests And Certificates	X	Specs, 1705.3		X			X, 1
Reinf. Steel	Shop Drawings Of Reinforcing Steel	X	Specs		X			
Reinf. Steel	Placement Of Reinforcing Steel	X	1705.3	X (Spot)	X (Spot)		X	
Reinf. Steel	Welding		1705.3.1	X (Spot)	2			X,1
Reinf. Steel	Special Construction		1704.5.7		2			
Formwork	Shape, Location, Dimensions	X	1705.3	X (Spot)			X	X
Formwork	Removal and Reshoring	X	1705.3	X (Spot)				
Concrete	Test Cylinders & Strength Test	X	1705.3, 1910.10	X	4			
Concrete	Mix Proportions & Mix On Delivery Tickets	X	1705.3				X (Spot)	
Concrete	Slump Test	X	1705.3	X	4		X	
Concrete	Placement Procedures	X	1705.3	X	X (Spot)		X (Spot)	
Concrete	Curing Temperatures & Techniques	X	1705.3	X			X	
Prestressed	Prestressing Procedures & Forces		1705.3	X	2			X,1
Prestressed	Shop Drawings Of Prestressed Units		Specs		X			
Precast	Quality Control Of Manufacturer		1704.2.5		2			X, 1
Precast	Shop Drawings Of Precast		Specs		X			
Precast	Erection Of Precast		1705.3	X (Spot)	X (Spot)		X	X
Precast	Inspection Of Connections		1705.3	X (Spot)				
Shotcrete	Reinforcing Steel-Test Panel		1908.5, 1705.3	X	4			
Anchors	Anchors In Concrete	X	Specs, 1705.3, 1901.3	X				

* The numbers listed refer to notes on Page 5.

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				OWNER'S TEST LAB	A/E OF RECORD	SMOKE CONTROL	PROJECT INSPECTOR	CONTRACTOR / SUPPLIER
MASONRY CONSTRUCTION								
Quality Assurance	Indicate Quality Assurance Level (A, B or C)		TMS 402, 1.19.1, 2, 3		X			
Clay Masonry	Certificates, Tests & Technical Data		TMS 402, Table 1.19.1	X (Spot)	X			3
Concrete Masonry	Certificates, Tests & Technical Data		TMS 402, Table 1.19.1	X (Spot)	X			3
Reinf. Steel	Shop Drawings		Specs		X			
Reinf. Steel	Size, Grade, Type, Location, Spacing Of Reinf Steel		Tables 1.19.1, 2	X (Spot)				
Anchors	Manufacturer's Data		Tables 1.19.1, 2	X (Spot)	X			3
Accessories	Manufacturer's Data		Specs		X			3
Mortar & Grout	Mix Design And Data		Specs		X			3
Mortar & Grout	Field Samples and Testing, Placement		TMS 402, Tbls 1.19.1, 2	X (Spot)	4			
Masonry Strength	Masonry Strength Verified		TMS 402.1	X	2, 4			
Masonry	Placement Of Units, Mortar & Accessories		TMS 402, Table 1.19.2	X (Spot)				
Masonry	Protection Of Masonry Work		TMS 402, Table 1.19.2	X (Spot)				
Anchorage	Placement Of Devices		TMS 402, Table 1.19.2	X (Spot)				
Risk Cat. IV	A/E Shall edit list as required by ACI 530		Tables 1.19.2, 1.19.3		X			
STEEL CONSTRUCTION								
Fabricator	Quality Control Inspection Of Shop	X	1704.2.5		2			X, 1
Fasteners	Mfr's Certificate Of Compliance	X	AISC 360-16		2			3
Struct. Steel	Mfr's Certificate Of Compliance	X	AISC 360-16		2			3
Weld Mat'l's	Manufacturer's Certificate Of Compliance	X	AISC 360-16		2			3
Metal Decking	Welding to Supports		1705.2.2	X (Spot)				
Metal Decking	Manufacturer's Certificate Of Compliance		1705.2.2		2			3
Joist	Mrf's Certificate of Compliance		1704.5.5		2			3
Joist	Open Web Steel Joists-End Connections and Bridging		1705.2.3	X (Spot)				
Details	Shop Drawings Review	X	Specs		X			
Erection	Installation Of High-Strength Bolts	X	AISC 360-16	X (Spot)				
Erection	Welding		AISC 360-16	X (Spot)				
Erection	Steel Framing And Connections	X	AISC 360-16	X (Spot)	X (Spot)		X	

* The numbers listed refer to notes on Page 5.

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				OWNER'S TEST LAB	A/E OF RECORD	SMOKE CONTROL	PROJECT INSPECTOR	CONTRACTOR / SUPPLIER
SEISMIC FORCE RESISTANCE INSPECTIONS (as required by VUSBC 1705.12)								
(Note: SDC refers to Seismic Design Category.)								
Structural Steel	Welding and Bolting (SDC = B or C or D)		1705.12.1, AISC 341	X (Spot)				
Wood	Field Glueing (SDC = C or D)		1705.12.2	X				
Wood	Fastening Of Seismic Force Resistance System (SDC = C or D)		1705.12.2	X (Spot)			X	
Light Gage Steel	Fastening (SDC = C or D)		1705.12.3	X (Spot)			X	
Light Gage Steel	Special Bolted Moment Frames (SDC = D)		1705.12.9	X (Spot)				
Components	Mechanical & Electrical - Anchorage and Labeling (SDC = C or D)		1705.12.4, 1705.12.6	X (Spot)				
Components	Architectural - Cladding, Veneer, Non-Bearing Walls (SDC = D)		1705.12.5	X (Spot)				
Components	Access Floors (SDC = D)		1705.12.5.1	X (Spot)				
Components	Storage Racks (SDC = D)		1705.12.7	X (Spot)				
SEISMIC RESISTANCE TESTING (as required by VUSBC 1705.13)								
Structural Steel	Steel Systems and Elements		1705.13.1, AISC 341					
Non-Structural	Components-Mfr's Certificate of Compliance		1705.13.2		2			3
Non-Structural	Designated Systems-Certificate of Compliance		1705.13.3		2			3
Structural	Isolation Systems		1705.13.4	X				
WOOD & LIGHT GAGE STEEL CONSTRUCTION								
Fabrication	Quality Control Inspection Of Shop		1704.2.5		2			X, 1
Sheathing	Grade Stamp, Thickness & Fastening		Specs, 1703.5	X	X (Spot)		X	
Wood	Grade Stamp		Specs, 1703.5		X (Spot)		X	
Wood/Light Gage	Diaphragm Fastening Per Code And Drawings		1705.2.2, 1705.5.1	X (Spot)	X (Spot)		X	
Trusses	Shop Drawings		Specs		X			
Trusses	Truss Placement, Bracing and Fastening & Anchorage		Specs, 1705.2.4, 1705.5.2		X (Spot)		X	
Laminates	Shop Drawings		Specs		X			
Laminates	Identification Per Shop Drawings		Specs		X (Spot)		X	

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FIREPROOFING								
Spray-on	Manufacturer's Data		Specs		X			3
Spray-on	Surface Conditions		1705.14.2	X				
Spray-on	Application		1705.14.3	X				3
Spray-on	Thickness		1705.14.4	X				
Spray-on	Density		1705.14.5	X				
Spray-on	Bond Strength		1705.14.6	X				
Mastic/Intumescent	Fire-Resistant Coatings - Materials, Application		1705.15	X	X (Spot)		X	3
GWB Fireproof	Manufacturer's Data		Specs		X			3
GWB Fireproof	Placement Of Materials		Specs		X (Spot)		X	
Fire Wall Assembly	Manufacturer's Data		Specs, 706.2		X			3
Fire Wall Assembly	Placement Of Materials		Specs, 706.2		X (Spot)		X	
EXTERIOR INSULATION & FINISH SYSTEMS (EIFS)								
Materials	Manufacturer's Data		Specs		X			3
Preparation	Condition Of Sheathing Substrate		Specs, 1705.16.1		X (Spot)		X	
Application	Methods, Proportions & Thickness Of Installation		Specs, 1705.16.1	X (Spot)	X (Spot)		X	
SMOKE CONTROL (see note 5)								
Ducts	Device Location And Air Duct Leakage		1705.18.1			X		
System	Pressure Difference, Flow Measurements & Detection Testing		1705.18.1			X		
Controls	Activation Sequence		1705.18.1			X		

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NOTES:

1. Fabricator, supplier, ready-mixed plant or other production plant shall provide certificates from an approved independent inspection, testing or quality assurance agency attesting that the plant meets at least one of the following criteria:
 - a. The plant is a certified production plant meeting the quality assurance standards of a recognized national standards organization for that product.
 - b. The plant maintains an agreement with an independent inspection or quality assurance agency to conduct periodic in-plant quality assurance inspections. The frequency of these inspections shall not be less than one every six months.
 - c. The plant has an in-shop quality assurance inspection program by an independent testing or quality assurance agency for the work/product to be provided on this project.
2. A/E shall review fabricator/supplier/producer certificates for conformance with appropriate standards of practice and quality assurance.
3. Contractor/supplier shall submit manufacturer's certificates of compliance for the materials/products.
4. Reviews records and test results for conformance with requirements.
5. Special Inspection firm shall have expertise in fire protection engineering, mechanical engineering, and certification as an air balancer. The special inspector listed on the cover page and the Agency are responsible for verifying that the inspector (s) for smoke control is qualified as required by VUSBC 1705.18.2.
6. Unless noted otherwise, the reference numbers listed refer to the 2018 VUSBC.

* The numbers listed refer to notes on Page 5.

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END OF SECTION 133421

**AIRPORT AHQ CHEMICAL STORAGE BUILDING
SALEM DISTRICT**

APPENDIX D



Specification Section 107.16(a) contained in the following **Administrative Services Division – Capital Outlay Program Special Provision for Stormwater Pollution Prevention Plan (SWPPP)** requires that the Contractor have within the limits of the project, during land disturbance activities, an employee certified through the VDOT Erosion and Sediment Control Contractor Certification (ESCCC) Program. The ESCCC program course and examination is offered by several organizations, in conjunction with the VDOT. The program course is a one day class scheduled throughout the state at varying times during the year. The schedule for upcoming program courses is available at the following website: http://www.vdot.virginia.gov/business/locdes/ms4_stormwater_management.asp. Completion and submission of the Form C-45 - Stormwater Pollution Prevention Plan (SWPPP) and the Virginia Pollutant Discharge Elimination System (VPDES) General Permit for the Discharge of Stormwater from Construction Activities – Contractor Certification Statement, included in this special provision, shall be required prior to award of a contract for this project. This completed and certified form must be provided along with the performance and payment bonds required by the terms and conditions of the contract documents.



ADMINISTRATIVE SERVICES DIVISION – CAPITAL OUTLAY PROGRAM
SPECIAL PROVISION FOR STORMWATER POLLUTION PREVENTION PLAN
(SWPPP)

July 1, 2016

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Virginia Stormwater Management Program (18 pages)	IIM-LD-242.5
Stormwater Pollution Prevention Plan (13 pages)	IIM-LD-246.3

GENERAL INFORMATION SHEET(s)

See Drawings	See List of Drawings for Sheet(s) #
--------------	-------------------------------------

VIRGINIA DEPARTMENT OF TRANSPORTATION

STORMWATER POLLUTION PREVENTION PLAN (SWPPP) AND THE VIRGINIA POLLUTANT DISCHARGE ELIMINATION SYSTEM (VPDES) GENERAL PERMIT FOR THE DISCHARGE OF STORMWATER FROM CONSTRUCTION ACTIVITIES

CONTRACTOR CERTIFICATION STATEMENT

Order No.: _____ Project Number: _____
Route: _____ Contract ID. #: _____

I certify under penalty of law that I understand the terms and conditions of the project contract, plans, permits, specifications and standards related to the erosion and sediment control, stormwater management and stormwater pollution prevention plan requirements for the affected activities associated with this project, and the requirements of the VPDES General Permit for the Discharge of Stormwater from Construction Activities (the VPDES Construction Permit), if applicable to this project, issued by the Virginia Department of Environmental Quality. The VPDES Construction Permit authorizes the storm water discharges associated with the construction activities from the project site identified and described in the bid documents and subsequent contract including any onsite or off-site support facility areas located within VDOT right of way or easement and required for the complete fulfillment of the work therein.

Signature: _____

Name: _____

Title: _____

Contracting Firm: _____

Address: _____

Phone Number: _____

* Project Address/Location: _____

Certified on this date: _____

* Include any off-site support facility areas located within VDOT right of way or easement.

(Note: This form must be returned with performance and payment bonds)

**CONSTRUCTION RUNOFF CONTROL INSPECTION FORM (CRCIF)
C-107 CONTRACTOR INSPECTION SHEET**



Project Name/ID _____ UPC _____
Contractor _____
Inspection Date _____

Type of Inspection: (Check Appropriate Block)

- (1) After Measurable Storm Event ☐ Estimated Total Rainfall of Storm Event - _____ inches
(2) Schedule 1: (7 Calendar Days/5 Business Days) ☐ (3) Schedule 2: (Monday and Thursday/ 4 Business Days) ☐
(4) Monthly Schedule ☐
(5) ☐ Other Describe: _____

Weather Conditions (At Time of Inspection) (Check All Appropriate)

Clear ☐ Sunny ☐ Partly Cloudy ☐ Cloudy ☐
Cold ☐ Cool ☐ Mild ☐ Hot ☐

Is there any discharge occurring from construction site at time of inspection?

Yes ☐ No ☐

If yes, is discharge compliant with the Erosion and Sediment Control Regulation and VPDES Construction Permit Requirements?

Yes ☐ No ☐

If no, describe conditions of discharge: _____

ITEM #	ESC INSPECTION QUESTIONS	N/A ¹	YES ²	NO ³
1	Have stabilization activities been initiated on all disturbed areas that have reached final grade or that will remain dormant for more than 14 days?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Have stabilization activities been completed within 7 days of initiation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Have disposal/borrow and soil stockpiles areas been stabilized and/or protected with sediment trapping measures?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Have perimeter controls been constructed as a first step prior to initiation of land disturbing activities (including clearing or grubbing)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Are perimeter and other erosion and sediment control structures and systems being maintained, inspected and repaired, as necessary, to ensure functionality?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Have all land-disturbing activities occurred within the approved ESC plan area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Have earthen structures, such as dams, dikes, and diversions, been immediately stabilized upon installation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Have sediment basins and traps been constructed according to plans, specifications, and/or standards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Are all cut and fill slopes at final grade adequately stabilized?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Is concentrated water flowing through adequate slope drains, flumes, or other non-erodible conveyances on cut or fill slopes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Is stormwater runoff containing sediment or turbidity being properly treated prior to discharge?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Where water seeps from slope faces, has adequate drainage or erosion protection been provided?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Do all operational storm sewer and culvert inlets have inlet protection in accordance with plans, specifications, and/or standards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Are constructed stormwater conveyance channels and ditches stabilized with appropriate channel lining and/or outlet protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Is in-stream construction being conducted using measures to minimize channel impacts?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Are temporary stream crossings of non-erodible material installed at locations where construction equipment must cross?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Are all water quality permit requirements being adhered to?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Is re-stabilization of in-stream construction areas complete before leaving the site?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Are utility trenches stabilized properly according to the specifications?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Is effluent from dewatering operations being filtered (including in-stream structure dewatering)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Are construction entrances installed at appropriate locations and being maintained properly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Is any sediment tracking on public roadways cleaned-up at the end of each work day?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ITEM #	ESC INSPECTION QUESTIONS (CONTINUED)	N/A ¹	YES ²	NO ³
23	Have all temporary ESC measures that are no longer needed been removed and have all such areas been re-graded, as necessary, and stabilized?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	Are properties and waterways adjacent to the project site being adequately protected from accidental land disturbance, potential pollutant discharge, erosion, flooding, and sedimentation from the project site?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	Are all discharges from the construction site allowable under the VPDES construction permit?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	Are all ESC deficiencies from previous reports being addressed within allowable/established time frames?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	Is the location of the on-site rain gage identified on the record set of plans or in other appropriate SWPPP documents?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	Is the data from the daily observations of the rain gage being documented and included in the SWPPP in accordance with the Specifications and/or the SWPPP GIS?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ITEM #	POLLUTION PREVENTION (P2) INSPECTION QUESTIONS	N/A ¹	YES ²	NO ³
29	Have all potential pollutant generating activities present on the site been identified in the SWPPP and addressed with an approved Pollution Prevention Plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30	Is the person or contractor responsible for implementing and maintaining the pollution prevention practices for each potential pollutant generating support activity identified in the approved Pollution Prevention Plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31	Has pollution prevention awareness been provided to appropriate personnel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32	Are chemicals being properly stored (e.g., under cover or within secondary containment) and handled?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33	Are storage containers labeled to describe contents?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34	Are construction products, materials, and wastes being properly stored, handled, and disposed of?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35	Is the site absent of loose or uncontrolled trash and debris?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36	Is the site absent of spills, leaks, or stains (e.g., from hydraulic hoses, vehicle/equipment maintenance and fueling operations, etc.)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37	Are chemicals, soaps, solvents, and wash water from construction materials (e.g., from release oils and curing compounds from hand tools) prevented from leaving the site?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38	Is vehicle wash water free of soaps/detergents and properly treated before leaving the site?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39	Is concrete wash-out being directed into a properly installed leak-proof container or leak-proof settling basin?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40	Are concrete wash-out areas being properly maintained and utilized?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41	Are all other unauthorized non-stormwater discharges prevented from leaving the site (including untreated dust control water)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42	Are all P2 deficiencies from previous reports being addressed within allowable/established time frames?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ITEM #	SWPPP UPDATE AND MODIFICATION QUESTIONS	N/A ¹	YES ²	NO ³
43	Is the SWPPP being modified, amended and updated in accordance with the specifications and/or the SWPPP GIS?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44	Is a record set of plans being maintained and updated to document SWPPP changes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45	Are modifications, amendments or updates to the SWPPP being signed by the contractor and VDOT?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1 – N/A: Not Applicable

2 – YES: All related contract items, requirements, plans, specifications, standards, and permits pertaining to this question are being satisfied

3 – NO: See Note 1 on Sheet 4

By signing below, those persons doing so certify that the C-107 has been completed based on the actual field conditions at the time of the inspection and accurately reflects those conditions. Where no deficiencies have been identified, those signing below further certify that the construction activity is in compliance with the SWPPP and the VPDES Construction General Permit. It is encouraged that photos be taken to support findings.

CONTRACTOR: See Note 2 on Sheet 4				
	Name of ESCCC Person	Signature of ESCCC Person	Certification Number	Date
VDOT: See Note 3 on Sheet 4				
	Name of VDOT Certified Inspector	VDOT Certified Inspector Signature	Certification Number(s)	Date

Provide copies to 1.) the Contractor, 2.) the VDOT Project Inspector and 3.) the Project Engineer/ RLD (See Note 4 on Sheet 4)

**CONSTRUCTION RUNOFF CONTROL INSPECTION FORM (CRCIF)
C-107 DEFICIENCY DESCRIPTION SHEET**



Project Name/ID _____ UPC _____
Contractor _____
Inspection Date _____

ITEM #	STATION	DESCRIPTION OF PROBLEM, LOCATION, AND RECOMMENDED CORRECTIVE ACTION (SEE NOTE 5)	DATE TO BE CORRECTED BY	DATE CORRECTIVE ACTION COMPLETED

CONSTRUCTION RUNOFF CONTROL INSPECTION FORM (CRCIF)
C-107 NOTES AND ACRONYMS SHEET



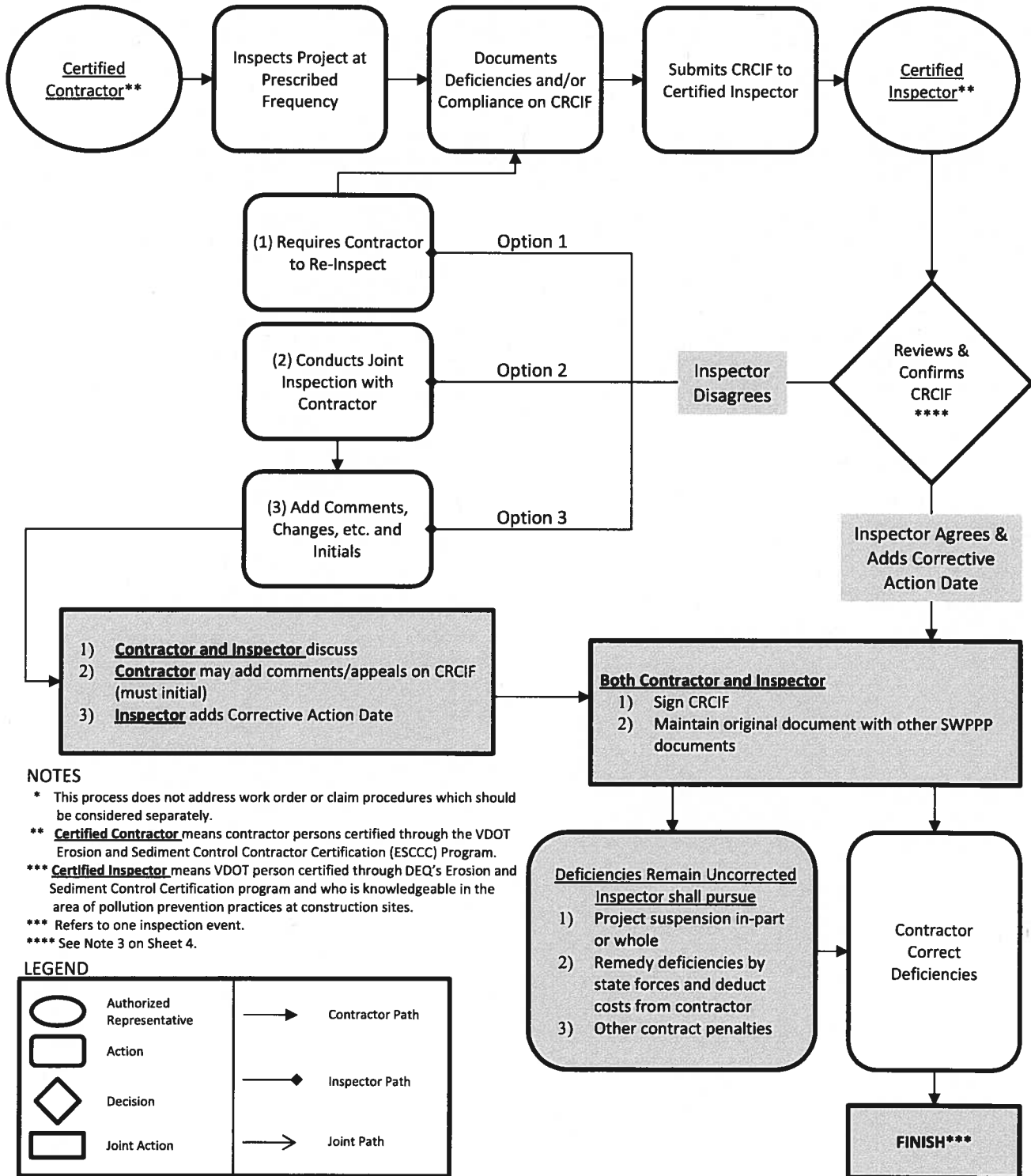
NOTES

1. If any "No" boxes are checked on the "Inspection Questions List" on Part I or if any other deficiencies of a contract specification plan item or SWPPP requirement is noted, the C-107 Deficiency Description Sheet is to be used to document the specifics of the deficiency. The description of the deficiency must contain (1) the permit condition deficiency, if applicable, (2) a description of the deficiency, (3) a corrective action deadline (should be as soon as practical and prior to the next anticipated measurable storm event but no later than seven days after the date of the site inspection that identified the deficiency) and (4) a recommended solution or approach. If this is a follow-up inspection, previous deficiencies that have been corrected must be documented as such. If conformity to specifications and plans is being achieved but the site conditions indicate that plan or specification adjustments may be needed to address environmental concerns, such conditions should be immediately referred to the designated Responsible Land Disturber (RLD) for resolution.
2. The Part I inspection and report is to be completed in accordance with the inspection schedule in the specifications and signed and submitted by a Contractor employee who is certified in accordance with VDOT R&B Specification 107.16(a).
3. The Part I report is to be accepted, confirmed and signed by a VDOT employee or a consultant inspector working directly for VDOT on a CEI services contract who is certified by DEQ as an Inspector for ESC and who is knowledgeable in the area of pollution prevention practices at construction sites. Confirmation shall be in the form of a joint inspection with the Contractor ESCCC employee or an independent inspection by the VDOT Certified Inspector.
4. All original completed C-107 Forms are to be maintained with the other SWPPP documents for the land disturbing activity. Copies of this report are to be provided to the Contractor, the VDOT Project Inspector and the Project Engineer/ RLD.
5. For Part I, non-compliant, non-compliance, or deficient is defined as documented evidence of (1) off-site damage in the form of sedimentation, unauthorized dewatering or pollutant discharge, erosion, flooding, encroachment outside of the project/permit limits, or a permit condition deficiency, (2) on-site damage in the form of significant erosion, flooding, sedimentation or uncontrolled pollution discharge, or (3) a previous deficiency that has not been corrected within the specified timeframe.
6. For the purposes of this document, a day is a calendar day unless otherwise stated.
7. The weekly inspection schedule in Special Provision S107J30 dated 9/3/14 is the same as a Schedule 1 on this form. When performing inspections in accordance with the weekly schedule in S107J30 dated 09/3/14, check the Schedule 1 box on this form.

ACRONYMS

ACE	Area Construction Engineer
CEI	Construction, Engineering and Inspection
CRCIF	Construction Runoff Control Inspection Form
DEQ	Virginia Department of Environmental Quality
ESC	Erosion and Sediment Control
ESCCCC	Erosion and Sediment Control Contractor Certification
GIS	General Information Sheet
MS	Minimum Standard
P2	Pollution Prevention
R&B	Road & Bridge
RLD	Responsible Land Disturber
SWM	Stormwater Management
SWPPP	Stormwater Pollution Prevention Plan
VAC	Virginia Administrative Code
VDOT	Virginia Department of Transportation
VESCR	Virginia Erosion and Sediment Control Regulations
VPDES	Virginia Pollutant Discharge Elimination System
VSMP	Virginia Stormwater Management Program

CONSTRUCTION RUNOFF CONTROL INSPECTION FORM (CRCIF)
C-107 CHAIN OF DOCUMENTED COMMUNICATION*



CONSTRUCTION RUNOFF CONTROL INSPECTION FORM (CRCIF)
C-107 VDOT INSPECTION SHEET

Project Name/ID _____ UPC _____

Contractor _____

Inspection Date _____
(See Note 5 on Sheet 2)

ITEM #	INSPECTION QUESTIONS	N/A	YES	NO
1	Is a copy of the signed VPDES Construction Permit coverage letter in the SWPPP?*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Is a copy of the VPDES General Permit For Discharges Of Stormwater from Construction Activities contained in the SWPPP?*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Are copies of the LD-445 and LD-445E forms contained in the SWPPP?*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Is a copy of the LD445A form completed and posted in accordance with the SWPPP GIS requirements?*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Are all ESC and P2 inspections being performed, recorded and documented in accordance with the specifications?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Are corrective actions being identified, performed and documented in accordance with the specifications?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Have enforcement actions been taken?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	If answer yes to #7, has documentation of enforcement actions been included in the SWPPP?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ITEM #	STATION	DESCRIPTION OF PROBLEM, LOCATION, AND RECOMMENDED CORRECTIVE ACTION (NOTE 4)	DATE TO BE CORRECTED BY	DATE CORRECTIVE ACTION COMPLETED

VDOT: See Note 3 on Sheet 2				
	Name of VDOT ACE	VDOT ACE Signature		Date
VDOT: See Note 3 on Sheet 2				
	Name of VDOT Delegated Authority	VDOT Delegated Authority Signature	Certification Number(s)	Date

Provide copies to 1.) the Contractor, 2.) the VDOT Project Inspector and 3.) the Project Engineer/ RLD (See Note 2 on Sheet 2)

CONSTRUCTION RUNOFF CONTROL INSPECTION FORM (CRCIF)
C-107 NOTES AND ACRONYMS SHEET



NOTES

- * Applies only to projects with coverage under the VPDES Construction General Permit.
- 1. All original completed C-107 Forms are to be maintained with the other SWPPP documents for the land disturbing activity.
- 2. Copies of this report are to be provided to the Contractor, the VDOT Project Inspector and the Project Engineer/RLD.
- 3. The Part II inspection and report is to be completed and signed by the VDOT ACE. The ACE may delegate this responsibility to another VDOT employee or consultant inspector working directly for VDOT on a CEI services contract provided 1) the delegation is in writing, 2) the delegated person is not the same person that signs the C-107 Part I form and 3) the delegated person is certified by DEQ as an Inspector for ESC and is knowledgeable in the area of pollution prevention practices at construction sites.
- 4. If any "No" boxes are checked on the "Inspection Questions List" on Part II or if any other deficiencies of a contract specification plan item or SWPPP requirement is noted, the Deficiency Description Table is to be completed to document the specifics of the deficiency. The description of the deficiency must contain (1) the permit condition deficiency, if applicable, (2) a description of the deficiency, (3) a corrective action deadline (should be as soon as practical and prior to the next anticipated measurable storm event but no later than seven days after the date of the site inspection that identified the deficiency) and (4) a recommended solution or approach. If this is a follow-up inspection, previously addressed deficiencies that have been corrected must be documented as such.
- 5. The C107 Part II shall be completed at the initiation of the land disturbing activity and every 60 days thereafter until termination of the VPDES Construction General Permit coverage.

ACRONYMS

ACE	Area Construction Engineer
CEI	Construction, Engineering and Inspection
CRCIF	Construction Runoff Control Inspection Form
ESC	Erosion and Sediment Control
GIS	General Information Sheet
P2	Pollution Prevention
R&B	Road & Bridge
RLD	Responsible Land Disturber
SWM	Stormwater Management
SWPPP	Stormwater Pollution Prevention Plan
VDOT	Virginia Department of Transportation
VPDES	Virginia Pollutant Discharge Elimination System

VIRGINIA DEPARTMENT OF TRANSPORTATION
LOCATION AND DESIGN
VPDES CONSTRUCTION PERMIT REGISTRATION INFORMATION
AND
CHESAPEAKE BAY PRESERVATION ACT PROJECT INFORMATION ⁽⁹⁾

CONSTRUCTION ACTIVITIES

1) Registration Information:

Date:		UPC #:	
Project #:		<input type="checkbox"/> LD-445B and LD-445C must be submitted with this form	

2) Project Location:

District:		Latitude: ⁽¹⁾	
Residency:		Longitude: ⁽¹⁾	
County/City:			

3) Project Time Frame:

Estimated project start date:	
Estimated project finish date:	

4) Support Activities: ⁽²⁾

Is this activity being used to support another permitted project? Yes <input type="checkbox"/> or No <input type="checkbox"/>	
If yes, provide the following for the primary project:	
UPC#:	
VAR10#:	

5) Project Site: ⁽³⁾

Total land development area (to the nearest one hundredth acre):	
Disturbed area within the total land development area (to the nearest one hundredth acre):	

6) SWM Technical Criteria: ⁽⁴⁾

Type of SWM Technical Criteria	Drop Down Selection
--------------------------------	---------------------

7) Receiving Waters

Receiving Waters ⁽⁵⁾	HUC ⁽⁶⁾

8) Municipal Separate Storm Sewer System (MS4) Considerations⁽⁷⁾

Is this project located within a MS4 area? Yes <input type="checkbox"/> or No <input type="checkbox"/>	
If yes; Is the project discharging through a MS4 system? Yes <input type="checkbox"/> or No <input type="checkbox"/>	
If yes; name of MS4 operator:	

9) Fees, Funding, and Costs:

Application fee (\$):	Drop Down Selection
-----------------------	---------------------

10) Certification Statement:

<input type="checkbox"/> By checking this box, the person named below certifies that they understand this LD-445 form and that this document and all attachments were prepared in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. The information submitted is to the best of their knowledge and belief true, accurate and complete.			
Printed Name ⁽⁸⁾ :			
Title:		Date:	

Instructional Notes for VPDES Construction Permit Registration Information Form LD-445

Note ⁽¹⁾: Latitude and Longitude: In decimal degrees to the nearest one ten-thousandth of a degree at the approximate center of the project.

Note ⁽²⁾: Support Activities: This section is used to associate a separately permitted support facility with the primary project. If the registration information is for the primary construction project, this section is not applicable.

Note ⁽³⁾: Project Site: Enter the Total Land Area of Development and the Area to be Disturbed within the Total Land Area of Development of the construction activity to the nearest one-hundredth acre. See Section 3.0 in [IIM-LD-242](#) for Area definitions.

Note ⁽⁴⁾: SWM Technical Criteria: Select either Part IIB or Part IIC as listed on the SWPPP information sheet.

Note ⁽⁵⁾: Receiving Waters: List the nearest surface water that receives direct storm water discharge from the project. If the storm water directly discharges to an unnamed stream list "Unnamed Tributary to (insert the closest named stream)". There are different ways to obtain this information that include: Terrain Navigator Pro, GIS Integrator, CEDAR and DEQ's method located at the [middle of this web page](#).

Note ⁽⁶⁾: Hydrologic Unit Code: HUC means a watershed unit established in the most recent version of Virginia's 6th Order National Watershed Boundary Dataset. Example: Y027. See the Virginia Hydrologic Unit Explorer [here](#).

Note ⁽⁷⁾: MS-4: This requirement is to list all MS4 operators receiving direct runoff from the land-disturbing activity. The discharge point is defined as the location where concentrated surface runoff exits the land-disturbing activity, right-of-way or easement.

- Step 1: Determine if the project is within a MS4 area.
 - Regardless of jurisdiction, only the Census Urban Areas are regulated MS4 areas.
 - To locate the census urban areas in the VDOT GIS Integrator; key [integrator](#) into the address bar of InsideVDOT. Navigate to the project site by the Navigation Joystick, UPC or by latitude and longitude. For UPC: Select *Search*, and then *UPC*. For Lat & Long: Select *Search*, and then *Lat/Long*, then *Zoom to Lat/Long*. Enter the values and select *Zoom*. Once at the project site: In the Layers tab, expand *Civil Infrastructure* in the *NonVDOTLayers*. Toggle on *Census Urban Areas* to find any areas shaded with red dots. Right click on the shaded area and select *Identify Visible Layers*. Select *Census Urban Areas* at the top of the information box. Scroll down to *NAMELSAD10*. If this line reads *VA Urbanized Area*, it is a MS4 area. If it reads *VA Urban Cluster*, it is NOT a MS4 area.
 - Reminder: Arlington and Henrico Counties own and operate their own secondary road system. VDOT owns and operates the primary and interstate road systems in all jurisdictions.
- Step 2: Determine the MS4 operator's name. A listing is found at the bottom of DEQ's web page [here](#).
- Step 3: Review the plans for discharge points into a system (ditches, storm sewer) owned and operated by a MS4 operator.
- Example #1: UPC 98831 is located in Buckingham County. Navigate to the project using one of three methods described above. Toggle on the census urban areas to find there is no census urban area shading in the project limits, therefore, UPC 98831 is not in a regulated MS4 area and there are no MS4 operators to report.
- Example #2: A 2.4 mile project located in Hanover County is partially within a census urban area, therefore it is considered within a MS4 area. The project area within the urban census area is then reviewed for concentrated storm water runoff discharge points. The runoff exits the project by roadside ditches owned and operated by VDOT. No storm water from the project is discharging

into a system owned by MS4 operator Hanover County, therefore the single reported MS4 operator is VDOT.

- Example #3: VDOT is building a 1.1 mile project located within Virginia Beach. The project is reviewed and concentrated runoff discharges into a ditch along the Interstate, a storm sewer system and local roadside ditches that are all within the census urban area. The Interstate ditch is owned and operated by VDOT, so VDOT would be reported as a MS4 operator. The storm sewer system and local ditches are owned by Virginia Beach, so Virginia Beach would also be reported as a MS4 operator.
- Example #4: A project in Salem District is located at Latitude 37.2381 and Longitude -79.9881. The project is found to be within a census urban area. The discharge points from the project are studied. The concentrated runoff exits the project by a roadside ditch owned and operated by Virginia Western Community College, a storm sewer system owned and operated by Roanoke County and roadside ditches owned and operated by VDOT. Three operators are reported; Virginia Western Community College, Roanoke County and VDOT.
- Example #5: The intersection improvement project of UPC 51927 in Greene County is checked for MS4 coverage. After navigating to the project and zooming out, red dots appear when toggling on the Census Urban Areas from the Layers tab in the VDOT GIS integrator. A Right Click displays the information box that shows *VA Urban Cluster* for Ruckersville. Urban Clusters are not MS4 areas, so there would be no MS4 operators reported.
- Example #6: A road improvement project in Henrico County involves outfalls on a primary road and two secondary roads. VDOT GIS integrator indicates the locations are within a census urban area. VDOT owns and operates the primary system and therefore would be listed as a MS4 operator. Henrico County owns and operates the secondary road system and would be listed as a MS4 operator as well.
- Remark: When discharging directly to [Waters of the Commonwealth](#) a MS4 operator is not reported.

Note ⁽⁸⁾: Name of person completing the form.

Note ⁽⁹⁾: Chesapeake Bay Preservation Act (CBPA) projects are defined as those projects with 2,500 square feet to one acre of land disturbance and located in a Chesapeake Bay Preservation Area as defined by the locality. These projects do not require VPDES Construction Permit coverage but are regulated under the Virginia Stormwater Management Program and require the reporting of land disturbance and BMP data. Except for line 9, this form is to be completed for all CBPA projects and submitted along with the forms for projects requiring VPDES Construction Permit coverage. Only form LD445C needs to accompany this form for the CBPA projects.

List of Abbreviations:

CBPA – Chesapeake Bay Preservation Act
CEDAR – Comprehensive Environmental Data and Reporting System
DEQ – Department of Environmental Quality
GIS – Geographic Information System
HUC – Hydraulic Unit Code
MS4 – Municipal Separate Storm Sewer System
SWM – Stormwater Management
UPC – Universal Project Code
VDOT – Virginia Department of Transportation
VPDES – Virginia Pollutant Discharge Elimination System

VIRGINIA DEPARTMENT OF TRANSPORTATION
VPDES CONSTRUCTION PERMIT CONTACT
INFORMATION

Project Number/Identification:

This project is covered under the General Virginia Pollutant Discharge Elimination

System Permit for Discharge of Stormwater from

Construction Activities (VAR10)

Permit Registration Number: _____

For information about the Stormwater Pollution Prevention Plan (SWPPP)

for this activity please contact:

VDOT Contact (name): _____

Phone number: _____

Email: _____

**VIRGINIA DEPARTMENT OF TRANSPORTATION
LOCATION AND DESIGN
VPDES CONSTRUCTION PERMIT FEE REGISTRATION FORM**

*To be submitted with LD-445 form
Use LD-445BInstr for assistance in completing this form*

I. VDOT Project Information					
Route:		VDOT Project #			
City/County:		UPC#			
II. VDOT Accounting Distribution					
Amount (1)	Account (2)	Project UPC (3)	Activity(3a)	Cost Center (4)	Department (4a)
	<input type="checkbox"/> Federal 5012680 <input type="checkbox"/> State 5015410				
III. VDOT Contacts					
District VPDES Coordinator (5)			Project Contact (6)		
Name:			Name:		
Address:			Address:		
Phone:			Phone:		

LD-445B Instructional Guide

1. **“Amount”**: Will be determined according to the Fee Schedule listed below. Fee should be based on the most conservative estimate of Area to be Disturbed.
Permit Application Fee Schedule:
 - \$450.00 for projects with an Area to be disturbed of 1-5 acres.
 - \$750.00 for projects with an Area to be Disturbed of 5 acres or greater.
2. **“Account”**: Check one or the other.
 - 5012680 for Federally Funded projects
 - 5015410 for State Funded projects
3. **“Project UPC”**: Use the 10 digit number. Example: 0000098831. Note: Either the UPC or Cost Center is used, but never both for the same charge.
 - a) **“Activity”**: You must provide an activity code when using a UPC number and it must be open to charges or *expected* to be open at time of funds transfer (estimated to be 2 months after date of permit application).
Example: 616
4. **Cost Center (CSC) number**: Example: 11120010. Note: Either the Cost Center or the UPC is used, but never both for the same charge.
 - a) **“Department”**: You must provide a Department number when using a Cost Center number. Example: 12013
5. **“District VPDES Coordinator”**: If unknown, contact the District Hydraulics Section to determine whose name goes here.
6. **“Project Contact”**: Typically will be the Project Manager or other designated Project Authority

Permit Modifications:

- The State Permit may be modified in accordance with Administrative Code [9VAC25-870-610](#) for causes listed in Administrative Code [9VAC25-870-630](#).
- There is a unique case when the actual land disturbance exceeds that which was originally reported on the LD-445. While there is no permit modification fee for VDOT there may be an additional permit fee assessed, which is based on the total disturbed acreage of the site.
 - Example #1: the original application reported 3.50 acres of land disturbance and was assessed a \$450.00 permit fee. The project unexpectedly disturbed 6.00 acres and required a modification. The modified permit fee assessment would be \$750.00 and the additional fee required from the project would be the difference of the two fee schedules listed in Line Item #1 or \$300.00.
 - Example #2: the original application reported 15.50 acres of land disturbance and was assessed a \$750.00 permit fee. The project unexpectedly disturbed 19.00 acres and required a modification. There is no change in the permit fee assessed.

Design-Build projects:

- If the Design-Builder contractor is responsible for the permit fee, then:
 - The Design-Builder contractor will submit a check made out to "Treasurer of Virginia".
 - The Design-Builder contractor will include the check along with the LD-445 form submission to the VDOT Project Authority.
 - The LD-445B form requires only the sections with the project information and contacts to be completed.
 - The VDOT Project Authority submits the LD-445 forms and check to the VDOT District VPDES Construction Permit Coordinator in accordance with [IIM-LD-242](#).
 - The VDOT District VPDES Construction Permit Coordinator uploads the LD-445 forms to the InsideVDOT site and sends the check along with a copy of the LD-445B form to the VDOT Central Office VPDES Construction Permit Coordinator for processing.
 - The VDOT Central Office VPDES Construction Permit Coordinator works with the accounting personnel to deposit the check in the proper account.

VIRGINIA DEPARTMENT OF TRANSPORTATION
LOCATION AND DESIGN
EROSION AND SEDIMENT CONTROL (ESC) AND STORMWATER MANAGEMENT
(SWM) CERTIFICATION FORM

From: Plan Reviewer _____

To: Project Manager _____

District: _____ Residency: _____

UPC Number: _____ VDOT Project Number: _____

Area to be Disturbed (to the nearest one-hundredth acre): _____

This form shall be completed by the Plan Reviewer and provided to the ESC/SWM Plan Designer. The ESC & SWM Plan Designer shall forward this form to the Project Authority for use in completing the application for a VPDES Construction Permit (if applicable).

This form serves to ensure that a project specific ESC Plan and SWM Plan has been designed/prepared, reviewed, and approved in accordance with the Virginia Department of Transportation's approved ESC & SWM Standards and Specifications.

ESC Plan Reviewer*

The ESC Plan for the project listed above has been reviewed and approved in accordance with the VDOT's approved ESC Standards and Specifications.

Signature: _____ Title: _____

Printed name: _____ Date: _____

*DEQ Certified Plan Reviewer for ESC or Professional Engineer, Land Surveyor, Landscape Architect or Architect with expertise in the field of ESC.

SWM Plan Reviewer**

The SWM Plan for the project listed above has been reviewed and approved in accordance with the VDOT's approved SWM Standards and Specifications.

Signature: _____ Title: _____

Printed name: _____ Date: _____

**DEQ Certified Plan Reviewer for SWM: Individuals seeking SWM certification will be considered provisionally certified for two years from the date they complete their first required training course.

**VPDES Construction Permit Coverage Termination Notice
And
Chesapeake Bay Preservation Act Project Reporting Notice⁽¹⁾**

1. District: _____
2. Residency: _____
3. County/City: _____
4. Project #: _____
5. UPC#: _____
6. Project Latitude*
(decimal degrees) _____
7. Project Longitude*
(decimal degrees) _____
8. Permit Registration Number: _____
9. Requested Date of Termination: _____
10. Reason for terminating coverage (check one)
 - ☐ Necessary permanent control measures (BMPs) included in the SWPPP for the site are in place and functioning effectively and final stabilization has been achieved on all portions of the site for which the operator is responsible
 - ☐ Another operator has assumed control over all areas of the site that have not been finally stabilized and obtained coverage for the ongoing discharge
 - ☐ Coverage under an alternative VPDES or State permit has been obtained.
11. Were Permanent Control Measures (BMPs) installed with this project? (**If yes, supply the appropriate information in Section I of this form for each permanent control measure installed.) Y/N
12. Was an Alternate Permanent Control Measure (BMP), other than the purchase of nutrient credits, utilized for this project? (** If yes, supply the appropriate information in Section II for each alternate BMP utilized.) Y/N
13. Were Perpetual Nutrient Credits acquired for this project? (** If yes, supply the appropriate information in Section III of this form.) Y/N

*Latitude and Longitude: In decimal degrees to the nearest one ten-thousandth of a degree at the approximate center of the project or BMP location.

** See Section VI of the SWPPP General Information Sheets for this project for BMP information.

Project RLD (Responsible Land Disturber)

I certify that this project meets the conditions checked in Item 10 above and no longer needs coverage under the VPDES General Permit for Storm Water Discharges from Construction Activities (Construction Permit).

Signature: _____

Printed Name: _____

Title: _____

Date: _____

Section I - Permanent Control Measures (BMPs) Installed with Project**	
a) Maintenance ID	
b) Type of Permanent Control Measure (BMP) installed	
c) Date that BMP became functional as a permanent control measure	
d) Geographic location (county or city)	
e) Latitude* (decimal degrees)	
f) Longitude* (decimal degrees)	
g) 6th Order HUC. Example: YO28	
h) Receiving water	
i) Name of Impaired Water ⁽²⁾	
j) Total number of project acres that will be treated (to the nearest one-tenth of an acre)	
k) Total number of project impervious acres that will be treated (to the nearest one-tenth of an acre)	
l) Total number of project pervious acres that will be treated (to the nearest one-tenth of an acre)	
m) Maintenance ID	
n) Type of Permanent Control Measure (BMP) installed	
o) Date that BMP became functional as a permanent control measure	
p) Geographic location (county or city)	
q) Latitude* (decimal degrees)	
r) Longitude* (decimal degrees)	
s) 6th Order HUC. Example: YO28	
t) Receiving water	
u) Name of Impaired Water ⁽²⁾	
v) Total number of project acres that will be treated (to the nearest one-tenth of an acre)	
w) Total number of project impervious acres that will be treated (to the nearest one-tenth of an acre)	1
x) Total number of project pervious acres that will be treated (to the nearest one-tenth of an acre)	

Final approved shop drawings of Manufactured Treatment Devices (MTDs) are to be included with the BMP information submitted with the LD-445D form.

*Latitude and Longitude: In decimal degrees to the nearest one ten-thousandth of a degree at the approximate center of the project or BMP location.

** See Section VI of the SWPPP General Information Sheets for this project for BMP information. For additional BMPs include page 2 of 4 with notice of Permit Termination.

Section II – Alternate BMP's (other than nutrient credits) Utilized by Project ±	
a) Type of BMP installed	
b) Geographic location (county or city)	
c) Latitude* (decimal degrees)	
d) Longitude* (decimal degrees)	
e) 6th Order HUC. Example YO27	
f) Receiving water	
g) Name of Impaired Water ⁽²⁾	
h) Total number of project acres that will be treated (to the nearest one-tenth of an acre)	
i) Total number of project impervious acres that will be treated (to the nearest one-tenth of an acre)	
j) Total number of project pervious acres that will be treated (to the nearest one-tenth of an acre)	

*Latitude and Longitude: In decimal degrees to the nearest one ten-thousandth of a degree at the approximate center of the project or BMP location.

± See Section VI of the SWPPP General Information Sheets for this project information.

Section III – Perpetual Nutrient Credits Acquired for Project ±	
a) Name of Nonpoint Nutrient Credit Generating Entity	
b) Perpetual Nutrient Credits Acquired (lbs/acre/year, to the nearest one-hundredth of a pound).	

If Nutrient Credits were purchased by others than VDOT an executed Assignment Agreement (including Nutrient Credit Bill of Sale) must be submitted with the BMP Termination information.

[NC Assignment Agreement Instructions \(Inside VDOT\)](#)
[NC Assignment Agreement \(Inside VDOT\)](#)

± See Section VI of the SWPPP General Information Sheets for this project information.

SWM Facility (BMP) Construction Certification ***	
I certify that the stormwater management facilities (BMPs) installed on this project and listed herein were constructed under my direction or supervision in accordance with a system designed to ensure that qualified personnel provided oversight and inspection of such construction. To the best of my knowledge and belief, the BMPs have been constructed in accordance with their approved plans.	
Signature:	_____
Printed Name:	_____
Title:	_____ Date: _____
License Number:	_____

*** The construction of the SWM BMPs shall be certified by a professional registered in the Commonwealth of Virginia (Architect, Professional Engineer, Land Surveyor or Landscape Architect).

Note ⁽¹⁾: Chesapeake Bay Preservation Act (CBPA) projects are defined as those projects with 2,500 square feet to one acre of land disturbance and located in a Chesapeake Bay Preservation Area as defined by the locality. These projects do not require VPDES Construction Permit coverage but are regulated under the Virginia Stormwater Management Program and require the reporting of land disturbance and BMP data. Except for lines 8, 9 & 10 this form is to be completed for all CBPA projects and submitted along with the forms for projects reporting termination of VPDES Construction Permit coverage.

Note ⁽²⁾: List the name of any impaired water to which the BMP discharges. The determination of impaired water shall be based on those streams listed as impaired in the 2012 305(b)/303(d) Water Quality Assessment Integrated Report and shall be the first named waterbody to which the BMP discharges.

**VIRGINIA DEPARTMENT OF TRANSPORTATION
LOCATION AND DESIGN
STORMWATER POLLUTION PREVENTION PLAN (SWPPP)
CERTIFICATION**

This form is to be completed by the designated Responsible Land Disturber and submitted to the District or Central Office VPDES Permit Coordinator, as appropriate (see IIM-LD 242 and the Drainage Manual, Chapter 1). A copy of this form shall be maintained in the SWPPP document for the land disturbing activity.

DISTRICT _____ RESIDENCY _____
UPC NUMBER _____ VDOT PROJECT NUMBER _____
VPDES PERMIT REGISTRATION NUMBER _____

I certify that all information to be supplied by the contractor noted on the Stormwater Pollution Prevention Plan (SWPPP) General Information Sheets contained in the construction plan set (or other such documents) will be reviewed, approved and included with the other documents related to the SWPPP for this land disturbance activity prior to implementation of work in those areas identified by such information. I further certify that this document and all other documents related to the SWPPP, as identified on the SWPPP General Information Sheets, are maintained at the activity site, or at a location convenient to the activity site where no on-site facilities are available, and such documents will be made available for review upon request in accordance with the provisions of the General VPDES Permit for Discharges of Stormwater from Construction Activities (VAR10). Where the SWPPP documents are not stored on-site, a copy of such documents shall be in the possession of those with day to day operational control over the implementation of the SWPPP whenever they are on site.

The VDOT person responsible for the inspection of the erosion and sediment control and pollution prevention measures for this land disturbing activity is: _____, who is certified through the Virginia Department of Environmental Quality ESC Inspector Certification Program and is knowledgeable in the area of pollution prevention at construction sites.

Signature: _____

Printed Name: _____

Title: _____ Date: _____

SECTION 106 - CONTROL OF MATERIAL

106.03 - Local Material Sources (Pits and Quarries)

The requirements set forth herein apply exclusively to non-commercial pits and quarries from which materials are obtained for use on contracts awarded by the Department.

Local material sources shall be concealed from view from the completed roadway and any existing public roadway. Concealment shall be accomplished by selectively locating the pit or quarry and spoil pile, providing environmentally compatible screening between the pit or quarry site and the roadway, or using the site for another purpose after removal of the material, or restoration equivalent to the original use (such as farm land, pasture, turf, etc.). The foregoing requirements shall also apply to any pit or quarry opened or reopened by a subcontractor or supplier. However, the requirements will not apply to commercial sand and gravel and quarry operations actively processing material at the site prior to the date of the Notice of Advertisement.

The Contractor shall furnish the Engineer a statement signed by the property owner in which the property owner agrees to the use of his property as a source of material for the project. Upon completion of the use of the property as a material source, the Contractor shall furnish the Engineer a release signed by the property owner indicating that the property has been satisfactorily restored. This requirement will be waived for commercial sources, sources owned by the Contractor, and sources furnished by the Department.

Local material pits and quarries that are not operated under a local or State permit shall not be opened or reopened without authorization by the Engineer. The Contractor shall submit for approval a site plan, including, but not limited to, the following

- (1) the location and approximate boundaries of the excavation;
- (2) procedures to minimize erosion and siltation;
- (3) provision of environmentally compatible screening;
- (4) restoration;
- (5) cover vegetation;
- (6) other use of the pit or quarry after removal of material, including the spoil pile;
- (7) the drainage pattern on and away from the area of land affected, including the directional flow of water and a certification with appropriate calculations that verify all receiving channels are in compliance with Minimum Standard 19 of the Virginia Erosion and Sediment Control Regulations;
- (8) location of haul roads and stabilized construction entrances if construction equipment will enter a paved roadway;
- (9) constructed or natural waterways used for discharge;
- (10) a sequence and schedule to achieve the approved plan and;
- (11) the total drainage area for temporary sediment traps and basins shall be shown. Sediment traps are required if the runoff from a watershed area of less than three acres flows across a disturbed area. Sediment basins are required if the runoff from a watershed area of three acres or more flows across a disturbed area. The Contractor

Stormwater Pollution Prevention Plan (SWPPP) Specifications

shall certify that the sediment trap or basin design is in compliance with VDOT Standards and Specifications, and all local, state, and federal laws. Once a sediment trap or basin is constructed, the dam and all outfall areas shall be immediately stabilized.

The Contractor's design and restoration shall be in accordance with the Contract requirements and in accordance with the requirements of the federal, state, and local laws and regulations.

If the approved plan provides for the continued use or other use of the pit or quarry beyond the date of final acceptance, the Contractor shall furnish the Department a bond made payable to the Commonwealth of Virginia in an amount equal to the Engineer's estimate of the cost of performing the restoration work. If the pit or quarry is not used in accordance with the approved plan within 8 months after final acceptance, the Contractor shall perform restoration work as directed by the Engineer, forfeit his bond, or furnish the Engineer with evidence that he has complied with the applicable requirements of the State Mining Law.

Topsoil on Department owned or furnished borrow sites shall be stripped and stockpiled as directed by the Engineer for use as needed within the construction limits of the project or in the reclamation of borrow and disposal areas.

If payment is to be made for material measured in its original position, material shall not be removed until Digital Terrain Model (DTM) or cross-sections have been taken. The material shall be reserved exclusively for use on the project until completion of the project or until final DTM or cross-sections have been taken.

If the Contractor fails to provide necessary controls to prevent erosion and siltation, if such efforts are not made in accordance with the approved sequence, or if the efforts are found to be inadequate the Department will withdraw approval for the use of the site and may cause the Contractor to cease all contributing operations and direct his efforts toward corrective action or may perform the work with state forces or other means as determined by the Engineer. If the work is not performed by the Contractor, the cost of performing the work, plus 25 percent for supervisory and administrative personnel, will be deducted from monies due the Contractor.

Costs for applying seed, fertilizer, lime, and mulch; restoration; drainage; erosion and siltation control; regrading; haul roads; and screening shall be included in the Contract price for the type of excavation or other appropriate items.

If the Contractor fails to fulfill the provisions of the approved plan for screening or restoring material sources, the Department may withhold and use for the purpose of performing such work any monies due the Contractor at the time of the final estimate. The Contractor shall be held liable for penalties, fines, or damages incurred by the Department as a result of his failure to prevent erosion or siltation and take restorative action.

After removing the material, the Contractor shall remove metal, lumber, and other debris resulting from his operations and shall shape and landscape the area in accordance with the approved plan for such work.

- (a) **Sources Furnished by the Department:** Sources furnished by the Department will be made available to the Contractor together with the right to use such property as may be required for a plant site, stockpiles, and haul roads. The Contractor shall confine his excavation operations to those areas of the property specified in the Contract.

The Contractor shall be responsible for excavation that shall be performed in order to furnish the specified material.

- (b) **Sources Furnished by the Contractor:** When the Contractor desires to use local material from sources other than those furnished by the Department, he shall first secure

Stormwater Pollution Prevention Plan (SWPPP) Specifications

the approval of the Engineer. The use of material from such sources will not be permitted until test results have been approved by the Engineer and written authority for its use has been issued.

The Contractor shall acquire the necessary rights to take material from sources he locates and shall pay all related costs, including costs that may result from an increase in the length of the haul. Costs of exploring, sampling, testing, and developing such sources shall be borne by the Contractor. The Contractor shall obtain representative samples from at least two borings in parcels of 10 acres or less and at least three additional borings per increment of 5 acres or portion thereof to ensure that lateral changes in material are recorded. Drill logs for each test shall include a soil description and the moisture content at intervals where a soil change is observed or at least every 5 feet of depth for consistent material. Samples obtained from the boring shall be tested by an approved laboratory for grading, Atterberg limits, CBR, maximum density, and optimum moisture. The Department will review and evaluate the material based on test results provided by the Contractor. The Department will reject any material from a previously approved source that fails a visual examination or whose test results show that it does not conform to the Specifications or specific contract requirements.

106.04 - Disposal Areas

Unsuitable or surplus material shown on the plans shall be disposed of as specified herein. Material not used on the project shall be disposed of by the Contractor off the right of way. The Contractor shall obtain the necessary rights to property to be used as an approved disposal area. For the purpose of this Specification an approved disposal area is defined as that which is owned privately, not operated under a local or State permit and has been approved by the Department for use in disposing of material not used on the project.

When neither unsuitable nor surplus material is shown on the plans, the Contractor shall dispose of it as shown herein.

Prior to the Department approving a disposal area, the Contractor shall submit a site plan. The plan shall show:

- (1) the location and approximate boundaries of the disposal area;
- (2) procedures to minimize erosion and siltation;
- (3) provision of environmentally compatible screening;
- (4) restoration;
- (5) cover vegetation;
- (6) other use of the disposal site;
- (7) the drainage pattern on and away from the area of land affected, including the directional flow of water and a certification with appropriate calculations that verify all receiving channels are in compliance with Minimum Standard 19 of the Virginia Erosion and Sediment Control Regulations;
- (8) location of haul roads and stabilized construction entrances if construction equipment will enter a paved roadway;
- (9) constructed or natural waterways used for discharge;

Stormwater Pollution Prevention Plan (SWPPP) Specifications

- (10) a sequence and schedule to achieve the approved plan and;
- (11) the total drainage area for temporary sediment traps and basins shall be shown. Sediment traps are required if the runoff from a watershed area of less than three acres flows across a disturbed area. Sediment basins are required if the runoff from a watershed area of three acres or more flows across a disturbed area. The Contractor shall certify that the sediment trap or basin design is in compliance with VDOT Standards and Specifications, all local, state, and federal laws. Once a sediment trap or basin is constructed, the dam and all outfall areas shall be immediately stabilized.

Disposal areas shall be cleared but need not be grubbed. The clearing work shall not damage grass, shrubs, or vegetation outside the limits of the approved area and haul roads thereto. After the material has been deposited, the area shall be shaped to minimize erosion and siltation of nearby streams and landscaped in accordance with the approved plan for such work or shall be used as approved by the Engineer. The Contractor's design and restoration shall conform to the requirements of the contract and federal, state, and local laws and regulations.

If the Contractor fails to provide and maintain necessary controls to prevent erosion and siltation, if such efforts are not made in accordance with the approved sequence, or if the efforts are found to be inadequate, the Department will withdraw approval for the use of the site and may cause the Contractor to cease all contributing operations and direct his efforts toward corrective action or may perform the work with state forces or other means as determined by the Engineer. If the work is not performed by the Contractor, the cost of performing the work, plus 25 percent for supervisory and administrative personnel, will be deducted from monies due the Contractor.

The Contractor shall furnish the Engineer a statement signed by the property owner in which the owner agrees to the use of his property for the deposit of material from the project. Upon completion of the use of the property as an approved disposal area, the Contractor shall furnish the Engineer a release signed by the property owner indicating that the property has been satisfactorily restored. This requirement will be waived for commercial sources, sources owned by the Contractor, and sources furnished by the Department.

Material encountered by the Contractor shall be handled as follows:

- (a) **Unsuitable material** for the purpose of this Specification is defined as material having poor bearing capacity, excessive moisture content, extreme plasticity or other characteristics as defined by the Engineer that makes it unacceptable for use in the work and shall be disposed of at an approved disposal area or landfill licensed to receive such material.
- (b) **Surplus material** as shown on the plans shall be disposed of by flattening slopes, used to fill in ramp gores and medians, or if not needed, disposed of at an approved disposal area or a landfill licensed to receive such material.

Surplus material stockpile areas on the right-of-way shall be cleared but need not be grubbed. The clearing work shall not damage grass, shrubs, or vegetation outside the limits of the approved area and the haul roads thereto. Placement of fill material shall not adversely affect existing drainage structures. If necessary, modified existing drainage structures, as approved by the Engineer, shall be paid for in accordance with [the Contract Documents](#). Within 7 days after the material has been deposited, the area shall be shaped and stabilized to minimize erosion and siltation.

Stormwater Pollution Prevention Plan (SWPPP) Specifications

- (c) **Organic materials** such as, but not limited to, tree stumps and limbs (not considered merchantable timber), roots, rootmat, leaves, grass cuttings, or other similar materials shall be chipped or shredded and used on the project as mulch, given away, sold as firewood or mulch, burned at the Contractor's option if permitted by local ordinance, or disposed of at a facility licensed to receive such materials. Organic material shall not be buried in state rights of way or in an approved disposal area.
- (d) **Rootmat** for the purpose of this Specification is defined as any material that, by volume, contains approximately 60 percent or more roots and shall be disposed of in accordance with (c) herein.
- (e) **Inorganic materials** such as brick, cinder block, broken concrete without exposed reinforcing steel, or other such material shall be disposed of at an approved disposal area or landfill licensed to receive such materials. If disposed of in an approved disposal area, the material shall have enough cover to promote soil stabilization in accordance with the requirements of Section 303 and shall be restored in accordance with other provisions of this Section.
- (f) **Excavated rock** in excess of that used within the project site in accordance with the requirements of Section 303 shall be treated as surplus material.
- (g) **Other materials** such as, but not limited to, antifreeze, asphalt (liquid), building forms, concrete with reinforcing steel exposed, curing compound, fuel, hazardous materials, lubricants, metal, metal pipe, oil, paint, wood or metal from building demolition, or similar materials shall not be disposed of at an approved disposal area but shall be disposed of at a landfill licensed to receive such material.

Section 106.08—Storing Materials

Chemicals, fuels, lubricants, bitumens, paints, raw sewage, and other potential pollutant-generating materials as determined by the Engineer or defined in the *VPDES General Permit For Discharge of Stormwater From Construction Activities* shall not be stored within any flood-prone area unless no other location is available. A flood-prone area is defined as the area adjacent to the main channel of a river, stream or other waterbody that is susceptible to being inundated by water during storm events and includes, but is not limited to, the floodplain, the flood fringe, wetlands, riparian buffers or other such areas adjacent to the main channel. If stored in a flood-prone area, the material shall be stored in one or more secondary containment structures with an impervious liner and be removed entirely from the flood-prone area at least 24 hours prior to an anticipated storm event that could potentially inundate the storage area. Any storage of these materials outside of a flood-prone area that is in proximity to natural or man-made drainage conveyances where the materials could potentially reach a river, stream, or other waterbody if a release or spill were to occur, must be stored in a bermed or diked area or inside a secondary containment structure capable of preventing a release. Any spills, leaks or releases of such materials shall be addressed in accordance with Section 107.16(b) and (e) of the Specifications. Accumulated rain water shall be pumped out of impoundment or containment areas into approved filtering devices. All proposed pollution prevention measures and practices must be identified by the Contractor in his Pollution Prevention Plan as required by the Specifications, other contract documents and/or the *VPDES General Permit for Discharge of Stormwater from Construction Activities*.

SECTION 107—LEGAL RESPONSIBILITIES

107.01 - Laws To Be Observed

The Contractor shall keep fully informed of federal, state, and local laws, bylaws, ordinances, orders, decrees, and regulations of governing bodies, courts, and agencies having any jurisdiction or authority that affects those engaged or employed on the work, the conduct of the work, or the execution of any documents in connection with the work. The Contractor shall observe and comply with such laws, ordinances, regulations, orders, or decrees and shall indemnify and hold harmless the Commonwealth and its agents, officers, or employees against any claim for liability arising from or based on their violation, whether by himself, his agents, his employees, or subcontractors. The Contractor shall execute and file the documents, statements, and affidavits required under any applicable federal or state law or regulation required by or affecting his bid or Contract or prosecution of the work there under. The Contractor shall permit examination of any records made subject to such examination by any federal or state law or by regulations promulgated there under by any state or federal agency charged with enforcement of such law.

In accordance with the *Code of Virginia* (Virginia Public Procurement Act), the Contractor shall make payment to all subcontractors, as defined in the Code, within seven days after receipt of payment from the Department; or shall notify the Department and subcontractor in writing of his intention to withhold all or a part of the amount due along with the reason for nonpayment.

In the event payment is not made as noted, the Contractor shall pay interest in accordance with the terms of the General Conditions of the Construction Contract, unless otherwise provided in the Contract, to the subcontractor on all amounts that remain unpaid after seven days except for the amounts withheld as provided in this Section.

These same requirements shall be included in each subcontract and shall be applicable to each lower-tier subcontractor.

107.02—Permits, Certificates, and Licenses.

General

The Contractor shall conform to the permit conditions as shown in the contract documents. Construction methods shall conform to the stipulations of the permit and/or certification conditions. The Contractor shall assume all obligations and costs incurred as a result of complying with the terms and conditions of the permits and certificates.

If any of the permits shown herein are applicable to the project, the contract documents will indicate such and the applicable permit conditions will be included in the contract documents.

- a) **Virginia Department of Environmental Quality – VPDES General Permit For Discharge of Stormwater From Construction Activities (VPDES Construction Permit):** All construction activities undertaken by or for VDOT involving land disturbances equal to or exceeding one acre must be covered by the VPDES Construction Permit. According to IIM-LD-242 and Section 107.16 of the Specifications, VDOT is responsible for securing VPDES Construction Permit coverage for all applicable land disturbing activities performed on VDOT rights of way or easements, including off-site support facilities that are located on VDOT rights of way or easements that directly relate to the construction site activity. The Contractor shall be responsible for securing VPDES Construction Permit coverage for support facilities that are not located on VDOT rights of way or easements.

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The Contractor shall be responsible for all costs to obtain VPDES Construction Permit coverage for all support facilities (both on-site and off-site) not included in the construction plans or contract documents for the project. The Department will not be responsible for any inconvenience, delay, or loss experienced by the Contractor as a result of his failure to gain access to any support facility areas at the time contemplated.

- b) **Other Permits, Certificates and Licenses:** Except as otherwise specified herein, the Contractor shall procure all necessary permits, certificates or licenses that have not been obtained by the Department. The Contractor shall pay all charges, fees, and taxes and shall comply with all conditions of the permits, certificates or licenses.

Construction or excavation material shall not be stored within the waterway or wetlands. Cofferdams, stream channel retaining structures and all necessary dikes shall be constructed of non-erodible materials or if specified in the permit(s), faced with coarse non-erodible materials. If faced with non-erodible material, filter cloth shall be placed between the granular fill and riprap in accordance with Section 245, 204, 303.03 and 414. Temporary structures shall be removed from the waterway with minimal disturbance of the streambed. Discharge of dredge or fill material shall be placed in accordance with the best management practice, project permits and all applicable laws and regulations. Dredged or fill material shall be removed to an approved, contained, upland location in accordance with Section 106.04. The disposal area will be of sufficient size and capacity to properly contain the dredge material, to allow for adequate dewatering and settling of sediment, and to prevent overtopping. The disposal area shall be stabilized prior to placement of dredge material.

The Contractor activities shall not substantially disrupt the movement of those species of aquatic life indigenous to the water body including those species that normally migrate through the area. The Contractor to the maximum extent practicable shall not permanently restrict or impede the passage of normal or expected high flows or cause the relocation of the water. The Contractor shall avoid and minimize all temporary disturbances to surface waters during construction. The Contractor shall remove any temporary fill in its entirety and the affected areas returned to their preexisting elevation conditions within 30 days of completing work, which shall include re-establishing pre-construction contours, and planting or seeding with appropriate wetland vegetation according to cover type (emergent, scrub/shrub, or forested). The Contractor shall perform all work activities during low-flow conditions and shall isolate the construction area via the implementation of nonerodible cofferdams, sheetpiling, stream diversions or similar structures.

The Contractor shall accomplish all construction, construction access (e.g., cofferdams, sheetpiling, and causeways) and demolition activities associated with this project in a manner that minimizes construction or waste materials from entering surface waters. Access roads and associated bridges or culverts shall be constructed to minimize the adverse effects on surface waters. Access roads constructed above preconstruction contours and elevations in surface waters must be bridged or culverted to maintain surface flows. All utility line work in surface waters shall be performed in a manner that minimizes disturbance, and the area shall be returned to its original contours and restored within 30 days of completing work in the area.

The Contractor shall 1) stockpile excavated material in a manner that prevents reentry into the stream, 2) restore original streambed and streambank contours, 3) revegetate barren areas, and 4) implement strict erosion and sediment control measures throughout the project period.

The Contractor shall provide fill material that is clean and free of contaminants in toxic concentrations or amounts in accordance with all applicable laws and regulations. The Contractor shall comply with all applicable FEMA-approved state or local floodplain management requirements.

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The Contractor shall adhere to any time-of-year restriction conditions as required by state and federal permitting agencies. No in-stream work shall be permitted during in-stream time-of-year restriction.

The Contractor shall prohibit wet or uncured concrete from entry into surface waters. The Contractor shall not dispose of excess or waste concrete in surface waters and prevent wash water from discharging into surface waters. The Contractor shall employ measures to prevent spills of fuels or lubricants into state waters. All pollution prevention measures and practices proposed by the Contractor shall be identified in the Contractor's Pollution Prevention Plan as required by the Specifications, other contract documents and/or the VPDES *General Permit For Discharge of Stormwater From Construction Activities*.

The Contractor shall not violate the water quality standards as a result of the construction activities. The Contractor shall not alter the physical, chemical, or biological properties of surface waters and wetlands or make them detrimental to the public health, to animal or aquatic life, to the uses of such waters for domestic or industrial consumption, for recreation, or for other uses.

The Contractor shall not proceed with work covered by a permit until the work is released in writing by the Engineer.

If the Department has not released work covered by a U.S. Army Corps of Engineers permit and the Contractor has completed all other work within the limits of the project, the Contractor shall so advise the Engineer in writing. Upon receipt of the notification, the Engineer will evaluate the status of the project and advise the Contractor within 45 days of the portion of the project that is acceptable under the terms of the Specifications and General Conditions of the Construction Contract. If the Engineer determines that all of the work except that encumbered by the permit application is acceptable under the requirements of the Specifications and General Conditions of the Construction Contract, the Contractor will be notified accordingly. The Department or the Contractor may then elect to continue or terminate the remaining portion of the Contract.

The party electing to terminate the Contract shall so advise the other party in writing after the 45-day period. The terms of contract termination will be in accordance with the requirements of the General Conditions of the Construction Contract. No compensation will be made for delays encountered or for work not performed except for an extension of time as determined in accordance with the requirements of the General Conditions of the Construction Contract.

The Contractor shall submit a request to the Engineer in writing if he wants to deviate from the plans or change his proposed method(s) regarding any proposed work located in waterways or wetlands. Such work may require additional environmental permits. If the Engineer determines that the activities are necessary for completion of the work, the Contractor shall furnish the Engineer all necessary information pertaining to the activity. The Contractor shall be responsible for designing and supplying all plans, sketches and notes necessary to acquire any permit modification required for changes in the proposed construction methods. Such information shall be furnished at least 180 days prior to the date the proposed changed activity is to begin. For other than the VPDES *General Permit For Discharge of Stormwater From Construction Activities*, the District Environmental Manager will apply for the necessary permits modifications to the permits obtained by the Department. The Contractor shall not begin the activity until directed to do so by the Engineer. Additional compensation will not be made for delay to the work or change in the Contractor's proposed methods that result from jurisdiction agency review or disapproval of Contractor's proposed methods.

If additional permits are required to perform dredging for flotation of construction equipment or for other permanent or temporary work as indicated in the Contractor's accepted plan of operation, but have not been obtained by the Department, the Contractor shall furnish the Engineer, at least 75 days prior to the proposed activity, all necessary information pertaining to the proposed activity in order for the Department to apply for the permits. The Contractor shall not begin the proposed

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activity until the additional permits have been secured and the Engineer has advised the Contractor that the proposed activity may proceed.

The Contractor shall permit representatives of state and federal environmental regulatory agencies to make inspections at any time in order to insure that the activity being performed under authority of the permit(s) is in accordance with the terms and conditions prescribed herein.

107.16 - Environmental Stipulations

By signing the bid, the bidder shall have stipulated (1) that any facility to be used in the performance of the Contract (unless the Contract is exempt under the Clean Air Act as amended [42 U.S.C. 1857, et seq., as amended by P.L. 91-604], the Federal Water Pollution Control Act as amended [33 U.S.C. 1251 et seq. as amended by P.L. 92-500], and Executive Order 11738 and regulations in implementation thereof [40 C.F.R., Part 15]) is not listed on the EPA's List of Violating Facilities pursuant to 40 C.F.R. 15.20; and (2) that the Department will be promptly notified prior to the award of the Contract if the bidder receives any communication from the Director, Office of Federal Activities, EPA, indicating that a facility to be used for the Contract is under consideration to be listed on the EPA's List of Violating Facilities.

No separate payment will be made for the work or precautions described herein except where provided for as a specific item in the Contract or except where provision has been made for such payment in these Specifications.

Reference is made in various subsections of this section to Tidewater, Virginia. For the purposes of identifying the affected regions assigned to this designation and the requirements therein Tidewater, Virginia is defined as the Counties of Accomack, Arlington, Caroline, Charles City, Chesterfield, Essex, Fairfax, Gloucester, Hanover, Henrico, Isle of Wight, James City, King George, King and Queen, King William, Lancaster, Mathews, Middlesex, New Kent, Northampton, Northumberland, Prince George, Prince William, Richmond, Spotsylvania, Stafford, Surry, Westmoreland and York and the Cities of Alexandria, Chesapeake, Colonial Heights, Fairfax, Falls Church, Fredericksburg, Hampton, Hopewell, Newport News, Norfolk, Petersburg, Poquoson, Portsmouth, Richmond, Suffolk, Virginia Beach and Williamsburg.

- a) **Erosion and Siltation:** The Contractor shall exercise every reasonable precaution, including temporary and permanent soil stabilization measures, throughout the duration of the project to control erosion and prevent siltation of adjacent lands, rivers, streams, wetlands, lakes, and impoundments. Soil stabilization and/or erosion control measures shall be applied to erodible soil or ground materials exposed by any activity associated with construction, including clearing, grubbing, and grading, but not limited to local or on-site sources of materials, stockpiles, disposal areas and haul roads.

The Contractor shall comply with the requirements of Sections 301.02 and 303.03 of the Specifications. Should the Contractor as a result of negligence or noncompliance, fail to provide soil stabilization in accordance with these specifications, the cost of temporary soil stabilization in accordance with the provisions of Section 303 of the Specifications shall be at the Contractor's expense. If the delay in stabilizing an exposed area of land is due to circumstances beyond the Contractor's control, the Department will be responsible for the expense.

Temporary measures shall be coordinated with the work to ensure effective and continuous erosion and sediment control. Permanent erosion control measures and drainage facilities shall be installed as the work progresses.

For projects that disturb 10,000 square feet or greater of land or 2,500 square feet or greater in Tidewater, Virginia, the Contractor shall have within the limits of the project during land disturbance activities, an employee certified by the Department in erosion

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and sediment control who shall inspect erosion and sediment control and pollution prevention practices, devices and measures for proper installation and operation and promptly report their findings to the Inspector. Failure on the part of the Contractor to maintain appropriate erosion and sediment control or pollution prevention devices in a functioning condition may result in the Engineer notifying the Contractor in writing of specific deficiencies. Deficiencies shall be corrected immediately or as otherwise directed by the Engineer. If the Contractor fails to correct or take appropriate actions to correct the specified deficiencies within 24 hours (or as otherwise directed) after receipt of such notification, the Department may do one or more of the following: require the Contractor to suspend work in other areas and concentrate efforts towards correcting the specified deficiencies, withhold payment of monthly progress estimates, or proceed to correct the specified deficiencies and deduct the entire cost of such work from monies due the Contractor. Failure on the part of the Contractor to maintain a Department certified erosion and sediment control employee within the project limits when land disturbance activities are being performed will result in the Engineer suspending work related to any land disturbance activity until such time as the Contractor is in compliance with this requirement.

(b) Pollution:

1. **Water:** The Contractor shall exercise every reasonable precaution throughout the duration of the project to prevent pollution of rivers, streams, and impoundments. Pollutants such as, but not limited to, chemicals, fuels, lubricants, bitumens, raw sewage, paints, sedimentation, and other harmful material shall not be discharged into or alongside rivers, streams, or impoundments or into channels leading to them. The Contractor shall provide the Engineer a contingency plan for reporting and immediate actions to be taken in the event of a dump, discharge, or spill within eight hours after he has mobilized to the project site.

Construction discharge water shall be filtered to remove deleterious materials prior to discharge into state waters. Filtering shall be accomplished by the use of a standard dewatering basin or a dewatering bag or other measures approved by the Engineer. Dewatering bags shall conform to the requirements of Section 245 of the Specifications. During specified spawning seasons, discharges and construction activities in spawning areas of state waters shall be restricted so as not to disturb or inhibit aquatic species that are indigenous to the waters. Neither water nor other effluence shall be discharged onto wetlands or breeding or nesting areas of migratory waterfowl. When used extensively in wetlands, heavy equipment shall be placed on mats. Temporary construction fills and mats in wetlands and flood plains shall be constructed of approved nonerodible materials and shall be removed by the Contractor to natural ground when the Engineer so directs.

If the Contractor dumps, discharges, or spills any oil or chemical that reaches or has the potential to reach a waterway, he shall immediately notify all appropriate jurisdictional state and federal agencies in accordance with the requirements of Section 107.01 and 107.16(e) of the Specifications and the *VPDES General Permit For Discharge of Stormwater From Construction Activities* and shall take immediate actions to contain, remove, and properly dispose of the oil or chemical.

Solids, sludges or other pollutants removed in the course of the treatment or management of pollutants shall be disposed of in a manner that prevents any pollutant from such materials from entering surface waters in compliance with all applicable state and federal laws and regulations.

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Excavation material shall be disposed of in approved areas above the mean high water mark shown on the plans in a manner that will prevent the return of solid or suspended materials to state waters. If the mark is not shown on the plans, the mean high water mark shall be considered the elevation of the top of stream banks.

Constructing new bridge(s) and dismantling and removing existing bridge(s) shall be accomplished in a manner that will prevent the dumping or discharge of construction or disposable materials into rivers, streams, or impoundments.

Construction operations in rivers, streams, or impoundments shall be restricted to those areas where identified on the plans and to those that must be entered for the construction of structures. Rivers, streams, and impoundments shall be cleared of falsework, piling, debris, or other obstructions placed therein or caused by construction operations. Stabilization of the streambed and banks shall occur immediately upon completion of work or if work is suspended for more than 14 days.

The Contractor shall prevent stream constriction that would reduce stream flows below the minimum, as defined by the State Water Control Board, during construction operations.

If it is necessary to relocate an existing stream or drainage facility temporarily to facilitate construction, the Contractor shall design and provide temporary channels or culverts of adequate size to carry the normal flow of the stream or drainage facility. The Contractor shall submit a temporary relocation design to the Engineer for review and acceptance in sufficient time to allow for discussion and correction prior to beginning the work the design covers. Costs for the temporary relocation of the stream or drainage facility shall be included in the Contract price for the related pipe or box culvert, unless specifically provided for under another Pay Item. Stabilization of the streambed and banks shall occur immediately upon completion of, or during the work or if the work is suspended for more than 14 days.

Temporary bridges or other minimally invasive structures shall be used wherever the Contractor finds it necessary to cross a stream more than twice in a 6 month period, unless otherwise authorized by water quality permits issued by the U. S. Army Corps of Engineers, Virginia Marine Resources Commission or the Virginia Department of Environmental Quality for the Contract.

2. **Air:** The Contractor shall comply with the provisions of [the Contract Documents](#) and the State Air Pollution Control Law and Rules of the State Air Pollution Control Board, including notifications required therein.

Burning shall be performed in accordance with all applicable local laws and ordinances and under the constant surveillance of watchpersons. Care shall be taken so that the burning of materials does not destroy or damage property or cause excessive air pollution. The Contractor shall not burn rubber tires, asphalt, used crankcase oil, or other materials that produce dense smoke. Burning shall not be initiated when atmospheric conditions are such that smoke will create a hazard to the motoring public or airport operations. Provisions shall be made for flagging vehicular traffic if visibility is obstructed or impaired by smoke. At no time shall a fire be left unattended.

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Asphalt mixing plants shall be designed, equipped, and operated so that the amount and quality of air pollutants emitted will conform to the rules of the State Air Pollution Control Board.

Emission standards for asbestos incorporated in the EPA's National Emission Standards for Hazardous Air Pollutants apply to the demolition or renovation of any institutional, commercial, or industrial building, structure, facility, installation, or portion thereof that contains friable asbestos or where the Contractor's methods for such actions will produce friable asbestos.

3. **Noise:** The Contractor's operations shall be performed so that exterior noise levels measured during a noise-sensitive activity shall not exceed 80 decibels. Such noise level measurements shall be taken at a point on the perimeter of the construction limit that is closest to the adjoining property on which a noise sensitive activity is occurring. A *noise-sensitive activity* is any activity for which lowered noise levels are essential if the activity is to serve its intended purpose and not present an unreasonable public nuisance. Such activities include, but are not limited to, those associated with residences, hospitals, nursing homes, churches, schools, libraries, parks, and recreational areas.

The Department may monitor construction-related noise. If construction noise levels exceed 80 decibels during noise sensitive activities, the Contractor shall take corrective action before proceeding with operations. The Contractor shall be responsible for costs associated with the abatement of construction noise and the delay of operations attributable to noncompliance with these requirements.

The Department may prohibit or restrict to certain portions of the project any work that produces objectionable noise between 10 P.M. and 6 A.M. If other hours are established by local ordinance, the local ordinance shall govern.

Equipment shall in no way be altered so as to result in noise levels that are greater than those produced by the original equipment.

When feasible, the Contractor shall establish haul routes that direct his vehicles away from developed areas and ensure that noise from hauling operations is kept to a minimum.

These requirements shall not be applicable if the noise produced by sources other than the Contractor's operation at the point of reception is greater than the noise from the Contractor's operation at the same point.

- (c) **Forests:** The Contractor shall take all reasonable precautions to prevent and suppress forest fires in any area involved in construction operations or occupied by him as a result of such operations. The Contractor shall cooperate with the proper authorities of the state and federal governments in reporting, preventing, and suppressing forest fires. Labor, tools, or equipment furnished by the Contractor upon the order of any forest official issued under authority granted the official by law shall not be considered a part of the Contract. The Contractor shall negotiate with the proper forest official for compensation for such labor, tools, or equipment
- (d) **Archeological, Paleontological, and Rare Mineralogical Findings:** In the event of the discovery of prehistoric ruins, Indian or early settler sites, burial grounds, relics, fossils, meteorites, or other articles of archeological, paleontological, or rare mineralogical interest during the prosecution of work, the Contractor shall act immediately to suspend work at the site of the discovery and notify the Engineer. The Engineer will immediately notify the proper state authority charged with the responsibility of investigating and

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evaluating such finds. The Contractor shall cooperate and, upon the request of the Engineer, assist in protecting, mapping, and removing the findings. Labor, tools, or equipment furnished by the Contractor for such work will be paid for in accordance with the requirements of [the Contract Documents](#). Findings shall become the property of the Commonwealth unless they are located on federal lands, in which event they shall become the property of the U.S. government.

When such findings delay the progress or performance of the work, the Contractor shall notify the Engineer in accordance with the provisions of [the Contract Documents](#).

(e) Storm Water Pollution Prevention Plan and VPDES General Permit for the Discharge of Stormwater from Construction Activities

A Stormwater Pollution Prevention Plan (SWPPP) identifies potential sources of pollutants which may reasonably be expected to affect the stormwater discharges from the construction site and any on-site or off-site support facilities located on VDOT rights of way and easements. The SWPPP also describes and ensures implementation of practices which will be used to minimize or prevent pollutants in such discharges.

The SWPPP shall include, but not be limited to, the approved Erosion and Sediment Control (ESC) Plan, the approved Stormwater Management (SWM) Plan (if applicable), the approved Pollution Prevention Plan and all related Specifications and Standards and notes contained within all contract documents and shall be required for all land-disturbing activities that disturb 10,000 square feet or greater, or 2,500 square feet or greater in Tidewater, Virginia.

Land-disturbing activities that disturb one acre or greater require coverage under the Department of Environmental Quality's VPDES General Permit for the Discharge of Stormwater from Construction Activities (hereafter referred to as the VPDES Construction Permit). According to [IIM-LD-242](#), VDOT will apply for and secure VPDES Construction Permit coverage for all applicable land disturbing activities on VDOT rights of way or easements for which it has contractual control, including off-site (outside the project limits) support facilities on VDOT rights of way or easements that directly relate to the construction activity.

The Contractor shall be responsible for securing VPDES Construction Permit coverage and complying with all permit conditions for all support facilities that are not located on VDOT rights of way or easements.

The required contents of a SWPPP for those land disturbance activities requiring coverage under the VPDES Construction Permit are found in Section II of the permit.

While a SWPPP is an important component of the VPDES Construction Permit, it is only one of the many requirements that must be addressed in order to be in full compliance with the conditions of the permit.

The Contractor and all other persons that oversee or perform activities covered by the VPDES Construction Permit shall be responsible for reading, understanding, and complying with all of the terms, conditions and requirements of the permit and the project's SWPPP including, but not limited to, the following:

1. Project Implementation Responsibilities

The Contractor shall be responsible for the installation, maintenance, inspection, and, on a daily basis, ensuring the functionality of all erosion and sediment control measures and all other stormwater runoff control and pollution prevention

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measures identified within or referenced within the SWPPP, the construction plans, the specifications, all applicable permits, and all other contract documents.

The Contractor shall be solely responsible for the temporary erosion and sediment control protection and permanent stabilization of all borrow areas and soil disposal areas located outside of VDOT right of way or easement.

The Contractor shall prevent or minimize any stormwater or non-stormwater discharge that will have a reasonable likelihood of adversely affecting human health or public and/or private properties.

2. Certification Requirements

In addition to satisfying the personnel certification requirements contained in Section 107.16(a) of the Specifications, the Contractor shall certify his activities by completing, signing, and submitting Form C-45 VDOT SWPPP Contractor Certification Statement to the Engineer at least 7 days prior to commencing any project related land-disturbing activities, both within the project limits and any support facilities located on VDOT rights of way or easements outside the project limits.

3. SWPPP Requirements for Support Facilities

VDOT will secure VSMP Construction Permit coverage for support facilities located on VDOT rights of way or easements according to [IIM-LD-242](#). The Contractor shall be responsible for securing separate VSMP Construction Permit coverage for support facilities that are not located on VDOT rights of way or easements.

Support facilities shall include, but not be limited to, borrow and disposal areas, construction and waste material storage areas, equipment and vehicle washing, maintenance, storage and fueling areas, storage areas for fertilizers, fuels or chemicals, concrete wash out areas, sanitary waste facilities and any other areas that may generate a stormwater or non-stormwater discharge directly related to the construction site.

The Contractor shall develop and enforce a Spill Prevention Control and Countermeasure (SPCC) Plan conforming to 40 CFR 112 if the aggregated volume of Oil stored within the project limits at any one time is greater than 1320 gallons. Oil, in this context, shall be defined according to 40 CFR 112. The aggregated volume includes that of both stationary and portable storage facilities but does not include individual storage containers with less than a 55 gallon capacity. The contractor shall include the SPCC Plan as a part of his Pollution Prevention Plan for the project.

Support Facilities located on VDOT rights of way or easements:

- a. For those support facilities located within the project limits but not included in the construction plans for the project, the Contractor shall develop a SWPPP according to [IIM-LD-246](#) which shall include, where applicable, an erosion and sediment control plan according to [IIM-LD-11](#), a stormwater management plan according to [IIM-LD-195](#) and a pollution prevention plan, according to these Specifications and the SWPPP General Information Sheet notes in the construction plans or other such contract documents. All plans developed shall be reviewed and approved by appropriate personnel certified through DEQ's ESC and

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SWM Certification program and shall be submitted to the Engineer for review and approval. Once approved, the Engineer will notify the Contractor in writing that the plans are accepted as a component of the Project's SWPPP and VPDES Construction Permit coverage (where applicable) and shall be subject to all conditions and requirements of the VPDES Construction Permit and all other contract documents. No land disturbing activities can occur in the support area(s) until written notice to proceed is provided by the Engineer.

- b. For support facilities located outside the project limits and not included in the construction plans for the project, the Contractor shall develop a SWPPP according to [IIM-LD-246](#) which shall include, where applicable, an erosion and sediment control plan according to [IIM-LD-11](#), a stormwater management plan (where applicable) according to [IIM-LD-195](#), a pollution prevention plan according to these specifications and the SWPPP General Information Sheet notes in the construction plans or other such contract documents and all necessary documents for obtaining VPDES Construction Permit coverage according to [IIM-LD-242](#). All plans developed shall be reviewed and approved by appropriate personnel certified through DEQ's ESC and SWM Certification program and shall be submitted to the Engineer for review and approval. Once approved by the Engineer, VDOT will secure VPDES Construction Permit coverage according to [IIM-LD-242](#). After VDOT secures VPDES Construction Permit coverage for the support facility, the Engineer will notify the Contractor in writing. The support facility shall be subject to all conditions and requirements of the VPDES Construction Permit and all other contract documents. No land disturbing activities can occur in the support area(s) until written notice to proceed is provided by the Engineer.

4. Inspection Procedures

a. Inspection Requirements

The Contractor shall be responsible for conducting site inspections according to the requirements herein. Site inspections shall include erosion, sediment control, and pollution prevention practices and facilities; all areas of the site disturbed by construction activity; all on-site support facilities; and all off site support facilities within VDOT right of way or easement. The Contractor shall document such inspections by completion of Form C-107, Construction Runoff Control Inspection Form, according to the directions contained within the form. Inspections shall be conducted using one of the following schedules:

- Schedule 1 - At least once every 7 calendar days (equivalent to the once every five business days schedule in the VPDES *General Permit for Discharge of Stormwater from Construction Activities*) and within 48 hours following any measureable storm event. If a measureable storm event occurs when there are more than 48 hours between business days, the Contractor shall perform his inspection no later than the next business day. The Contractor shall install a rain gage at a central location on the project site for the purposes of determining the occurrence of a measureable storm event. Where the project is of such a length that one rain gage may not provide an accurate representation of the occurrence of a measurable storm event over the entire

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project site, the Contractor shall install as many rain gages as necessary to accurately reflect the amount of rainfall received over all portions of the project. The Contractor shall observe all rain gages no less than once each business day at the time prescribed in the SWPPP General Information Sheet notes in the construction plans or other contract documents to determine if a measurable storm event has occurred. The procedures for determining the occurrence of a measurable storm event are identified in the SWPPP General Information Sheet notes in the construction plans or other contract documents.

- Schedule 2 - At least each Monday and Thursday (equivalent to the once every four business days schedule in the VPDES *General Permit for Discharge of Stormwater from Construction Activities*). Where Monday or Thursday is a non-business day, the inspection may be performed on the next business day afterward. In no case shall the inspections be performed less than once every four business days.

The inspection schedule (1 or 2) is to be selected prior to the beginning of land disturbance. Once an inspection schedule is selected, it shall be defined in the appropriate note in the SWPPP General Information Sheets contained in the construction plan set and shall be used for the duration of the project.

A business day is defined as Monday through Friday excluding State holidays. A measurable storm event is defined as one producing 0.25 inches of rainfall or greater over a 24 hour time period.

For those areas of the site that have been temporarily stabilized or where land disturbing activities have been suspended due to continuous frozen ground conditions and stormwater discharges are unlikely, the inspection schedule may be reduced to once per month. If weather conditions (such as above freezing temperatures or rain or snow events) make stormwater discharges likely, the Contractor shall immediately resume the regular inspection schedule. Those definable areas where final stabilization has been achieved will not require further inspections provided such areas have been identified in the project's Stormwater Pollution Prevention Plan.

b. Corrective Actions

If a site inspection identifies an existing control measure that is not being maintained properly or operating effectively or an existing control measure that needs to be modified or locations where an additional control measure is necessary or any other deficiencies in the erosion and sediment control and pollution prevention plan, corrective action(s) shall be completed as soon as practical and prior to the next anticipated measurable storm event but no later than seven days after the date of the site inspection that identified the deficiency.

5. Unauthorized Discharges and Reporting Requirements

The Contractor shall not discharge into state waters sewage, industrial wastes, other wastes or any noxious or deleterious substances nor shall he otherwise alter the physical, chemical, or biological properties of such waters that render

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such waters detrimental for or to domestic use, industrial consumption, recreational or other public uses.

(1) Notification of non-compliant discharges

The Contractor shall immediately notify the Engineer upon the discovery of or the potential of any unauthorized, unusual, extraordinary, or non-compliant discharge from the land construction activity or any of support facilities located on VDOT right of way or easement. Where immediate notification is not possible, such notification shall be not later than 24 hours after said discovery.

(2) Detailed report requirements for non-compliant discharges

The Contractor shall submit to the Engineer within 5 days of the discovery of any actual or potential non-compliant discharge a written report describing details of the discharge to include a description of the nature and location of the discharge, the cause of the discharge, the date of occurrence, the length of time that the discharge occurred, the volume of the discharge, the expected duration and total volume if the discharge is continuing, a description of any apparent or potential effects on private and/or public properties and state waters or endangerment to public health, and any steps planned or taken to reduce, eliminate and prevent a recurrence of the discharge. A completed Form C-107 shall be included in such reports.

6. Changes and Deficiencies

The Contractor shall report to the Engineer when any planned physical alterations or additions are made to the land disturbing activity or deficiencies in the project plans or contract documents are discovered that could significantly change the nature of or increase the potential for pollutants discharged from the land disturbing activity to surface waters and that have not previously been addressed in the SWPPP.

7. Amendments, Modifications, Revisions and Updates to the SWPPP

- a. The Contractor shall amend the SWPPP whenever site conditions, construction sequencing or scheduling necessitates revisions or modifications to the erosion and sediment control plan, the pollution prevention plan or any other component of the SWPPP for the land disturbing activity or onsite support facilities,
- b. The Contractor shall amend the SWPPP to identify any additional or modified erosion and sediment control and pollution prevention measures implemented to correct problems or deficiencies identified through any inspection or investigation process.
- c. The Contractor shall amend the SWPPP to identify any new or additional person(s) or contractor(s) not previously identified that will be responsible for implementing and maintaining erosion and sediment control and pollution prevention devices.
- d. The Contractor shall update the SWPPP to include:

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- (1) A record of dates when, major grading activities occur, construction activities temporarily or permanently cease on a portion of the site and stabilization measures are initiated.
 - (2) Documentation of replaced or modified erosion and sediment control and pollution prevention controls where periodic inspections or other information have indicated that the controls have been used inappropriately or incorrectly.
 - (3) Identification of areas where final stabilization has occurred and where no further SWPPP or inspection requirements apply.
 - (4) The date of any prohibited discharges, the discharge volume released, and what actions were taken to minimize the impact of the release.
 - (5) A description of any measures taken to prevent the reoccurrence of any prohibited discharge.
 - (6) A description of any measures taken to address any issues identified by the required erosion and sediment control and pollution prevention inspections.
- e. The Contractor shall update the SWPPP no later than seven days after the implementation and/or the approval of any amendments, modifications or revisions to the erosion and sediment control plan, the pollution prevention plan or any other component of the SWPPP.
 - f. Revisions or modifications to the SWPPP shall be approved by the Engineer and shall be documented by the Contractor on a designated plan set (Record Set) according to IIM-LD-246. All updates to the SWPPP shall be signed by the Contractor and the VDOT Responsible Land Disturber (RLD).
 - g. The record set of plans shall be maintained with other SWPPP documents on the project site or at a location convenient to the project site where no on site facilities are available.

107.18 - Sanitary Provisions

The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of employees as may be necessary to comply with the requirements of the state and local Board of Health or other bodies or tribunals having jurisdiction.

SECTION 202—FINE AGGREGATE

202.01—Description

These specifications cover material for use as fine aggregate in hydraulic cement concrete, mortar, asphalt concrete, and asphalt surface treatments.

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202.02—Materials

Fine aggregate is classified herein in accordance with its occurrence or method of manufacture as natural sand or stone sand. Natural sand shall consist of grains of hard, sound material, predominantly quartz, occurring in natural deposits or in loosely bound deposits, such as sandstone conglomerate. Stone sand shall consist of sound crushed particles of approved Grade A stone, essentially free from flat or elongated pieces, with sharp edges and corners removed.

Fine aggregates for use in hydraulic cement concrete that are obtained from more than one source shall not be used alternately or mixed without the consent of the Engineer.

202.03—Detail Requirements

- (a) **Grading:** Grading shall conform to the requirements of Table II-1. Tests will be performed in accordance with the requirements of AASHTO T27.
- (b) **Soundness:** Soundness shall conform to the requirements of Table II-2. Tests will be performed in accordance with the requirements of AASHTO T103 or T104.
- (c) **Organic Impurities:** When fine aggregate is to be used in hydraulic cement concrete, the percentage of organic impurities shall conform to the requirements of AASHTO T21; however, material producing a darker color than that specified in AASHTO T21 may be accepted in accordance with the requirements of AASHTO M6.
- (d) **Void Content:** Void content will be tested in accordance with the requirements of VTM-5.
- (e) **Deleterious Material:** The amount of deleterious material in sands shall be not more than the following:

Material	% by Weight	AASHTO Test Method
Clay lumps	0.25	T112
Shale, mica, coated grains, soft or flaky particles	1.0	T113
Organic material	0	T21
Total material passing No. 200 sieve by washing ¹		T11 and T27
For use in concrete subject to abrasion	3	
For other concrete	5	

¹In the case of stone sand, if the material passing the No. 200 sieve is dust of fracture, essentially free from clay and shale, the percentages shown for use in concrete subject to abrasion and in other concrete may be increased to 5.0 percent and 7.0 percent, respectively.

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**TABLE II-1
Fine Aggregate**

Amounts Finer Than Each Laboratory Sieve (Square Opening) (% by Weight)								
Grading	3/8 in.	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200
A	Min. 100	95-100	80-100	50-85	25-60	5-30	Max. 10	
B	Min. 100	94-100					Max. 10	
C	Min. 100	94-100				Max. 25		

**TABLE II-2
Soundness**

Use	Max. Soundness Loss (%)	
	Magnesium Sulphate (5 Cycles)	Freeze and Thaw (100 Cycles)
Hydraulic cement concrete	18	8
Asphalt concrete surfaces and surface treatments	25	15
Asphalt concrete bases	30	15

SECTION 203—COARSE AGGREGATE

203.01—Description

These specifications cover material for use as coarse aggregate in hydraulic cement concrete, asphalt concrete, asphalt surface treatments, and drainage.

203.02—Materials

Coarse aggregate shall consist of crushed stone, crushed slag, crushed or uncrushed gravel with clean, hard, tough, and durable pieces free from adherent coatings and deleterious amounts of friable, thin, elongated, or laminated pieces; soluble salts; or organic materials.

- (a) **Crushed hydraulic cement concrete** will be permitted for use as a coarse aggregate provided it conforms to the physical requirements specified herein and shows no adverse chemical reaction. Crushed hydraulic cement concrete will not be permitted in the following: (1) reinforced cement concrete, (2) in combination with other materials in contact with geotextile fabric when such fabric is used as a drainage item, and (3) in backfill or bedding for perforated pipe.

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- (b) **Crushed gravel** shall consist of particles of which at least 80 percent by weight shall have at least one face fractured by artificial crushing. Tests will be performed in accordance with the requirements of VTM-15.
- (c) **Blast furnace slag** shall be relatively free from foreign minerals and glassy or spongy pieces. It shall weigh at least 70 pounds per cubic foot, dry rodded, for size No. 68 and smaller and at least 65 pounds per cubic foot, dry rodded, for larger sizes. Tests will be performed in accordance with the requirements of AASHTO T19. When used in asphalt surface treatments, blast furnace slag shall contain not more than 10 percent nonporous material and shall have an absorption of at least 3 percent. Tests will be performed in accordance with the requirements of AASHTO T85.
- (d) **Crushed glass** shall consist of particles of curbside-collected or waste glass. It shall be free from sources of glass that include automotive glass, lead crystal, TV monitors, lighting fixtures and electronics applications. Non-glassy material associated with curbside collection (paper, capping materials, etc.), excluding fragments of broken ceramics and pottery, shall be limited to 5 percent by weight using a gravimetric determination, and including loss on ignition performed in accordance with the requirements of ASTM D2974. One hundred percent of the crushed glass shall pass the 9.5 mm (3/8 inch) sieve with less than 5 percent passing the No. 200 sieve. Crushed glass shall not be used in hydraulic cement concrete, asphalt, base/subbase, or exposed shoulder applications.

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TABLE II-3
Sizes of Open-Graded Coarse Aggregates

Amounts Finer Than Each Laboratory Sieve (Square Openings) (% by Weight)															
Va. Size No.	4 in.	3½ in.	3 in.	2½ in.	2 in.	1½ in.	1 in.	¾ in.	½ in.	3/8 in.	No. 4	No. 8	No. 16	No. 50	No. 100
1	Min. 100	90-100		25-60		Max. 15		Max. 5							
2			Min. 100	90-100	35-70	Max. 15		Max. 5							
3				Min. 100	90-100	35-70	0-15		Max. 5						
357				Min. 100	95-100		35-70		10-30		Max. 5				
5						Min. 100	90-100	20-55	Max. 10	Max. 5					
56						Min. 100	90-100	40-85	10-40	Max. 15	Max. 5				
57						Min. 100	95-100		25-60		Max. 10	Max. 5			
67							Min. 100	90-100		20-55	Max. 10	Max. 5			
68							Min. 100	90-100		30-65	5-25	Max. 10	Max. 5		
7								Min. 100	90-100	40-70	Max. 15	Max. 5			
78								Min. 100	90-100	40-75	5-25	Max. 10	Max. 5		
8									Min. 100	85-100	10-30	Max. 10	Max. 5		
8P									Min. 100	75-100	5-30	Max. 5			
9										Min. 100	85-100	10-40	Max. 10	Max. 5	
10										Min. 100	85-100				10-30

203.03—Detail Requirements

- (a) **Grading:** Open-graded aggregates shall conform to the requirements of Table II-3. Tests will be performed in accordance with the requirements of AASHTO T27.
- (b) **Soundness:** Soundness shall conform to the requirements of Table II-4. Tests will be performed in accordance with the requirements of AASHTO T103 or T104. The requirement for soundness test for crushed glass is waived due to its preclusion from the applications shown in Table II-4.
- (c) **Abrasion Loss:** Abrasion loss shall conform to the requirements of Table II-5. Tests will be performed in accordance with the requirements of AASHTO T96 on aggregate with a grading the most nearly identical with the grading to be used in the work.

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- (d) **Deleterious Material:** The amount of deleterious material shall be not more than the following:

Material	% by Weight	AASHTO Test Method
Coal and lignite	0.25	T113
Clay lumps	0.25	T112
Material passing No. 200 sieve by washing ¹	1.00	T11

¹When the material passing the No. 200 sieve by washing is dust of fracture, the percentage of deleterious material may be increased to 1.50 percent.

**TABLE II-4
Soundness**

Use	Max. Soundness Loss (%)	
	Magnesium Sulphate (5 Cycles)	Freeze and Thaw (100 Cycles)
Hydraulic cement concrete	12	5
Asphalt surface courses	15	6
Asphalt and aggregate bases	20	7
Select material (Type I) and subbase	30	12

**TABLE II-5
Abrasion**

Use	Max. Los Angeles Abrasion Loss (%)	
	100 Rev.	500 Rev.
Grade A stone	9	40
Grade B stone	12	45
Grade C stone	14	50
Slag	12	45
Gravel	12	45

- (e) **Flat and Elongated Particles:** Coarse aggregate to be used as a riding surface during construction activities or as the riding surface after construction shall contain not more than 30 percent by mass of aggregate particles retained on and above the 3/8-inch sieve having a maximum to minimum dimensional ratio greater than 5 as determined in accordance with the requirements of ASTM D4791.

SECTION 204—STONE FOR MASONRY, RIPRAP, POROUS BACKFILL, AND GABIONS

204.01—Description

These specifications cover aggregate materials used to protect ground slopes from erosion or wave action and those used for drainage, generally behind a backwall or abutment.

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204.02—Detail Requirements

- (a) **Stone for rubble or mortar rubble masonry** shall be sound, durable, and free from seams, cracks, and other structural defects and shall be minimum Grade C stone free from rounded, worn, or weathered surfaces.
- (b) **Stone for riprap and bedding** shall be sound, durable, and free from seams, cracks, and other structural defects. Riprap stone and bedding exposed to the wave action of water shall be of igneous or metamorphic origin. Riprap bedding shall be crushed stone, minimum Grade B.
- (c) **Porous backfill** shall be aggregate size No. 78 or No. 8, a minimum Grade B. Crushed glass meeting the gradation requirements specified in Section 203.02(d) of the Specifications can be directly substituted for size No. 78 and 8 aggregates.
- (d) **Gabion stone** shall be durable and free from seams and cracks. Weathered stone shall not be used. Stone shall weigh between 4 and 30 pounds except that approximately 5 percent of the individual stones may weigh less than 4 or more than 30 pounds. At least 50 percent of the stone shall weigh more than 10 pounds.

SECTION 214—HYDRAULIC CEMENT

214.01—Description

These specifications cover cements that harden when mixed with water. The various types have special characteristics to be used as denoted in other parts of these specifications.

214.02—Detail Requirements

- (a) **Blended hydraulic cement** shall conform to the requirements of AASHTO M240, Type I(P) or Type I(S).
- (b) **Portland cements** shall conform to the requirements of AASHTO M85 except as follows:
 - 1. The SO_3 content as specified in AASHTO M85 will be permitted, provided supporting data specified in AASHTO M85 are submitted to the Department for review and acceptance prior to use of the material.
 - 2. Type I and Type II cement shall contain not more than 1.0 percent alkalies (% $\text{Na}_2\text{O} + \% 0.658\text{K}_2\text{O}$).
- (c) **Expansive hydraulic cement** shall conform to the requirements of ASTM C 845 Type K.

SECTION 215—HYDRAULIC CEMENT CONCRETE ADMIXTURES

215.01—Description

These specifications cover materials that are chemical or organic elements that may be added to a concrete mixture, when permitted elsewhere in these specifications, to achieve some desired effect.

215.02—Materials

- (a) **Air-entraining admixtures** shall conform to the requirements of AASHTO M154.
- (b) **Water-reducing and retarding admixtures** shall conform to the requirements of AASHTO M194, Type D, and shall be free from water-soluble chlorides.

Use of water-reducing and retarding admixtures that have not been tested for compatibility with the brand, type, source, and quantity of cement proposed for use will not be permitted until tests have been performed in accordance with the requirements of VTM-16 and the test results conform to the requirements of Table I therein.
- (c) **Water-reducing admixtures** shall conform to the requirements of AASHTO M194, Type A, and shall be free from water-soluble chlorides.
- (d) **Accelerating admixtures** shall conform to the requirements of AASHTO M194, Type C or E.
- (e) **High-range water-reducing and high-range water-reducing and retarding admixtures** shall conform to the requirements of AASHTO M194, Type F or G, and shall be free from water-soluble chlorides.
- (f) **Calcium chloride** shall conform to the requirements of AASHTO M144, Type 2.
- (g) **Pozzolan** shall conform to Section 241 of the Specifications.
- (h) **Granulated iron blast-furnace slag** shall conform to the requirements of ASTM C989, Grade 100 or 120.
- (i) **Silica fume** shall conform to the requirements of AASHTO M307.
- (j) **Corrosion inhibitor** shall contain a minimum 30 percent solution of calcium nitrate or other approved material.
- (k) **Metakaolin** shall conform to the requirements of AASHTO M321.

215.03—Detail Requirements

Approved admixture(s) shall be used in concrete in the proportions recommended by the manufacturer to obtain the optimum effect where seasonal, atmospheric, or job conditions dictate its use.

Only admixtures (a) through (e) that appear on the Department's approved products list shall be used. Initial approval will be based on independent laboratory data submitted by the

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manufacturer. Following initial approval of concrete admixtures, the manufacturer shall annually certify to the Engineer in writing that the material currently being furnished is identical in both composition and chemical concentrations with the material for which the laboratory tests were performed. If the Contractor proposes to use an admixture that differs in concentration from the acceptance sample, a certificate shall be required from the manufacturer stating that the chemical composition of the material is essentially the same as that of the approved mixture.

When placing concrete by pumping is authorized, the use of pump-aid admixtures approved by the Department will be allowed provided they are used in accordance with the manufacturer's recommendations.

SECTION 216—WATER FOR USE WITH CEMENT OR LIME

216.01—Description

These specifications cover water for use in mixing with cement or lime.

216.02—Detail Requirements

Water shall be clean, clear, and free from oil, acid, salt, alkali, organic matter, or other deleterious substances.

Water that has been approved for drinking purposes may be accepted without testing for use in hydraulic cement concrete, cement, or lime stabilization. Water from other sources and pumping methods shall be approved by the Engineer before use.

The acidity or alkalinity of water will be determined colorimetrically or electrometrically. Water shall have a pH between 4.5 and 8.5. When subjected to the mortar test in accordance with the requirements of AASHTO T26, water shall produce a mortar having a compressive strength of at least 90 percent of a mortar of the same design using distilled water.

Wash water from hydraulic cement concrete mixer operations will be permitted to be reused in the concrete mixture provided it is metered and is 25 percent or less of the total water. The total water shall conform to the acceptance criteria of ASTM C1602, Tables 1 and 2. A uniform amount of wash water shall be used in consecutive batches, with subsequent admixture rates adjusted accordingly to produce a workable concrete conforming to the requirements of the Specifications.

SECTION 218—HYDRAULIC CEMENT MORTAR AND GROUT

218.01—Description

These specifications cover hydraulic cement mortar and grout used in bonding units together, filling voids, and making surface repairs.

218.02—Materials

- (a) **Hydraulic cement** shall conform to the requirements of Section 214.
- (b) **Fine aggregate** shall conform to the requirements of Section 202.

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- (c) **Water** shall conform to the requirements of Section 216.
- (d) **Admixtures** shall conform to the requirements of Section 215.

218.03—Detail Requirements

Hydraulic cement mortar and grout shall consist of a mixture of hydraulic cement, fine aggregate, water, and admixtures as specified herein.

Hydraulic cement mortar and grout shall contain from 3 to 7 percent entrained air. Air-entrained hydraulic cement may be used. Hydraulic cement mortar and grout shall be mixed with the minimum amount of water necessary to obtain the required consistency.

- (a) **Hydraulic cement mortar** shall consist of 1 part hydraulic cement, 2 1/2 parts fine aggregate by weight, and sufficient water to produce a stiff mixture. Grading C fine aggregate shall be used.
- (b) **Nonshrink mortar** shall consist of 1 part hydraulic cement, 2 parts fine aggregate by weight, a set retarder or other admixture that will reduce the amount of required mixing water, and sufficient water to produce a stiff mixture. Grading C fine aggregate shall be used.
- (c) **Hydraulic cement grout** shall consist of 1 part hydraulic cement, 2 parts fine aggregate by weight, and sufficient water to produce a free-flowing mixture. Grading A or C fine aggregate shall be used.
- (d) **High-strength grout and mortar** shall consist of a prepackaged, nonshrink hydraulic cement mixture conforming to the requirements of ASTM C1107 modified by the following: the grout/mortar shall develop a 7-day compressive strength of at least 4,000 pounds per square inch when tested in accordance with the requirements of ASTM C109 and a 7-day bond strength of at least 1,000 pounds per square inch when tested in accordance with the requirements of VTM-41, except that epoxy shall not be used to develop the bond.

SECTION 223—STEEL REINFORCEMENT

223.01—Description

These specifications cover steel items designed to give added flexural strength to hydraulic cement concrete or to control and reduce cracking.

223.02—Detail Requirements

- (a) **Reinforcement:**
 - 1. **Welded wire fabric** shall conform to the requirements of ASTM A185. When used in continuously reinforced pavement, wire fabric shall be deformed and furnished in flat sheets and shall conform to the requirements of ASTM A497, high yield of 70,000 pounds per square inch.

SECTION 232—PIPE AND PIPE ARCHES

232.01—Description

These specifications cover materials used for the conveyance of water, including drainage, storm water, sanitary systems, and waste water.

232.02—Detail Requirements

Concrete, corrugated steel and polyethylene pipe shall only be supplied from manufacturers currently having an approved Quality Control Plan on file with the Department.

(a) Concrete Pipe:

1. **Concrete pipe for culverts and sewers** shall be circular or elliptical in cross-section, either plain concrete or reinforced concrete, and of the modified tongue-and-groove design in sizes up to and including 18 inches in internal diameter and either standard or modified reinforced tongue-and-groove in sizes above 18 inches in internal diameter. Pipe shall conform to the specified AASHTO requirements except that pipe having an internal diameter of 36 inches or less shall be manufactured without lift holes. Pipe larger than 36 inches in internal diameter may be manufactured with lift holes provided the holes are created by molding, forming, coring, or other methods to be cylindrical or conical in shape and are sufficiently smooth to permit plugging with an elastomeric or other approved plug type.
- a. **Plain concrete culvert pipe** shall be composed of hydraulic cement, water, and mineral aggregates conforming to the requirements of b(3) and b(4) herein. Pipe shall conform to the following:

Min. Inside Diameter (in)	Min. Wall Thickness (in)	Groove Depth (in)	Crushing Strength (lb/lin ft)
12	1 3/4	1 3/4	1,800
15	2	1 3/4	2,125
18	2	1 3/4	2,400
21	2 3/4	2	2,700
24	3	2 1/4	3,000

Pipe shall also comply with the requirements of AASHTO M170 for manufacture, finish, marking, inspection, and rejection.

b. Reinforced concrete culvert pipe:

- (1) **Circular pipe** shall conform to the requirements of AASHTO M170, class as specified, or AASHTO M242. Circular pipe that does not have values listed in the AASHTO M170 design tables for diameter, wall thickness, compressive strength, and reinforcement shall be certified in accordance with the requirements of the Contract Documents. Pipe conforming to the requirements of AASHTO M242 shall also be certified in accordance with the requirements of the Contract Documents.
- (2) **Elliptical pipe** shall conform to the requirements of AASHTO M207, class as specified. Elliptical pipe that does not have values listed in the AASHTO M207

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design tables for wall thickness, compressive strength, and reinforcement shall be certified in accordance with the requirements of the Contract Documents.

- (3) **Fine aggregate** shall conform to the requirements of Section 202 for quality except that the void content, grading, and uniformity shall be controlled as necessary to produce the specified level of strength and absorption.
- (4) **Coarse aggregate** shall conform to the requirements of Section 203 for Grade A crushed stone or gravel.
- (5) **Positioning of reinforcement** when two layers of wire or bar reinforcement are used shall be such that welded joints are at an angle of approximately 60 degrees to each other.
- (6) **Strength tests** shall be performed by the three-edge bearing method in accordance with the requirements of AASHTO T280 or by control cylinders tested in accordance with ASTM C31 and C39 or by the testing of cores in accordance with ASTM C42. Control cylinders for acceptance testing shall be cured under the same conditions as the concrete the cylinders represent. Hand cast pipe and end sections may be tested in accordance with the requirements of ASTM C31 and C39. Concrete pipe may be shipped after reaching 85 percent of design strength as determined by control cylinders or cores.
- (7) **Absorption tests** shall be performed in accordance with the requirements of AASHTO T280 on specimens of broken pipe or cores.

2. **Concrete pipe for underdrains** shall conform to the requirements of AASHTO M86, Class I, and the perforation requirements of AASHTO M175, Type I, except that spalls shall be not more than 1 1/2 inches in diameter or 3/16 inch in depth and shall not adjoin. When used as combination underdrains, pipe shall not be perforated.

Porous concrete pipe for underdrains shall conform to the requirements of AASHTO M176, standard strength.

3. **Concrete pipe for water lines, water mains, and sanitary sewers:**

- a. **Concrete pressure pipe** (steel cylinder) shall conform to the requirements of AWWA C300, AWWA C301, or AWWA C303 for the size, minimum working pressure, protective coating, seal coat, and type of joint as specified.
- b. **Nonreinforced concrete sanitary sewer pipe** shall conform to the requirements of AASHTO M86 for the class specified.
- c. **Reinforced concrete water pipe** (noncylinder) shall conform to the requirements of AWWA C302 for size, minimum working pressure, seal coat, protective coating, and type of joint specified.
- d. **Reinforced concrete sanitary sewer pipe** shall conform to the requirements of AASHTO M170 for the class specified.

- (b) **Cast Iron and Ductile Iron Pipe and Fittings:**

1. **Cast iron pipe** shall conform to the requirements of ASTM A888 for the class specified.

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2. **Ductile iron pipe** shall conform to the requirements of AWWA C151 for size, joint type, class, type of coating and lining as specified, and minimum working pressure if applicable. Flanged joints shall conform to the requirements of AWWA C115.
3. **Fittings** for cast iron and ductile iron pipe for water lines, water mains, and sanitary sewers shall conform to the requirements of AWWA C110 (ANSI A21.10) or AWWA C153 (ANSI A21.53) for size, joint type, pressure rating, and type of coating and lining as specified.
4. **Cement mortar linings** shall conform to the requirements of AWWA C104 (ANSI A21.4).

(c) Steel Pipe:

1. **Corrugated steel culvert pipe and pipe arches** shall conform to the requirements of AASHTO M36 except that helically formed pipe shall be tested in accordance with the requirements of AASHTO T249 at the rate of one test per week per corrugation machine per work shift. Records of such test shall be maintained for a period of 24 months. Pipe shall be fabricated from materials conforming to AASHTO M218 for galvanized pipe, AASHTO M274 for aluminum coated pipe, AASHTO M246 for polymer coated pipe and AASHTO M289 for aluminum zinc alloy coated pipe. Steel spiral rib pipe shall be of smooth wall spiral rib construction. When connecting bands or flared end sections are required, helically formed pipe shall have rerolled ends with a minimum of two annular corrugations. End sections shall be produced in accordance with the general requirements of AASHTO M36 from materials conforming to the applicable requirements of AASHTO M218 for use with galvanized pipe, AASHTO M274 for use with aluminum-coated or polymer coated pipe, or AASHTO M289 for use with aluminum zinc alloy-coated pipe.

Pipe sections shall be joined with annular corrugated bands, hugger bands, or maxidimple bands conforming to the requirements of AASHTO M36 and shall be designed to form a leak-resistant joint. Maxidimple bands shall have two rows of circumferential dimples spaced approximately 4 to 6 inches on center. Coupling band widths shall be at least 7 inches for pipe 12 through 30 inches in diameter and 10 1/2 inches for pipe 36 through 120 inches in diameter. Coupling bands shall be not more than 0.109 inch (12 gage) and not less than 0.052 inch (18 gage) in thickness, and the thickness shall be equal to the pipe thickness or up to two numerical thicknesses lighter than the pipe thickness. (*Example:* For 12-gage pipe, coupling bands may be 12, 14, or 16 gage.) Coupling bands shall have the same metallic or polymer coating as the pipe sections on which they are connecting.

2. **Corrugated steel pipe for underdrains** shall conform to the requirements of AASHTO M36.
3. **Black and galvanized steel pipe:**
 - a. **Black steel pipe for bridge deck drains and drainage systems** shall conform to the requirements of ASTM A53, extra strong (Schedule 80), with a wall thickness of at least 0.337 inch except that the hydrostatic test will not be required.
 - b. **Galvanized steel pipe for handrails** shall conform to the requirements of ASTM A120 or ASTM A53 for standard or extra strong pipe as indicated except that the hydrostatic test will not be required.

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- c. **Black and galvanized steel pipe for miscellaneous items** shall conform to the requirements of ASTM A53 except that the hydrostatic test will be required only when the pipe is used as pressure pipe.
- 4. **Smooth wall pipe (jacked or casing for general use):**
 - a. **Steel encasement pipe** shall conform to the requirements of ASTM A139 with a minimum wall thickness of 0.500 inch or ASTM A53 Standard Weight Class and shall have beveled edges suitable for welding or be threaded. The hydrostatic test for such pipe will be waived.
 - b. **Pipe for jacking** shall be of sufficient strength, diameter and wall thickness to accomplish the specific task and shall be approved by the Engineer.
- 5. **Steel water pipe, flanges, and fittings:**
 - a. **Steel pipe** shall conform to the requirements of AWWA C200 for the minimum design working pressure, wall thickness, and type of pipe ends as specified. The protective coating shall conform to the requirements of AWWA C203 for coal tar protective coating, and the lining shall conform to the requirements of AWWA C205 for cement mortar lining.
 - b. **Flanges** shall conform to the requirements of AWWA C207 as specified for pressure rating and size.
 - c. **Fittings** shall conform to the requirements of AWWA C208.
- 6. **Galvanized steel water pipe and fittings:**
 - a. **Galvanized steel pipe** shall conform to the requirements of ASTM A53, Schedule 40 or 80, for the size; method of manufacture; type, plain or threaded; couplings; and class specified.
 - b. **Fittings** shall be galvanized malleable iron conforming to the requirements of ASTM A47. Threads shall conform to the requirements of ANSI B2.1.
- 7. **Concrete-lined corrugated steel pipe** shall conform to the requirements of Section 232.02(c)1. and shall be fabricated from material conforming to AASHTO M274 for aluminum coated pipe. The concrete lining shall be at least 1/8 inch in thickness over the inside crest of corrugation. Concrete for the lining shall be composed of cement, sand, and water, mixed to produce a dense, homogeneous lining.

Pipe sections shall be connected using a hugger band with O-rings. After pipe is installed, the separation between pipe sections shall be filled with a cement grout. After finishing, the area shall be sprayed with a liquid membrane-forming compound.
- 8. **Polymer coated steel pipe** shall conform to the requirements of Section (c)1 herein. Polymer coating material shall conform to AASHTO M246 and be composed of polyethylene and acrylic acid copolymer. Polymer coating shall have a minimum thickness of 0.01 inch and shall be applied to both sides of the pipe material. Polymer coating shall be labeled with the brand name of the material and the manufacture in accordance with AASHTO M246.
- 9. **Corrugated steel double wall pipe** shall conform to the requirements of Section (c)1 herein. Corrugated steel double wall pipe shall consist of a standard corrugated steel exterior shell that meets the structural requirements for the pipe and a smooth

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interior steel liner. The interior liner is to be continuously attached to the exterior shell along the lock seam. The interior liner is to have a minimum thickness of 0.052 inches. Both the exterior shell and the interior liner are to have a polymer coating applied to both sides of the pipe material in accordance with Section (c)9, herein.

- (d) **Structural Plate Pipe, Pipe Arches, and Arches:** Pipe, pipe arches, and arches shall conform to the requirements of AASHTO M167 for corrugated steel pipe and AASHTO M219 for aluminum alloy pipe.. When asphalt coating is required, it shall be an asphalt mastic applied to the structure after assembly. The asphalt mastic shall conform to the requirements of and be applied in accordance with the requirements of AASHTO M243.

(e) **Aluminum Alloy Pipe:**

1. **Corrugated aluminum alloy culvert pipe and pipe arches** shall conform to the requirements of AASHTO M196. Material used to produce end sections for use with corrugated aluminum alloy pipe shall conform to the requirements of AASHTO M196.

Aluminum spiral rib pipe used for storm drains shall conform to the requirements of AASHTO M196 except that it shall be of smooth wall, spiral ribbed construction. Connecting bands for aluminum drainpipe shall conform to the thickness and the corrugations or rib of the pipe to which they are connecting.

2. **Corrugated aluminum alloy pipe underdrains** shall conform to the requirements of AASHTO M196, Type III. When used as combination underdrains, pipe shall not be perforated.

- (f) **Vitrified Clay Pipe and Fittings:** Pipe and fittings shall conform to the requirements of AASHTO M65, extra strength, or, for sanitary sewer, may conform to the requirements of ASTM C700, extra strength. Joints for sanitary sewer shall conform to the requirements of ASTM C425. Plain and perforated clay pipe for drain fields shall conform to the requirements of ASTM C700, extra strength.

(g) **Polyvinylchloride (PVC) Pipe:**

1. **PVC water and pressure sewer pipe** shall conform to the requirements of AWWA C-900, PC-150, for water facilities and ASTM D1785 for pressure sewers and shall have a pressure rating of at least 150 pounds per square inch.
2. **PVC gravity sewer pipe** shall conform to the requirements of ASTM D3034; SDR35; ASTM F794, Series 46; or ASTM F949.
3. **PVC ribbed pipe for culverts and storm drains** shall conform to the requirements of AASHTO M304 or ASTM F949.
4. **PVC underdrains** shall conform to the requirements of ASTM F758, Type PS 28, or ASTM F949.

- (h) **Glass Fiber-Reinforced Epoxy Pipe and Fittings:** Pipe and fittings shall conform to the requirements of ASTM D2996, ASTM D2997, or AWWA C950 with a continuous rating of at least 150 pounds per square inch at 150 degrees F for pipe, fittings, and adhesive joints.

(i) **ABS Pipe:**

1. **ABS semiround underdrain pipe with top shield** shall be at least 4 5/8 inches in diameter with drain holes 1/4 or 3/8 inch in diameter drilled at least 7/8 inch apart under

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the roof line. Pipe shall weigh at least 0.80 pound per foot. When used as combination underdrains, pipe shall not be perforated.

2. **ABS sewer pipe and fittings** shall conform to the requirements of ASTM D2680 for the type of joints specified and shall have a pressure rating of at least 150 pounds per square inch.

(j) **Polyethylene (PE) Pipe:**

1. **PE corrugated underdrain pipe** shall conform to the requirements of AASHTO M252. Pipe shall be supplied in individual lengths with no lengths shorter than 10 feet. Coil pipe will be permitted only in 4-inch or 6-inch diameters provided it is machine installed. If the pipe starts to recoil during installation, the Contractor shall cease operations until a method of anchoring the pipe in the trench is approved. When used as combination underdrain or outlet pipe, the pipe shall be smooth wall, nonperforated.
2. **PE corrugated culvert pipe** shall conform to the requirements of AASHTO M294. PE pipe used for storm drains and entrances shall conform to the requirements of classification Type S. For all other applications, PE pipe shall be Type C or S.
3. **PE pipe and fittings** shall conform to the requirements of AWWA C-901 for water mains and ASTM D2239, Grade P34, for sanitary sewers and shall have a pressure rating of at least 150 pounds per square inch.

- (k) **Copper Water Pipe or Tubing:** Copper water pipe or tubing shall conform to the requirements of ASTM B88 and shall have the cast or wrought pattern. Fittings for concealed soft drawn pipe may be the flared mechanical type. Unions shall be the ground joint type.

- (l) **Polybutylene Pipe and Fittings:** Pipe and fittings shall conform to the requirements of AWWA C902 for water mains and ASTM F809 for sanitary sewers.

(m) **Polypropylene (PP) Pipe:**

1. **PP corrugated culvert and storm drain pipe** shall conform to the requirements of AASHTO MP 21-11, and shall be double wall pipe (Type S) for nominal diameters of 12 inches through 30 inches, inclusive, and shall be triple wall pipe (Type D) for nominal diameters of 36 inches through 48 inches, inclusive. Polypropylene Pipe less than 12 inches and greater than 48 inches in diameter will not be allowed. Fittings and joining systems shall also meet the requirements of the AASHTO MP 21-11.

SECTION 240—LIME

240.01—Description

These specifications cover lime to be used as a stabilizer or soil conditioner.

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240.02—Detail Requirements

- (a) **Hydrated lime** shall conform to the requirements of ASTM C207, Type N, except that the average percentage of calcium oxide shall be at least 93. Single test results shall not be below 90 percent.
- (b) **Hydraulic lime** shall conform to the requirements of ASTM C141.
- (c) **Agricultural lime:**
 - 1. **Ground limestone** shall be of such fineness that at least 86 percent will pass a No. 20 mesh screen, at least 47 percent will pass a No. 60 mesh screen, and at least 28 percent will pass a No. 100 mesh screen. Material shall have a calcium carbonate equivalent of at least 85 percent.
 - 2. **Pulverized limestone** shall be of such fineness that at least 90 percent will pass a No. 20 mesh screen and at least 66 percent will pass a No. 100 mesh screen. Material shall have a calcium carbonate equivalent of at least 85 percent.
- (c) **Lime for soil stabilization** shall be quicklime or hydrated lime conforming to the requirements of AASHTO M216.

SECTION 241—FLY ASH

241.01—Description

These specifications cover fly ash (burnt coal residue) used as an additive in hydraulic cement concrete or as a soil stabilizer.

241.02—Detail Requirements

- (a) **Fly ash used in hydraulic cement concrete** shall conform to the requirements of ASTM C618, Class F or Class C.
- (b) **Fly ash used in lime stabilization** shall conform to the requirements of ASTM C593. Bulk material may be used as approved by the Engineer.

SECTION 242—FENCES

242.01—Description

These specifications cover material specifications for temporary silt fences, geotextile fabric silt barriers, and filter barriers used for erosion control.

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242.02—Detail Requirements

(a) Temporary Silt Fences, Geotextile Fabric, Silt Barriers, and Filter Barriers:

1. **Geotextile fabric** shall conform to the requirements of Section 245.
2. **Posts for temporary silt fences** shall be a nominal 2 1/2 by 2 1/2 inch or 3 inch diameter No. 2 Southern pine, a nominal 2 by 2 inch oak, or steel having a weight of at least 1.25 pounds per linear foot and a length of at least 5 feet.
3. **Supports for temporary filter barriers** shall be a nominal 1 by 2 inch or 1 1/2 inch diameter No. 2 Southern Pine or oak or steel having a weight of at least 1.00 pound per linear foot and a length of at least 2.5 feet.

SECTION 244—ROADSIDE DEVELOPMENT MATERIALS

244.01—Description

These specifications cover the various materials, such as fertilizers, seeds, plants, sod, and mulch, for use in landscaping and materials used for soil retention to help prevent erosion.

244.02—Detail Requirements

(a) **Herbicides:** Herbicides shall be registered with the Virginia Department of Agriculture and Consumer Services in accordance with the Virginia Pesticide Law and shall be supplied in the manufacturer's containers clearly labeled as to the composition, brand, and name and address of the manufacturer.

1. **Herbicide for control of broadleaf weeds** shall contain at least 3 pounds of 2,4-D as an oil-soluble, water-emulsifiable amine salt. It shall have a shelf life of at least 2 years and shall be homogeneous with slight agitation. The type of amine salt and the actual acid equivalent per gallon shall be shown on the container.
2. **Herbicide for stump treatment** shall be dicamba CST and shall be applied in accordance with the manufacturer's registered label.

(b) **Topsoil:**

1. **Class A topsoil:** Class A topsoil shall be stockpiled topsoil that has been salvaged in accordance with the requirements of Section 303.04(a). It shall be the original layer of the soil profile formed under natural conditions, technically defined as the "A" horizon or as defined by the United States Department of Agriculture—Natural Resources Conservation Service (USDA—NRCS) Soil Survey Division. It shall be free from refuse and any other materials toxic to plant growth and subsoil, stumps, viable noxious weeds, roots, brush, rocks, clay lumps, or similar objects larger than 3 inches in any dimension.
2. **Class B topsoil:** Class B topsoil shall be topsoil furnished from sources outside the project limits and shall be the original top layer of a soil profile formed under natural conditions, technically defined as the "A" horizon or as defined by USDA—NRCS Soil Survey Division. It shall consist of natural, friable, loamy soil without admixtures of subsoil or other foreign materials and shall be free of viable noxious weed seed, plant propagules, brush, rocks or other litter, and rocks greater than 3 inches in any

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dimension. It shall have demonstrated by evidence of healthy vegetation growing or having grown on it prior to stripping that it is well drained and does not contain substances toxic to plants. The Contractor shall submit a source of materials for topsoil on the project prior to use. The Department reserves the right to reject any topsoil material not complying with the requirements of this specification.

The allowable pH range for Class B topsoil for use in establishing sod or turf shall be 5.5 to 7.0.

Class B topsoil shall be a "sandy loam," "loamy sand," or "sandy clay loam" soil as defined by the USDA Soil Textural Classification System with an organic matter content between 1 and 8 percent or as approved in writing by the Engineer.

3. **Testing and documentation:** The Contractor shall submit the following test reports to the Engineer for Class B topsoil prior to use. Testing shall be completed by an independent commercial soils testing laboratory:
 - a) **Soil analysis** of topsoil including pH factor, mechanical analysis (composition), salinity, percentage of organic content, and soil classification based thereon.
 - b) **Recommendations** on type and quantity of additives required to establish a satisfactory pH and bring the supply of nutrients to a level satisfactory for sustaining turf and/or for use as a soil mix for planting if applicable.
- (c) **Seeds:** Kinds and varieties of seeds shall be delivered to the project in separate sacks bearing a green seed label denoting that the seed was inspected and approved by the Virginia Crop Improvement Association. Open bags will not be accepted for use. Seeds shall be mixed under the observation of the Engineer on the project or at other approved locations. Seeds shall comply with applicable state and federal seed laws and contract requirements. Seed shall not be used until approved by the Engineer.

Seed shall be subject to inspection by Virginia State Seed Regulatory Inspectors of the Virginia Department of Agriculture and Consumer Services.

Seed tests shall be completed within the 9-month period prior to the beginning of the area scheduled seeding period during which the seed is to be used.

Seed shall not be or have been stored in an enclosure where herbicides, kerosene, or other material detrimental to seed germination is stored.

Noxious weed seeds, as defined by the rules and regulations adopted for enforcement of the Virginia Seed Law, will not be permitted. The number of restricted noxious weed seeds shall be not more than the number per ounce or per pound of noxious weed seeds specified in the rules and regulations of the Virginia Seed Law.

The tag from each sack of seed shall be signed by the Contractor and delivered to the Engineer after each sack is completely used.

- (d) **Fertilizers:** Fertilizer shall be uniform in composition, free flowing, and suitable for application with approved equipment. The fertilizer shall be delivered to the project in bags or other convenient containers, each fully labeled, and shall conform to all applicable state and federal laws and regulations. Additional nutrients shall be added only when specified in the contract documents. Fertilizer shall be subject to testing by the Virginia Department of Agriculture and Consumer Services. The Department

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reserves the right to reject fertilizer materials that do not comply with the requirements of these specifications or to be compensated in an amount as decided by the Engineer for failure of complying with the requirements of the Virginia Fertilizer Law. Other fertilizer products and rates may be substituted with the prior written approval from the Engineer.

A copy of the material safety data sheet (MSDS) shall be provided to the Department for each type of fertilizer supplied with each fertilizer delivery. Any fertilizer delivery that is not accompanied by the appropriate MSDS will be rejected.

1. **Fertilizer for seeding, sodding, sprigging, and plugging** shall have a guaranteed 1-2-1 ratio and a nitrogen, phosphorous, and potassium (NPK) analysis as detailed in the plans with a minimum 30 percent of the nitrogen from a slow release or slowly soluble source with the remainder of the nitrogen from urea or ammonium nitrate. The following types of slow release or slowly soluble nitrogen fertilizers may be used: urea formaldehyde (UF) (ureaform, methylene urea, and methylene diurea/dimethylene triurea); isobutylidene diurea (IBDU); sulfur-coated urea (SCU); and polycoated urea (PCU). UF products shall have a minimum activity index of 40 percent. The IBDU minimum size guide number shall be 230. All UF and IBDU products shall indicate the slow release/slowly available nitrogen source on the fertilizer analysis label as water-insoluble nitrogen. PCU and SCU shall have a minimum 3-month release duration for the total product. The phosphorous content of the fertilizer shall be triple superphosphate or diammonium phosphate. The potassium content of the fertilizer shall be potassium chloride, commonly known as muriate of potash. Slow release or slowly soluble fertilizers may be applied with a hydraulic seeder except for SCU. Fertilizer shall be applied in accordance with the requirements of Section 603.
 2. **Fertilizer for planting plants** shall have a guaranteed 1-2-1 ratio and a 15-30-15 analysis with a minimum of 40 to 50 percent of the nitrogen from one of the following slow release or slowly soluble sources, with the remainder of the nitrogen from urea or ammonium nitrate: soluble UF, SCU, and PCU. The UF products shall have a minimum activity index of 40 percent. SCU and PCU shall have a minimum 3-month release duration for the total product. Slow release or slowly soluble fertilizers shall be applied as a dry surface application as shown in the Department's *Road and Bridge Standards*, Volume II, Landscape Section.
- (e) **Lime:** Lime shall be agricultural grade ground limestone. Agricultural grade pulverized or pelletized lime products may be substituted at no additional cost to the Department.
- The material source shall be registered with and approved by the Virginia Department of Agriculture and Consumer Services in accordance with the Virginia Agricultural Lime Law and shall conform to the requirements of Section 240. All lime shall be subject to testing by the Virginia Department of Agriculture and Consumer Services. Other lime products may be substituted with approval from the Engineer.
- (f) **Inoculating Bacteria for Treating Leguminous Seeds:** Bacteria shall be a pure culture of nitrogen-fixing bacteria selected for maximum vitality. Cultures shall be not more than 1 year old and shall be subject to the approval of the Engineer.
- (g) **Mulch:** Mulch shall conform to the following unless otherwise approved in writing by the Engineer:
1. **Mulch for seeding** (vegetative) shall consist of dry straw or hay, free from noxious weeds. Mulch shall be reasonably bright in color and shall not be musty, moldy, caked, decayed, or dusty.

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2. **Wood cellulose fiber mulch for hydraulic seeding** shall consist of specially prepared wood cellulose processed into a uniform fibrous physical state. Mulch shall be dyed green or contain a green dye in the package that will provide an appropriate color to facilitate visual inspection of the uniformly spread slurry. Mulch, including dye, shall not contain germination-inhibiting or growth-inhibiting factors. Mulch shall be manufactured and processed so that it will remain in uniform suspension in water under agitation and will blend with seed, fertilizer, and other additives to form a homogeneous slurry. Mulch shall form a blotterlike ground cover, on application, having moisture absorption and percolation properties and shall cover and hold grass seed in contact with the soil without inhibiting the growth of grass seedlings. Field and equipment performance determinations by the Department shall be prerequisites for the approval of a source of supply for mulch.

The manufacturer shall provide certification that the mulch conforms to the following:

Property	Value
Fiber or particle size	
Length	To approximately 0.39 inch (10 mm)
Thickness or diameter	Approximately 0.04 inch (1 mm)
Net dry weight content (VTM-47)	Minimum stated on bag
pH range (TAPPI T509 or ASTM D 778)	4.0 to 8.5
Ash content (TAPPI T413 or ASTM D 586)	Maximum 7.0%
Water-holding capacity (VTM-46)	Minimum 90%

Mulch shall not contain elements or compounds at concentration levels that will be phytotoxic.

In addition to making field performance determinations, the Department may sample and perform such other tests on mulch to ensure that it conforms to these specifications. Only those materials that have been evaluated by the Department and that appear on its list of approved sources of supply will be accepted.

Mulch shall be delivered in packages of uniform weight bearing the name of the manufacturer, the net weight, and an additional statement of the net dry weight content.

3. **Wood chips** processed from clearing and grubbing operations may be used for mulch on seeded areas as directed by the Engineer. Wood chips shall be not more than 3/8 inch in thickness or 6 square inches in area.
4. **Mulch for individual planting pits and planting beds** shall be double-shredded hardwood mulch aged for at least 1 year and brown in color. A representative sample shall be submitted to the Engineer for approval prior to delivery to the work site.
- (h) **Sod:** Sod shall be cultivated material conforming to the requirements of the State Board of Agriculture for state-approved sod or the State Sod Certification Agency for state-certified sod. Root development shall be such that standard size pads will support their own weight and retain their size and shape when suspended vertically from a firm grasp on the uppermost 10 percent of the area. The top growth of sod shall be mowed so that the height of the grass will be 2 to 3 inches at the time of the stripping operation. Sod may be furnished in any standard pad width and length provided the dimensions do not vary from the average by more than 5 percent. Sod shall be machine stripped at a uniform soil thickness of at least 1 inch. Broken, torn, or irregularly shaped pads will be rejected.

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- (i) **Trees, Shrubs, Vines, and Other Plants:** The botanical and common name of plants shall be in accordance with the latest edition of *Standardized Plant Names*, prepared by the Editorial Committee of the American Joint Committee on Horticultural Nomenclature in effect on the date of the Notice of Advertisement.

1. **Quality and size:** Plants shall conform to the requirements of the current *American Standard for Nursery Stock* (ANSI Z-60.1) by the American Nursery and Landscape Association and these specifications.

Plants shall be representative of their normal species and varieties; shall have well-furnished branch systems and vigorous fibrous root systems characteristic of their respective kinds; shall be grown in a state-approved, certified nursery; and shall bear evidence of proper nursery care, including adequate transplanting and root pruning. Plants shall comply with state and federal laws governing inspection for plant diseases and insect infestation and shall be free from insect pests, plant diseases, disfiguring knots, stubs, sunscald, bark abrasions, or any other form of damage or objectionable disfigurements.

When a minimum and maximum size or range is specified, an average size shall be furnished. Plants shall not be pruned before delivery or cut back from larger sizes to conform to the sizes specified. Sizes furnished shall be those specified at the time of delivery and before the usual pruning at the time of planting. Nursery-grown trees shall be free from cuts of limbs that are not healed and cuts more than $\frac{3}{4}$ inch that have not completely callused over. Plants from cold storage will not be accepted. Deciduous plants, except those grown in containers, shall be dormant when planted.

2. **Digging and protection:** Digging shall be in accordance with the current *American Standards for Nursery Stock* and done in a manner that will avoid damage to or loss of roots, but roots that are cut shall be cleanly cut. Balled and burlapped plants shall be properly dug and protected to preserve the natural earth in contact with the roots. Manufactured balls or processed balls will not be accepted. Balls shall be firmly wrapped and tied with approved materials. Balled plants will not be accepted if the ball is broken, cracked, or loose. After plants are dug, their roots shall be protected from damage. Roots of bare root plants shall be kept moist at all times. Bare root plants shall be further protected by wrapping in wet straw, moss, burlap, or other approved material.
3. **Plantable pots:** In lieu of using burlap with balled plants, plants may be dug as specified herein and placed in plantable pots. Pots shall be constructed of organic, biodegradable material that will readily decompose in soil and shall not be smaller in any dimension than the size specified for balled and burlapped root systems. At the time of planting, the lip or rim of pots shall be broken away, and drainage holes shall be provided as directed. Plants with balls that have been grown in pots or with loose stems will be rejected.
4. **Container-grown plants:** In addition to the requirements of the *American National Standard for Nursery Stock*, container-grown plants shall conform to the following:
- a. The space between the rim or top of the container and the soil line within the container shall not be more than $1\frac{1}{2}$ inches for the 1-gallon and 2-gallon sizes and not more than $2\frac{1}{2}$ inches for the 5-gallon size.
 - b. Encircling roots shall not have grown in such a manner that they will cause girdling of the trunk or stems.

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- c. Roots shall have been grown in the soil medium for a minimum of 6 months extending to the limits of the container on all sides and from top to bottom.
5. **Collected plants:** Collected plants from wild or native stands shall not be used without the written permission of the Engineer unless specified on the plans. Wild or native plants shall be clean, sound stock and free from injury, and the quality of the plants shall be similar to that specified for nursery-grown material. Stock shall have sufficient root systems to ensure successful transplanting. Balls, when specified, shall be tight and well formed.
6. **Clumps:** Clumps shall be dug from good soil that has produced a fibrous root system typical of the nature of the plant and shall have earth and incidental vegetation adhering to roots.

(j) **Miscellaneous Planting Materials:**

1. **Twine** for wrapping balled and burlapped trees shall be made of an organic material, biodegradable twine, at least two-ply.
2. **Composted yard waste** shall be dark brown or black in color and consist of decomposed leaves, branches, and grass clippings. Prior to delivery, the Contractor shall submit to the Engineer for approval, a sample of the composted yard waste and a test report from an independent laboratory verifying that the material conforms to the following analysis:
 - pH = 5.5 dry–8.0 wet
 - Moisture Content = 35%–45%
 - Particle Size = Pass through a 1-inch screen or smaller
 - Stability = Stable to highly stable, thereby providing nutrients for plant growth
 - Maturity/Growth Screening = Aged (cured) for a minimum of 6 months, reach thermophilic (113—158 degrees F) temperature ranges following a minimum of two successive turnings of the compost, and pass maturity tests or demonstrate its ability to enhance plant growth
 - Soluble Salt Concentration = 3.0 dS/m (mmhos/cm) or less
 - Nutrient Content: Nitrogen = 0.5%–3.5%
 - Phosphorous = 0.2–4.0%
 - Potassium = 0.3%–2.0%
 - Density = Not more than 1,250 pounds per cubic yard.

The Contractor shall submit the following information to the Engineer 30 days prior to the date the compost is shipped to the construction site:

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- a. A vendor's certificate or affidavit attesting that the "Composted Yard Waste" complies with the requirements of this specification.
 - b. A test report from an independent certified laboratory verifying that the material complies with the requirements for use as specified by the Virginia Department of Environmental Quality and United States Environmental Protection Agency/40 CFR Part 503 Regulations February 1993 with regard to heavy metal content and restrictive use of biosolids.
 - c. A 2-gallon sample of the material for visual inspection. In addition, the test report shall indicate that the compost material is free of viable weed seed, plant propagules, and harmful pathogens. Non-organic materials such as concrete, plastic, metal, glass, paper products, chemically treated plywood, plywood, pressboard, and organic pine by-products will not be accepted. The Engineer reserves the right at any time to test and reject compost material that does not comply with the requirements of this specification. Other compost products may be substituted with the written approval of the Engineer.
3. **Horticultural Grade Perlite** shall be a fine-to-medium grade, non-organic volcanic mineral identified as Perl-Lome having closed air cells and surface cavities, expanded to form a granular, snow-white material, 5 to 20 times its original volume. Perlite shall have a weight of 5 to 8 pounds per cubic foot. Prior to delivery, the Contractor shall submit to the Engineer for approval, a sample of the perlite and a manufacturer's test report or product certification verifying that the material complies with the following analysis and gradation:

pH = 6.5 to 7.5
Nutrient Content = Sterile.

Standard Sieve or Micron Size	Perlite Gradation	
	Fine	Medium
+16 mesh	10% maximum	60% maximum
+100 mesh	60% minimum	85% minimum

4. **Burlap used for wrapping the tree ball** shall be made of an organic biodegradable material.
5. **Water** used in watering plants shall be obtained from fresh water sources and shall be free from chemicals and other toxic substances harmful to plants. Brackish water shall not be used. The source of water will be subject to the approval of the Engineer.
6. **Staking and guying materials** shall be 14-gage galvanized steel wire. Hose shall be corded rubber, ½ inch or ¾ inch, and solid green in color. Turnbuckles shall be galvanized steel or zinc-coated steel. Stakes for anchoring trees and shrubs shall be 2 inch by 2 inch rough dressed hardwood in the appropriate length and reasonably free of knots. Trees and shrubs shall be anchored in accordance with Section 1200 of the Department's *Road and Bridge Standards* unless otherwise indicated on the plans. Other staking, guying, and anchoring methods and materials specifically designed for securing trees and shrubs may be substituted with prior approval in writing from the Engineer or as designated on the plans.

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7. **Below-ground tree anchors** shall be below-grade steel stabilizers capable of fixing the root ball in place until the tree has established itself in place. Prior to ordering material, the Contractor shall furnish the Engineer manufacturer's product data for the type of anchoring system he proposes to supply for review.
8. **Tree protection tubes** shall be constructed from flexible UV-inhibited polyethylene, polypropylene, or similar material designed to speed photosynthesis, promote seedling growth, and reduce planting stress by trapping moisture, thereby raising relative humidity and ambient temperature inside the tube. Tree tubes shall protect the tree seedlings from animals, wind desiccation, small rodents, chemical sprays, and insects. The design of the tree tubes shall not be detrimental to the establishment and growth of the seedling or young tree. Tree tube designs shall be capable of accommodating tree growth for at least 3 years after planting.

(k) Soil Retention Coverings:

1. **Jute mesh** shall be a uniform, open, plain weave of undyed and unbleached single layer jute yarn. The yarn shall be loosely twisted and shall not vary in thickness by more than its normal diameter. Jute mesh shall be new, and its length shall be marked on each roll.

Between strands lengthwise, openings shall be 0.60 inch \pm 25 percent. Between strands crosswise, openings shall be 0.90 inch \pm 25 percent. Jute mesh shall weigh 0.9 pound per square yard \pm 5 percent.

2. **Soil retention mats** shall consist of a machine-produced mat of wood fibers, wood excelsior, or manmade fiber that shall intertwine or interlock. Matting shall be nontoxic to vegetation and germination of seed and shall not be injurious to the unprotected skin of the human body.

Mats shall be of consistent thickness, with fiber evenly distributed over its entire area, and covered on the top and bottom side with netting having a high web strength or covered on the top side with netting having a high web strength and machine sewn on 2-inch centers along the longitudinal axis of the material. Netting shall be entwined with the mat for maximum strength and ease of handling.

3. **Soil stabilization mats** shall be from the Department's approved products list for the site conditional use(s) specified.

- (l) **Fencing and Steel Posts for Protection of Landscape:** When specified on the plans, fencing to delineate areas of landscaping to be protected shall be 40 inches in height, international orange, high-visibility, plastic (polyethylene) web fencing. Fence posts shall be conventional metal "T" or "U" posts 6 feet in length. The plastic fencing shall be securely fastened to the posts in a manner approved by the Engineer. The plastic fencing shall have the following physical qualities:

Tensile Yield = Average 2,000 pounds per 4-foot width (ASTM D 638)

Ultimate Tensile Yield = Average 2,900 pounds per 4-foot width (ASTM D 638)

Elongation at Break (%) = Greater than 1000% (ASTM D 638)

Chemical Resistance = Inert to most chemicals and acids.

SECTION 245—GEOSYNTHETICS

245.01—Description

These specifications cover artificial fiber textile products to be used in transportation construction work.

245.02—Detail Requirements

Geosynthetics shall include a label that clearly shows the manufacturer or supplier name, style name, and roll number. The shipping document shall include documentation to comply with the requirements of Section 245.03.

Each geosynthetic roll shall be wrapped or otherwise packaged in a manner that will protect the geosynthetic, including the ends of the roll, from damage due to shipment, water, sunlight, and contaminants. The protective wrapping shall be maintained during periods of shipment and storage.

During storage, geosynthetics rolls shall be elevated off the ground and adequately covered to protect them from the following: site construction damage; precipitation; extended ultraviolet radiation including sunlight; chemicals that are strong acids or strong bases; flames including welding sparks; temperatures in excess of 160 degrees F; and other environmental conditions that may damage the physical property values of the geosynthetic. Geosynthetics that are not properly protected may be subject to rejection.

245.03—Testing and Documentation

Each geosynthetic material provided to the project shall be tested to determine conformance with the material properties specified herein within 24 months of submission. Test results reported from AASHTO's National Transportation Product Evaluation Program—Laboratory Results of Evaluations on Geotextile and Geosynthetics may be used. The Contractor shall provide certification of the material in accordance with the requirements of AASHTO M288, Section 5, Certification, and copies of the test results. This testing, however, will not be the sole basis for acceptance.

The Contractor shall be responsible for ensuring that each roll of geosynthetic delivered to the project includes a certificate from the manufacturer showing manufacturer name, product name, style number or identifier, roll number, chemical composition of the filaments or yarns, any other pertinent information to fully describe the product, and a signature or attest of a person having legal authority to bind the manufacturer.

VDOT will sample and test the geosynthetics for acceptance to verify conformance with this specification. Sampling shall be performed in accordance with the requirements of ASTM D4354, Procedure C. For tests not conducted by VDOT, acceptance may be based on the manufacturer's certifications as a result of testing by the manufacturer of quality assurance samples obtained using the procedure for ASTM D4354 Procedure B Sampling for Manufacturer's Quality Assurance (MQA) Testing. A lot size shall be considered to be the shipment quantity of the given product or a truckload of the given product, whichever is smaller, but in no case shall lot size exceed 250,000 square feet.

Property values, with the exception of apparent opening size (AOS) and panel vertical strain, in these specifications represent minimum average roll values (MARV) in the

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weakest principal direction (i.e., average test results of any roll in a lot sampled for conformance or quality assurance testing shall meet or exceed the minimum values provided herein). Values for AOS and panel vertical strain represent maximum average roll values.

Tests shall be performed in accordance with the methods referenced in this specification for the indicated application. The number of specimens to test per sample is specified by each test method. Geotextile product acceptance shall be based on conformance to the requirements of ASTM D4759. Product acceptance is determined by comparing the average test results of specimens in a given sample to the specification MARV.

(a) Geotextile Fabric for Use in Silt Fences, Silt Barriers, or Filter Barriers:

Geotextile shall function as a vertical, permeable interceptor designed to remove suspended soil from overland water flow. Fabric shall filter and retain soil particles from sediment-laden water to prevent eroding soil from being transported off the construction site by water runoff. Fabric shall contain ultraviolet inhibitors and stabilizers to provide at least 6 months of expected, usable construction life at a temperature of 0 degrees F to 125 degrees F. The tensile strength of the material after 6 months of installation shall be at least 50 percent of the initial strength.

Physical Property	Test Method	Requirements
Filtering efficiency	VTM-51 or ASTM D5141-11	Min. 75%
Flow rate	VTM-51 or ASTM D5141-11	Min. 0.2 gal/ft ² /min

In addition to these requirements, the geotextile shall comply with the requirements of AASHTO M288 for temporary silt fence property requirements, Table 7, Temporary Silt Fence Property Requirements, for grab strength and ultraviolet stability.

The Contractor shall be responsible for supplying test results on each lot of silt fence geotextile for filtering efficiency, flow rate, and grab strength. These results shall be from a GAI-accredited laboratory, which also is specifically accredited by GAI in tests ASTM D5141 and ASTM D4632. Passing test results submitted by the Contractor are not sufficient for acceptance, as VDOT shall also conduct verification testing.

- (b) Geotextile for Use as Riprap Bedding Material:** Geotextile shall comply with the requirements of AASHTO M288 for separation geotextile properties, Table 3, for apparent opening size and ultraviolet stability and geotextile strength property requirements, Table 1, Class 2, for grab strength and puncture strength.

- (c) Geotextile Fabric for Use in Drainage Systems (Drainage Fabric):** Drainage fabric shall be nonwoven and clog resistant, suitable for subsurface application, and thermally and biologically stable.

The geotextile shall retain at least 75 percent of its ultimate strength when subjected to substances having a pH of a minimum of 3 and a maximum of 12 for a period of 24 hours.

Physical Property	Test Method	Requirements
Permittivity	ASTM D4491	Min. 0.5 sec ⁻¹
Apparent opening size	ASTM D4751	Max. No. 50 sieve

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In addition to these requirements, the geotextile shall comply with the requirements of AASHTO M288 for strength requirements, Table 1, Class 3, for grab strength.

- (d) **Geotextile for Use in Stabilization:** These are geotextiles used in saturated and/or unstable conditions to provide the functions of separation and reinforcement.

1. Subgrade Stabilization Fabric:

Physical Property	Test Method	Requirements
Apparent opening size	ASTM D 4751	Max. No. 20 sieve

In addition to this requirement, the geotextile shall comply with the requirements of AASHTO M 288 for strength property requirements, Table 1, Class 3, for grab strength, tear strength, and puncture strength.

2. Embankment Stabilization Fabric Up to 6 Feet High:

Physical Property	Test Method	Requirements
Apparent opening size	ASTM D 4751	Max. No. 20 sieve
Seam strength	ASTM D 4632	90% specified grab strength

In addition to this requirement, the geotextile shall comply with the requirements of AASHTO M288 for strength property requirements, Table 1, Class 1 for grab strength, tear strength, and puncture strength.

- (e) **Prefabricated Geocomposite Pavement Underdrain:** Prefabricated geocomposite pavement underdrain shall consist of a polymeric drainage core encased in a nonwoven filter fabric envelope having sufficient flexibility to withstand bending and handling without damage. Prefabricated geocomposite pavement underdrain shall conform to the following:

1. **Core:** The drainage core shall be made from an inert, polymeric material resistant to commonly encountered chemicals and substances in the pavement environment and shall have a thickness of not less than 3/4 inch.

Physical Properties	Test Method	Requirements
Compressive strength panel vertical strain and core area change	ASTM D1621/D2412	Min. 40 psi at 20% deflection
Panel vertical strain and core area change at 22.7 psi	ASTM D6244	Max. 10% for core area and panel height
Water flow rate (after 100 hr at 10 psi normal confining pressure gradient of no more than 0.1)	ASTM D4716	Min. 15 gal/min/ft width for 12-in specimen length

The core shall retain at least 75 percent of its ultimate strength when subjected to temperatures of 0 degree F and 125 degrees F, respectively, for a period of 24 hours.

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2. **Filter Fabric:** Geotextile shall be bonded to and tightly stretched over the core. Geotextile shall not sag or block the flow channels, shall have a life equivalent to that of the core material, and shall conform to the requirements of (c) herein.

- (f) **Geocomposite Wall Drains:** Prefabricated geocomposite wall drain shall consist of a polymeric drainage core encased in a nonwoven filter fabric envelope having sufficient flexibility to withstand bending and handling without damage. Geocomposite wall drains shall conform to the following:

1. **Core:** The drainage core shall be made from an inert, polymeric material resistant to commonly encountered chemicals and substances in the roadway.

Physical Property	Test Method	Requirements
Compressive strength at 20% deflection	ASTM D1621/D2412	Min. 40 psi
Water flow rate (after 100 hr at 10 psi normal confining pressure and gradient of no more than 0.1)	ASTM D4716	Min. 15 gal/min/ft width (for 12-in specimen length)

The core shall retain at least 75 percent of its ultimate strength when subjected to temperatures of 0 degree F and 125 degrees F for a period of 24 hours.

2. **Filter Fabric:** Geotextile shall be bonded to and tightly stretched over the core. Geotextile shall not sag or block the flow channels, shall have a life equivalent to that of the core material, and shall conform to the requirements of (c) herein.

- (g) **Geomembrane Moisture Barrier:** Geomembrane moisture barrier shall be resistant to biological attack. Geomembrane shall be constructed of PVC, shall have a thickness of 30 mils, and shall conform to the requirements of the PVC Geomembrane Institute 1197 material specification for PVC geomembrane or shall conform to the following requirements:

Physical Property	Test Method	Requirements
Thickness	ASTM D5199	Min. 30 mils
Tensile (1-in strip)	ASTM D882	Min. 130 kip/ft
Tear (Die C)	ASTM D1004	Min. 200 lbf
Puncture	ASTM D4833	Min. 620 lbf

- (h) **Dewatering Bag:** A nonwoven geotextile sewn together to form a bag that can be used in lieu of a de-watering basin for the purpose of filtering out suspended soil particles. The bag shall be capable of accommodating the water flow from the pump without leaking at the spout and seams.

Physical Property	Test Method	Requirements
Grab strength @ Elongation >50%(CRE/Dry)	ASTM D4632	Min. 250 lb (min)
Seam strength	ASTM D4632	90% Specified grab strength
Puncture	ASTM D4833	Min. 150 lb
Mullen burst	ASTM D3786	Min. 450 psi
Flow rate	ASTM D4491	Min. 0.189 ft ³ /sec/ft ² (min)
Permittivity	ASTM D4491	Min. 1.2 sec ⁻¹
UV resistance	ASTM D4355	Min. 70% at 500 hr
AOS	ASTM D4751	Max. 100 sieve

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- (i) **Paving Geosynthetics:** Paving geosynthetics shall be used as an interlayer between pavement layers. Specific application of these paving geosynthetics shall be determined by the Engineer.

- 1. **Geotextile Paving Fabric:** The geotextile shall conform to the requirements of AASHTO M288 Paving Fabric Property Requirements, Section 9.

Pavement Reinforcing Mat: The geotextile shall meet the requirements of ASTM D7239 Geosynthetic Paving Mat, Type 1.

SECTION 301—CLEARING AND GRUBBING

301.01—Description

This work shall consist of clearing, grubbing, removing, and disposing of vegetation, debris, and other objects within the construction limits except for vegetation and objects that are designated to be preserved, protected, or removed in accordance with the requirements of other provisions of these specifications.

301.02—Procedures

If approved by the Engineer, the Contractor may clear and grub to accommodate construction equipment within the right of way up to 5 feet beyond the construction limits at his own expense. The Contractor shall install erosion and siltation control devices prior to beginning clearing or grubbing operations and such devices shall be functional before upland land-disturbing activities take place.

The surface area of earth material exposed by grubbing, stripping topsoil, or excavation shall be limited to that necessary to perform the next operation within a given area. Grubbing of root mat and stumps shall be confined to that area of land which excavation or other land disturbance activities shall be performed by the Contractor within 14 days following grubbing.

Stumps, roots, other perishable material, and nonperishable objects that will be less than 5 feet below the top of earthwork within the area directly beneath the pavement and shoulders shall be removed. However, such material and objects that will be 5 or more than 5 feet below the top of earthwork within the area directly beneath the pavement and shoulders and all such material and objects beneath slopes of embankments shall be left in place unless removal is necessary for installation of a structure. The top of stumps left in place shall be not more than 6 inches above the existing ground surface or low water level.

Vegetation, structures, or other items outside the construction limits shall not be damaged. Trees and shrubs in ungraded areas shall not be cut without the approval of the Engineer.

Combustible cleared and grubbed material shall be disposed of in accordance with the following:

- (a) **Trees, limbs, and other timber having a diameter of 3 inches and greater** shall be disposed of as saw logs, pulpwood, firewood, or other usable material; however, treated timber shall not be disposed of as firewood. Not more than 2 feet of trunk shall be left attached to grubbed stumps.

When specified that trees or other timber is to be reserved for the property owner, such material shall be cut in the lengths specified and piled where designated, either within the limits of the right of way or not more than 100 feet from the right-of-way line. When not

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reserved for the property owner, such material shall become the property of the Contractor.

- (b) **Material less than 3 inches in diameter** shall be used to form brush silt barriers when located within 500 feet of the source of such material when specified on the plans or where directed by the Engineer. Material shall be placed approximately 5 feet beyond the toe of fill in a strip approximately 10 feet wide to form a continuous barrier on the downhill side of fills. Where selective clearing has been done, material shall be piled, for stability, against trees in the proper location. On the uphill side of fills, brush shall be stacked against fills at approximately 100-foot intervals in piles approximately 5 feet high and 10 feet wide. Any such material not needed to form silt barriers shall be processed into chips having a thickness of not more than 3/8 inch and an area of not more than 6 square inches and may be stockpiled out of sight of any public highway for use as mulch.

SECTION 303—EARTHWORK

303.01—Description

This work shall consist of constructing roadway earthwork in accordance with these specifications and in conformity with the specified tolerances for the lines, grades, typical sections, and cross sections shown on the plans or as established by the Engineer. Earthwork shall include regular, borrow, undercut, and minor structure excavation; constructing embankments; disposing of surplus and unsuitable material; shaping; compaction; sloping; dressing; and temporary erosion and siltation control work.

303.02—Materials

- (a) **Borrow excavation** shall consist of approved material required for the construction of the roadway and shall be obtained from approved sources outside the project limits. Borrow excavation shall conform to the requirements of AASHTO M57 and the requirements herein.
- (b) **Materials for temporary silt fences, geotextile fabric silt barriers, and filter barriers** shall conform to the requirements of Sections 242.02(c) and 245.03(a).
- (c) **Geotextile materials used for embankment stabilization** shall conform to the requirements of Section 245.03(e).
- (d) **Mulch** shall conform to the requirements of Section 244.02(g).
- (e) **Seed** shall conform to Section 244.02(c) of the Specifications.

303.03—Erosion and Siltation Control and Stormwater Pollution Prevention

Erosion, siltation and stormwater pollution shall be controlled through the use of the devices and methods specified herein, identified in other contract documents or as is otherwise necessary. The Engineer reserves the right to require other temporary measures not specifically described herein or in other contract documents to correct an erosion, siltation or pollution condition.

Erosion and sediment control and pollution prevention devices and measures shall be maintained in a functional condition at all times. Temporary and permanent erosion and sediment control and pollution prevention measures shall be inspected and deficiencies

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corrected in accordance with the requirements of Section 107.16(e) of the Specifications. In addition, the Contractor shall make a daily review of the location of silt fences, filter barriers and other perimeter controls to ensure that they are properly located for maximum effectiveness. Where deficiencies are found, corrections shall be made in accordance with the requirements of Section 107.16(e) of the Specifications or as directed by the Engineer.

When erosion and sediment control devices function by using wet storage, sediments shall be removed when the wet storage volume has been reduced by 50 percent. Sediments shall be removed from dewatering basins when the excavated volume has been reduced by 50 percent. Sediments shall be removed from all other erosion and sediment control devices when capacity, height, or depth has been reduced by 50 percent. Removed sediment shall be disposed of in accordance with the requirements of Section 106.04 of the Specifications. Sediment deposits remaining in place after the device is no longer required shall be removed or dressed to conform to the existing grade. The site shall be prepared and seeded in accordance with the requirements of Section 603 of the Specifications.

Geotextile fabric that has decomposed or has become ineffective and is still needed shall be replaced. Temporary erosion and sediment control devices except brush silt barriers shall be removed within 30 days after final site stabilization or after the temporary devices are no longer needed as determined by the Engineer.

- (a) **Earth Berms and Slope Drains:** The top of earthwork shall be shaped to permit runoff of rainwater. Temporary earth berms shall be constructed and compacted along the top edges of embankments to intercept runoff water. Temporary Berms and temporary dikes are to be stabilized immediately following installation. Temporary slope drains shall be provided to intercept runoff and adequately secured to prevent movement. Slope drains may be flexible or rigid but shall be capable of being readily shortened or extended. A portable flume shall be provided at the entrance to temporary slope drains.
- (b) **Soil Stabilization:** Soil stabilization shall be initiated on any portion of the project where clearing, grading, excavation or other land disturbing activities have permanently ceased or where land disturbing activities have been temporarily suspended for an anticipated duration of greater than 14 days, or upon completion of grading operation for a specific area. Soil stabilization shall begin as soon as practicable but no later than the next business day (Monday through Friday excluding State holidays) following the day when land disturbing activities temporarily or permanently cease. Initiation of stabilization activities includes, but is not limited to 1) prepping the soil for vegetative or non-vegetative stabilization, 2) applying mulch or other non-vegetative product to exposed soil, 3) seeding or planting the exposed area 4) starting any of the above activities on a portion of the area to be stabilized but not on the entire area or 5) finalizing arrangements to have the stabilization product fully installed within the time frame for completing stabilization. Temporary or permanent soil stabilization shall be completed within 7 days after initiation. Areas excluded from this requirement include areas within 100 feet of the limits of ordinary high water or a delineated wetland which shall be continuously prosecuted until completed and stabilized immediately upon completion of the work in each impacted area. Soil stabilization includes: temporary and permanent seeding, riprap, aggregate, sod, mulching, and soil stabilization blankets and matting in conjunction with seeding. The applicable type of soil stabilization shall depend upon the location of areas requiring stabilization, time of year (season), weather conditions and stage of construction operations.

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Cut and fill slopes shall be shaped and topsoiled where specified. Seed and mulch shall be applied in accordance with the requirements of Section 603 of the Specifications as the work progresses in the following sequence:

1. Slopes whose vertical height is 20 feet or greater shall be seeded in three equal increments of height. Slopes whose vertical height is more than 75 feet shall be seeded in 25-foot increments.
2. Slopes whose vertical height is less than 20 but more than 5 feet shall be seeded in two equal increments.
3. Slopes whose vertical height is 5 feet or less may be seeded in one operation.

Areas that cannot be seeded because of seasonal or adverse weather conditions shall be mulched to provide some protection against erosion to the soil surface. Mulch shall be applied in accordance with the requirements of Section 603.03(e) of the Specifications and paid for in accordance with the requirements of Section 603.04 of the Specifications. Organic mulch shall be used, and the area then seeded as soon as weather or seasonal conditions permit in accordance with the requirements of Section 603.03 of the Specifications. Organic mulch includes: straw or hay, fiber mulch, wood cellulose, or wood chips conforming to the requirements of Section 244.02(g) of the Specifications.

- (c) **Check Dams:** As an initial item of work, required check dams shall be constructed at 25-foot intervals, unless otherwise shown on the plans, below the outfall end of drainage structures.

Synthetic check dams recorded in the Department's Approved List may be substituted for Standard EC-4, Rock Check Dams, Type II, with the approval of the Engineer at no additional cost to the Department. Synthetic check dams shall be installed in accordance with the manufacturer's recommendation.

- (d) **Baled Straw Silt Barriers:** Baled straw silt barriers may be substituted for temporary filter barriers with the approval of the Engineer in noncritical areas, such as pavement areas and rock locations where filter barriers cannot be installed in accordance with the plans and specifications and locations where the Engineer determines that streams and water beds will not be affected.

- (e) **Temporary Silt Fences, Geotextile Fabric Silt Barriers, and Filter Barriers:**

1. **Temporary silt fences:** Fences shall be erected at locations shown on the plans or determined by the Engineer. Geotextile fabric used for silt fences shall be provided, and posts shall not be spaced more than 6 feet apart. Posts shall be uniformly installed with an inclination toward the potential silt load area of at least 2 degrees but not more than 20 degrees. Attaching fabric to existing trees will not be permitted.

Fabric shall be firmly secured to the post or wire fence. The bottom of the fabric shall be entrenched in the ground in a minimum 6-inch by 6-inch trench. Temporary silt fence may also be entrenched using a slicing method with a minimum of 8 inches sliced into the ground. Fabric may be spliced only at support posts and with an overlap of at least 6 inches. The top shall be installed with a 1-inch tuck or reinforced top end section. The height of the finished fence shall be a nominal 29 inches.

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2. **Geotextile fabric silt barriers:** Existing fences or brush barriers used along the downhill side of the toe of fills shall have geotextile fabric attached at specified locations as shown on the plans. The bottom of the fabric shall be entrenched in the ground in a minimum 6-inch by 6-inch trench, and the top shall be installed with a 1-inch tuck or reinforced top end section. Temporary fabric silt barriers may also be entrenched using a slicing method with a minimum of 8 inches sliced into the ground.

Brush barriers shall be installed prior to any major earth-disturbing activity and trimmed sufficiently to prevent tearing or puncturing fabric. Fabric shall be fastened securely to the brush barrier or existing fence. A 6-inch overlap of fabric for vertical and horizontal splicing shall be maintained and tightly sealed.

3. **Temporary filter barriers:** Barriers shall consist of geotextile fabric and shall be securely fastened to wood or metal supports that are spaced at not more than 3-foot intervals and driven at least 12 inches into the ground. At least three supports shall be used. The bottom of the fabric shall be entrenched in the existing ground in a minimum 4-inch by 4-inch trench.

Temporary filter barriers may also be entrenched using a slicing method with a minimum of 6 inches sliced into the ground. The top of the fabric shall be installed with a 1-inch tuck or reinforced top end section. The height of the finished temporary filter barrier shall be a nominal 15 inches.

Temporary filter barriers shall be installed at temporary locations where construction changes the earth contour and drainage runoff as directed or approved by the Engineer.

After removal and disposal of the temporary silt fence, geotextile fabric silt barrier, and temporary filter barrier, the area shall be dressed and stabilized with a permanent vegetative cover or other approved permanent stabilization practice approved by the Engineer.

- (f) **Sediment Traps and Sediment Basins:** Once a sediment trap or basin is constructed, the earthen embankment and all outfall areas shall be stabilized immediately.
- (g) **Erosion Control Mulch:** This work shall consist of furnishing and applying mulch as a temporary erosion control treatment on slopes exposed to the elements but not at final grade during the period from December 1 to March 1 for periods of up to 30 days prior to final grading or to areas to receive stabilization or paved surfaces within 6 months in accordance with this provision and as directed by the Engineer.

Mulch shall be applied to exposed slopes requiring mulch or to areas to be stabilized or paved, within 48 hours after performance of grading operations. Straw or hay mulch shall be applied on bare slope areas at the rate of approximately 3 tons per acre (1.24 pounds per square yard). Straw or hay mulch shall be applied at a uniform thickness in such a manner that not more than 10 percent of the soil surface will be exposed. Straw or hay mulch shall be anchored to the slope surface by one of the following methods: spraying with cellulose fiber mulch at the rate of 750 pounds per acre (0.15 pound per square yard); disking or punching the mulch partially into the soil; using approved netting; or using other materials or methods approved by the Engineer. The Contractor may use more than one method on the same project.

- (h) **Temporary Diversion Dike:** This work shall consist of constructing temporary diversion dikes at the locations designated on the plans and in accordance with the

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plan details and the Specifications, stabilizing with seed and mulch, maintaining, removing when no longer required, and restoration of the area.

Temporary diversion dikes shall be installed as a first step in land-disturbing activities and shall be functional prior to downslope land disturbance. The dike shall be constructed to prevent failure in accordance with Section 303.04 of the Specifications. Seeding and mulch shall be applied to the dike in accordance with Section 603 of the Specifications immediately following its construction. The dikes should be located to minimize damages by construction operations and traffic.

The Contractor shall inspect the temporary diversion dikes after every storm and repairs made to the dike, flow channel, outlet, or sediment trapping facility, as necessary. Once every two weeks, whether a storm event has occurred or not, the measure shall be inspected and repairs made if needed. Damages to the dikes caused by construction traffic or other activity must be repaired before the end of the working day.

303.04—Procedures

Loose rock 3 inches or larger shall be removed from the surface of cut slopes.

When slides occur, the Contractor shall remove and dispose of material as directed by the Engineer.

Where required, surface ditches shall be placed at the top of cut slopes or at the foot of fill slopes and at such other points not necessarily confined to the right of way or shown on the plans and shall be of such dimensions and grades as directed by the Engineer.

Prior to the beginning of grading operations in the area, necessary clearing and grubbing shall be performed in accordance with the requirements of Section 301.02.

- (a) **Regular Excavation:** Existing foundations and slabs located within the construction limits shall be removed and disposed of in a location approved by the Engineer. In lieu of removal, foundations and slabs located 5 feet or more below the proposed subgrade may be broken into particles not more than 18 inches in any dimension and reoriented to break the shear plane and allow for drainage.

Balance points shown on the plans are theoretical and may vary because of actual field conditions.

Regular excavation shall consist of removing and disposing of material located within the project limits, including widening cuts and shaping slopes necessary for preparing the roadbed; removing root mat; stripping topsoil; cutting ditches, channels, waterways, and entrances; and performing other work incidental thereto. The Engineer may require materials in existing pavement structures to be salvaged for use in traffic maintenance.

Undrained areas shall not be left in the surface of the roadway. Grading operations shall be conducted so that material outside construction limits will not be disturbed.

Where rock or boulders are encountered, the Contractor shall excavate and backfill in accordance with the plans and contract documents.

Where the project has been designed and slopes have been staked on the assumption that solid rock will be encountered and the Contractor fails to encounter solid rock at the

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depth indicated, he shall cease excavation in the area and immediately notify the Engineer. If it is necessary to redesign and restake slopes, any additional excavation necessary will be paid for at the contract unit price per cubic yard.

Topsoil stockpiled for later use in the work shall be stored within the right of way unless the working area is such that the presence of the material would interfere with orderly prosecution of the work. Stockpile areas outside the right of way shall be located by the Contractor at his expense. Topsoil used in the work shall be removed first from stockpiles located on private property. Surplus topsoil remaining on private property after completion of topsoiling operations shall be moved onto the right of way and stockpiled, shaped, and seeded as directed by the Engineer.

Stripping topsoil shall be confined to the area over which grading is to be actively prosecuted within 14 calendar days following the stripping operation. Grading operations shall be confined to the minimum area necessary to accommodate the Contractor's equipment and work force engaged in the earth moving work.

- (b) **Borrow Excavation:** The Contractor shall make his own arrangements for obtaining borrow and pay all costs involved in accordance with the provisions of Section 106.03.

When borrow is obtained from sources within the right of way and the excavation is performed simultaneously with regular excavation, borrow excavation will be designated as regular excavation. Material secured by widening cuts beyond slope stakes, when taken from previously excavated slopes, will be designated as borrow excavation. When such a procedure is approved, slopes shall be uniform and no steeper than shown on the plans.

Borrow excavation areas shall be bladed and left in a shape to permit accurate measurements after excavation has been completed.

CBR values, stipulated for borrow excavation, shall apply to the uppermost three feet of fill below the top of earthwork. Borrow excavation, installed below the top three feet shall consist of suitable fill material, available from regular excavation or borrow excavation, as defined and of a quality consistent with project requirements.

- (c) **Undercut Excavation:** Undercut excavation shall consist of removing and disposing of unsuitable material located within the construction limits in accordance with the requirements of Section 303.06(a)3.

Undercut excavation shall be disposed of in accordance with the requirements of Section 106.04.

- (d) **Minor Structure Excavation:** Minor structure excavation shall consist of removing material necessary to accommodate the structure, such as box or arch culverts, including pipe arches, structural plate arches, structural plate pipe, pipe culverts, and storm drains with a span(s) or opening(s) of 48 inches or greater. Minor structure excavation shall also include dewatering, sheeting, bracing, removing existing structures, and backfilling. Removing existing structures shall also include foundations that might be necessary to clear the site.
- (e) **Removing Unsuitable Material:** Where excavation to the finished graded section results in a subgrade or slopes of unsuitable material, such material shall be excavated below the grade shown on the plans or as directed by the Engineer. Areas so excavated shall be backfilled with approved material in accordance with (f) herein.

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Excavation for structures shall be carried to foundation materials satisfactory to the Engineer regardless of the elevation shown on the plans. If foundation material is rock, the Contractor shall expose solid rock and prepare it in horizontal beds for receiving the structure. Loose or disintegrated rock and thin strata shall be removed. Excavated material, if suitable, shall be used for backfilling around the structure or constructing embankments.

Material shown on the plans as unsuitable and during construction found to be suitable for use shall first be used in embankments where needed in lieu of borrow.

Unsuitable material shall be disposed of in accordance with Section 106.04.

- (f) **Backfill for Replacing Undercut Excavation:** Backfill shall be composed of regular excavation, borrow, select material, subbase material, or other material as directed by the Engineer. Backfilling operations shall be performed in accordance with (g) herein.
- (g) **Backfilling Openings Made for Structures:** Backfill shall be suitable material removed for the structure, although the Engineer may require that backfill material be obtained from a source within the construction limits entirely apart from the structure or other approved material. The opening to be backfilled shall be dewatered prior to backfilling. Backfill shall not be placed against or over cast-in-place box culverts or other structures until the top concrete slab section(s) has been in place 14 days, exclusive of days on which the average high-low ambient temperature is below 40 degrees F in the shade or until the concrete control cylinder(s) has attained a compressive strength equal to 93 percent of the 28-day design compressive strength.

Backfill shall be compacted in horizontal layers not more than 6 inches in thickness, loose measurement, and as specified in (h) herein. Backfill shall be placed in horizontal layers such that there will be a horizontal berm of compacted undisturbed material behind the structure for a distance at least equal to the remaining height of the structure or wall to be backfilled. Backfill shall be placed in a manner to deter impoundment of water and facilitate existing drainage. Backfill around piers in areas not included in the roadway prism shall be constructed in uniformly compacted layers. However, density requirements will be waived.

Box culverts shall not be opened to construction equipment traffic until concrete has attained 100 percent of the 28-day design compressive strength and has a backfill cover of at least 4.0 feet. The minimum height of backfill cover required to protect pipe culverts from construction equipment shall be in accordance with Standard Drawing PC-1 for the type and size specified.

Where only one side of abutments, wingwalls, piers, or culvert headwalls can be backfilled, care shall be taken that the area immediately adjacent to the structure is not compacted to the extent that it will cause overturning or excessive pressure against the structure. When both sides of a concrete wall or box structure is to be backfilled, operations shall be conducted so that the backfill is always at approximately the same elevation on both sides of the structure.

Openings subject to flooding shall be backfilled as soon as practicable or as directed by the Engineer.

- (h) **Embankments:** Work shall consist of constructing roadway embankments; placing and compacting approved material within roadway areas where unsuitable material has been removed; and placing and compacting approved material in holes, pits, utility trenches, basements, and other depressions within the roadway area.

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Embankment shall be constructed with approved material and placed so as to be uniformly compacted throughout. Embankment shall be placed adjacent to structures in the same manner as for backfill as described in (g) herein. Embankment shall not contain muck, frozen material, roots, sod, or other deleterious material. Embankment shall not be placed on frozen ground or areas covered with ice or snow.

Unsuitable material used in widening embankments and flattening embankment slopes shall be placed in uniform layers not more than 18 inches in thickness before compaction. Each layer of material placed shall be compacted to the extent necessary to produce stable and reasonably even slopes.

Wherever rock excavation is available on the project, an 8 to 15-inch layer of such materials shall be dump spread over the lower region of embankments in the immediate vicinity of stream crossings and used to cover ditches, channels, and other drainage ways leading away from cuts and fills. However, drainage ways shall be prepared to receive the rock excavation to the extent necessary to avoid reducing their cross section. If rock excavation is not available on the project, rip-rap, jute mesh or soil retention mats shall be used as the covering material and shall be installed in accordance with the requirements of Section 606.03(c). Limits of the area to be covered will be as noted on the plans or as directed by the Engineer.

Wherever sufficient right of way exists, surplus materials shall be used to widen embankments and flatten slopes as directed by the Engineer.

Rock excavation may be placed on slopes by uniform end dumping of the material from along the top of the embankment or as directed by the Engineer. Slopes that are covered with rock excavation shall not receive topsoil or seed.

When geotextile drainage fabric is required under rock fills, preparation shall be as specified in Section 245.

The Contractor shall schedule excavation and embankment work in a manner that will minimize the quantity of unsuitable material for which more than one handling is required prior to final placement. Therefore, the provisions for additional payment for each rehandling of material specified in Section 303.06(a) will not apply to placing unsuitable material for widening embankments and flattening embankment slopes.

The surface area directly beneath the pavement and shoulders on which embankments of less than 5 feet in depth are to be constructed shall be denuded of vegetation. These areas shall be scarified and compacted to a depth of 6 inches to the same degree as the material to be placed thereon.

Areas that contain material unsuitable as foundations for embankments shall be undercut and backfilled in accordance with (e) and (f) herein.

Embankments to be placed over saturated areas that will not support the weight of hauling equipment may be constructed by end dumping successive loads in a uniformly distributed layer of a thickness capable of supporting the hauling equipment while subsequent layers are placed. The nose, or leading edge, of the embankment shall be maintained in a wedge shape to facilitate mud displacement in a manner that will prevent its entrapment in the embankment. The front slope of the embankment shall be maintained steeper than 2:1. The use of compacting equipment will not be required on the original course. However, the remainder of the embankment shall be constructed in layers and compacted in accordance with these specifications.

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When geotextile for embankment stabilization is required, it shall be placed as shown on the plans. Geotextile shall be spliced by sewing double-stitched seams with stitching spaced $\frac{1}{4}$ inch to $\frac{1}{2}$ inch apart or as shown on the plans.

Once geotextile for embankment stabilization is placed, the initial lift of material to be placed atop shall be free draining and shall be end dumped onto the geotextile and spread to the thickness as shown on the plans. Free-draining material shall be any material of which 15 percent or less passes the No. 200 sieve. If the geotextile becomes punctured or torn, the Contractor shall repair the area with geotextile lapped at least 3 feet all around the damaged area.

Existing slopes shall be continuously benched where embankments are constructed one-half width at a time; against slopes of existing embankments or hillsides; or across existing embankments, hillsides, and depressions at a skew angle of 30 degrees or more or the existing slopes are steeper than 4:1. For slopes steeper than 4:1 but not steeper than 1-1/2:1, the bench shall be at least 6 feet in width. For slopes steeper than 1-1/2:1 but less than 1/2:1, the bench shall be at least 4 feet in width. Benching shall consist of a series of horizontal cuts beginning at the intersection with the original ground and continuing at each vertical intersection of the previous cut. Material removed during benching operations shall be placed and compacted as embankment material.

When excavated material consists predominantly of soil, embankment shall be placed in successive uniform layers not more than 8 inches in thickness before compaction over the entire roadbed area. Each layer shall be compacted within a tolerance of ± 20 percent of optimum moisture content to a density of at least 95 percent of the theoretical maximum density.

Material having a moisture content above optimum by more than 30 percent shall not be placed on a previously placed layer for drying unless it is shown that the layer will not become saturated by downward migration of moisture in the material.

Field density determinations will be performed in accordance with the requirements of AASHTO T191, modified to include material sizes used in the laboratory determination of density, with a portable nuclear field density testing device or by other approved methods. When a nuclear device is used, density determinations for embankment material will be related to the density of the same material tested in accordance with VTM-1 or VTM-12 and a control strip will not be required.

As the compaction of each layer progresses, continuous leveling and manipulating shall be performed to ensure uniform density. Prior to placement of subsequent layers, construction equipment shall be routed uniformly over the entire surface of each layer or the layer shall be scarified to its full depth in the area where the equipment is routed.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in layers of the thickness prescribed without crushing, pulverizing, or further breaking down the pieces resulting from excavation methods, such material may be placed in the embankment in layers that are not thicker than the approximate average size of the larger rocks. Rock not more than 4 feet in its greatest dimension may be placed in an embankment to within 10 feet of the subgrade. The remainder of the embankment to within 2 feet of the subgrade shall not contain rock more than 2 feet in its greatest dimension. Each layer shall be constructed so that rock voids are filled with rock spalls, rock fines, and earth. Rock shall be placed, manipulated, and compacted in uniform layers. However, density requirements may be waived. Rock, rock spalls, rock fines, and earth shall be distributed throughout each embankment layer and manipulated as specified herein so that the voids are filled. Rock shall not be end dumped over the edges of the layer being constructed but shall be deposited on the layer

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and moved ahead so as to advance the layer with a mixture of rock, rock spalls, rock fines, and earth. The 2 feet of the embankment immediately below the subgrade shall be composed of material that can be placed in layers of not more than 8 inches before compaction and compacted as specified herein for embankments. Rock more than 3 inches in its greatest dimension shall not be placed within 12 inches of the subgrade in any embankment.

Rock, broken concrete, or other solid materials shall not be placed in embankment areas where piling is to be placed or driven.

The best material shall be reserved for finishing and dressing the surface of embankments. Work necessary to ensure the reservation of such material shall be the responsibility of the Contractor. Section 303.06(a) will not apply to subsequent handling of capping material.

CBR values, stipulated for Embankment, shall apply to the uppermost three feet of fill below the top of earthwork. Embankment, installed below the top three feet shall consist of suitable fill material, available from regular excavation, borrow excavation or embankment, as defined and of a quality consistent with project requirements.

Crushed glass shall be limited within the boundaries of the embankment as follows. Crushed glass shall be a minimum of two feet inside the side slope and contain a minimum of two feet of soil embankment cap. For those areas where crushed glass is to be incorporated into the embankment, glass may constitute up to approximately ninety percent by weight of that portion of the embankment, except where 100 percent crushed glass is used for drainage purposes (including blankets).

Crushed glass shall be blended with soil and/or soil like materials as follows:

1. The embankment shall be constructed by placing alternate four-inch layers of waste glass and soil and mixing and blending by scarification or other approved methods during compaction. The thickness of uncompacted layers of soil/glass shall be a maximum of 8 inches (loose); or
2. Pugmilled in predetermined ratios to a visually consistent blend and placed in lifts of a maximum of 8 inches (loose); or
3. As directed by the Engineer.

Compaction of the soil/glass embankment shall be to the satisfaction of the Engineer and shall be accomplished with a vibratory compactor or other approved methods. Moisture and density requirements for the soil/glass embankments shall be the same as other conventional soil embankment in accordance with the requirements of Section 303 of the Specifications.

Normal compaction procedures and requirements are to be used for compaction of the soil embankment "cap" above the crushed glass/soil blends.

- (i) **Settlement Plates and Surcharge:** The Contractor shall expedite construction of embankment to provide the maximum time possible for settlement prior to completing grading operations.
 1. **Settlement plates:** The base of settlement plates shall be firmly seated into original ground for the full depth of the steel fins. The base shall be leveled. The Engineer shall be provided time to obtain the elevation of the seated base and the top

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elevation of the pipe extensions prior to placement of embankment material. Pipe extensions shall not be more than 4 feet in length and shall be vertically installed as the embankment is constructed such that the top of the pipe is not covered. As each extension is added, the Engineer shall be provided time to obtain the top elevation of the existing pipe and the top elevation of the new pipe extension. Pipe extensions shall be properly flagged at all times. Care shall be taken while placing and compacting embankment material around pipe extensions. Settlement plates shall be maintained until no longer required, as determined by the Engineer. Upon completion of the normal embankment plus 2 feet of the specified surcharge, the Contractor shall immediately commence placing the remaining surcharge to the limits shown on the plans or as directed by the Engineer. The remaining surcharge shall be placed in lifts of not more than 1 foot in depth and compacted uniformly with construction hauling and spreading equipment. Each lift shall be completed over the entire surcharge area before the next lift is begun.

If a settlement plate is damaged, the Contractor shall notify the Engineer immediately and promptly repair it under the observation of the Engineer to the nearest undamaged pipe. Excavation, backfill, compaction, and repair of settlement plates shall be at the Contractor's expense. The Engineer shall be provided time to obtain the top elevation of the undamaged connection and the top elevation of each subsequent pipe extension.

Settlement plates shall remain in place until settlement has been completed as indicated by elevation readings taken by the Engineer at approximately 2-week intervals. Evaluation of the readings by the Engineer will be the final and sole governing factor for releasing embankments for grading operations. Upon written release by the Engineer, extensions of settlement plate pipe shall be removed to at least 2 feet below the subgrade, the pipe capped, and the area backfilled and compacted.

2. **Surcharge:** When authorized by the Engineer, surcharge shall be removed to the subgrade and embankment slopes graded to the typical section. Removed surcharge shall be placed in roadway embankments not previously brought to grade or shall be disposed of in accordance with Section 106.04 or as directed by the Engineer.
- (j) **Hydraulic Embankment:** Hydraulic embankment shall consist of dredging and pumping materials approved by the Engineer from designated areas, placing the material in embankments, and dressing and completing the embankment. Material shall be nonplastic and of such grading that not more than 7 percent will pass the No. 200 sieve.

Unless otherwise shown on the plans, material for the embankment shall not be obtained from sources closer than 300 feet from the toe of the slope of the embankment. The Engineer may reject materials considered to be unsatisfactory for use in the embankment, and such materials shall be stripped at the Contractor's expense before the embankment is built. Muck and unsuitable material shall be removed to the line, grade, and section shown on the plans. Unsatisfactory material brought to the top of the embankment shall be removed by the Contractor at his own expense, and satisfactory material shall be substituted.

In placing material in the embankment, the Contractor shall begin at the centerline and deposit material in either or both directions toward the toe of slopes. Discharge shall always be in the direction of and parallel with the centerline. The maximum distance from the bottom of the discharge pipe to the surface on which material is being deposited shall be 5 feet unless otherwise directed by the Engineer. Material shall be deposited in a manner that will maintain a higher elevation at the center of the roadway than on either side. The Contractor will not be permitted to construct retaining levees along the roadway

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of such dimensions as to cause damage to the foundation of the roadway. The Contractor shall conduct operations so as to ensure the completion of an embankment that will conform to the cross section shown on the plans except that he will be permitted to flatten side slopes. However, if material is deposited on private property, the Contractor shall obtain permission in writing from the affected property owner(s). No payment will be made for material beyond the limits of the net pay section.

The embankment shall be placed so as to ensure a minimum relative density of 80 percent of the theoretical maximum density when tested in accordance with (h) herein. If the method of placing the embankment fails to produce the required density, the Contractor shall use approved methods to obtain the specified density.

The Contractor shall take all necessary precautions to prevent placing material in streams. The Contractor shall be responsible for all damage to or caused by the hydraulic embankment. The Contractor shall provide sufficient material to maintain the embankment in accordance with the typical cross section as shown on the plans or as directed by the Engineer until final acceptance.

The Contractor's plan for support of suction or discharge pipes shall be submitted to and approved by the Engineer. Traffic shall be protected by the display of warning devices both day and night. If dredging operations damage an existing traveled highway, the Contractor shall cease operations and repair damage to the highway.

- (k) **Surplus Material:** Surplus material shall not be wasted or sold by the Contractor unless authorized in writing by the Engineer. When authorization has been given for surplus material to be wasted, it shall be disposed of in accordance with the requirements of Section 106.04.

Material shown on the plans as surplus material will not be considered for overhaul payment.

303.05—Tolerances

- (a) **Finished grade of subgrade** shall conform to the requirements of Section 305.03(c).
- (b) **Slopes** shall be graded in the following manner:
 - 1. **Earth excavation slopes:**
 - a. **Slopes steeper than 2:1** shall be grooved in accordance with the standard drawings and shall not deviate from the theoretical plane surface by more than 0.5 foot.
 - b. **Slopes steeper than 3:1 up to and including 2:1** shall be rough graded in a manner to provide horizontal ridges and grooves having no more than 0.5 foot deviation from the theoretical line of the typical cross section as is accomplished by the normal operation of heavy grading equipment.
 - c. **Slopes 3:1 or flatter** shall be uniformly finished and shall not deviate from the theoretical plane surface by more than 0.5 foot.
 - 2. **Earth embankment slopes:**
 - a. **Slopes steeper than 3:1** shall not deviate from the theoretical plane slope by more than 0.5 foot and shall be rough graded in a manner to provide horizontal

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ridges and grooves not more than 0.5 foot from the theoretical line of the typical cross section as is accomplished by the normal operation of heavy grading equipment.

- b. **Slopes 3:1 and flatter** shall be uniformly finished and shall not deviate from the theoretical plane surface by more than 0.5 foot.
- 3. **Rock slopes** shall not deviate from a plane surface by more than 2.0 feet and shall not deviate from their theoretical location by more than 2.0 feet measured along any line perpendicular to the theoretical slope line.

Finished excavation and embankment slopes shall not deviate from their theoretical location by more than 0.5 foot measured along any line perpendicular to the theoretical slope line.

SECTION 305—SUBGRADE AND SHOULDERS

305.03—Procedures

- (c) **Finishing Subgrade:** The Contractor shall provide effective drainage for the subgrade and maintain it in a satisfactory condition until the next course is placed.

Material for subsequent courses shall not be placed until the subgrade has been checked and approved. The finished subgrade elevation shall be within ± 0.04 foot of the plan elevation unless otherwise specified. When imported material is used, acceptance of the course will be based on the requirements of Section 308.04.

SECTION 308—SUBBASE COURSE

308.04—Tolerances

The thickness of the subbase course will be determined by the depth measurement of holes dug in the subbase in accordance with the requirements of VTM-38B.

Acceptance of the subbase course for the physical property of depth will be based on the mean result of tests performed on samples taken from each lot of material placed. A *lot* of material is defined as the quantity being tested for acceptance except that the maximum lot size will be 2 miles of paver application width.

A lot will be considered acceptable for depth if the mean result of the tests is within the following tolerance of the plan depth for the number of tests taken except that each individual test shall be within ± 1.00 inch of the plan depth; mean of two tests, ± 0.75 inch; mean of three tests, ± 0.60 inch; and mean of four tests, ± 0.50 inch.

If an individual depth test exceeds the ± 1.00 inch tolerance, that portion of the lot represented by the test will be excluded from the lot. If the individual test result indicates that the depth of material represented by the test exceeds 1.00 inch, the Contractor will not be paid for that material in excess of the tolerance throughout the length and width represented by the test. If the individual test result indicates that the depth of the material represented by the test is deficient by more than 1.00 inch, correction of the subbase course represented by the test shall be made as specified herein.

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If the mean depth of a lot of material is in excess of the allowable tolerance, the Contractor will not be paid for that material in excess of the tolerance throughout the length and width represented by the test.

If the mean depth of a lot of material is deficient by more than the allowable tolerance, correction will not normally be required and the Contractor will be paid for the quantity of material that has been placed in the lot.

For excessive depth subbase courses, when tonnage measurement is used, the rate of deduction from the tonnage allowed for payment as subbase material will be calculated at a weight of 110 pounds per square yard per inch of depth in excess of the tolerance. Areas that are deficient in depth by more than 1.00 inch and areas that do not provide a smooth uniform surface shall be scarified, material added or removed; reshaped; and recompact to the specified density so as to conform with the depth tolerance and provide a smooth, uniform surface.

SECTION 414—RIPRAP

414.01—Description

This work shall consist of placing the specified type of riprap in accordance with the plans, Standard Drawings where applicable, and these specifications.

414.02—Materials

- (a) **Riprap** shall conform to the requirements of Section 204.
- (b) **Sand** shall conform to the requirements of Section 202. Grading A, B, or C sand may be used in mortared or grouted riprap.
- (c) **Mortar and grout** shall conform to the requirements of Section 218.
- (d) **Geotextile bedding** shall conform to the requirements of Section 245.
- (e) **Welded wire fabric** shall conform to the requirements of Section 223.

414.03—Procedures

- (a) **Dry Riprap:** The classes of dry riprap shall be as follows:
 - 1. **Class I:** Stones shall weigh between 50 and 150 pounds each. At least 60 percent shall weigh more than 100 pounds, and approximately 10 percent may weigh 50 pounds or less.
 - 2. **Class II:** Stones shall weigh between 150 pounds to 500 pounds each. At least 50 percent shall weigh more than 300 pounds, and approximately 10 percent may weigh 150 pounds or less.
 - 3. **Class III:** Stones shall weigh from 500 pounds to 1,500 pounds each. At least 50 percent shall weigh more than 900 pounds, and approximately 10 percent may weigh less than 500 pounds.

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4. **Class A1:** Stones shall weigh between 25 and 75 pounds each, except that approximately 10 percent may weigh 25 pounds or less and 10 percent may weigh 75 to 100 pounds.

Dry riprap shall be placed as follows:

Grading: Slopes shall be finished to a reasonably smooth and compact surface within a tolerance of 6 inches from the surface lines shown on the plans.

Immediately prior to placement of riprap bedding, the prepared base will be inspected. Riprap or bedding shall not be placed until the prepared base has been approved.

Bedding: Riprap bedding shall be placed on the embankment to form a backing for riprap. Riprap bedding shall be spread uniformly on the prepared base. Compaction of the bedding material will not be required, but material shall be finished to a reasonably even surface, free from mounds or depressions.

When geotextile bedding material is required, the entire perimeter of the material shall be turned down and buried at least 9 inches for anchorage. Adjacent strips of material shall run only up and down the slope and shall overlap at least 18 inches. Geotextile bedding material shall not be used on slopes greater than 1:1. If sewed, strips shall overlap at least 4 inches and shall be double stitched with a prayer seam, Type SSa 1. Damaged material shall be replaced or repaired with a patch of the same material overlapping the damaged area by at least 18 inches on all sides. Displaced material shall be repositioned, including, if necessary, removing and replacing riprap stone, at the Contractor's expense. Material shall be placed loosely so that positioning riprap will not stretch or tear it.

Placing stones: Riprap shall be placed on the embankment as soon as practicable after bedding has been finished but no later than 15 days in a manner that will produce a reasonably well-graded mass of rock with the minimum practicable percentage of voids. Riprap shall be placed to its full course thickness in one operation and in a manner to avoid displacing underlying material. Riprap stone shall not be dropped onto fabric from a height greater than 1 foot. Smaller-sized material shall not be dropped onto fabric from a height greater than 3 feet. Larger stones shall be reasonably well distributed.

Finished riprap shall be free from objectionable pockets of small stones and clusters of larger stones. Hand placing may be required to the extent necessary to secure the results specified and form uniform slopes.

A tolerance of $\pm 1/4$ of the thickness of the maximum-size stone from the lines and grades shown on the plans will be allowed in the finished surface. However, the extremes of such tolerance shall be not continuous over an area of more than 200 square feet. Riprap shall be keyed into the natural ground in an approved manner and to a depth equal to the bed thickness or to solid rock.

The desired distribution of various sizes of stones throughout the mass may be obtained by selective loading at the source, controlled dumping of successive loads during final placement, or a combination of these methods. Placing riprap by dumping into chutes or similar methods likely to cause segregation of the various sizes will not be permitted.

Riprap protection shall be maintained until the riprap is accepted by the Engineer. Displaced material shall be replaced to the lines and grades shown on the plans at the Contractor's expense.

- (b) **Dumped Riprap:** The types of dumped riprap shall be as follows:

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1. **Type I:** Core riprap shall be composed of compact angular pieces of derrick stone weighing from 3/4 ton to 2 tons each with an average weight of approximately 1 ton. Approximately 10 percent by weight may weigh less than 3/4 ton.
2. **Type II:** Heavy riprap shall be composed of compact angular pieces of derrick stone weighing from 3 to 10 tons each with an average weight of approximately 4 tons. Approximately 10 percent by weight may weigh less than 3 tons.

Dumped riprap shall be placed in the same manner described for dry riprap in (a) herein. Dumped riprap shall not be placed in layers.

- (c) **Mortared Riprap for Slopes:** Stone shall be the same size as specified for dry riprap, Class II, and shall be selected to secure fairly large, flat-surfaced stones that will produce a true and even surface with a minimum of voids. Stone shall be placed on a slope not steeper than the natural angle of repose of the fill material. Fifty percent of the mass shall be broad flat stones placed with the flat surface uppermost and parallel to the slope. Stones shall be placed first and roughly arranged in close contact, with the larger stones placed near the base of the slope. Spaces between larger stones shall be filled with stones of suitable size, leaving the surface reasonably smooth and tight and conforming to the contour required. Stones shall be placed in a manner so as to ensure for plane surfaces a maximum variation from a true plane of not more than 1¼ inches in 4 feet. Warped and curved surfaces shall have the same accuracy as specified for plane surfaces.

As each larger stone is placed, it shall be surrounded by fresh mortar, and adjacent stones shall be shoved into contact. After larger stones are in place, spaces or openings between them shall be filled with mortar, and smaller stones shall then be placed by shoving them into position, forcing excess mortar to the surface, ensuring that each stone is carefully and firmly bedded laterally.

After the work is complete, excess mortar forced up shall be spread uniformly to fill surface voids completely. Surface joints shall then be pointed roughly with flush or shallow smooth-raked joints.

- (d) **Grouted Riprap for Slopes:** Grout shall consist of 1 part hydraulic cement and 3 parts sand, thoroughly mixed with water to produce grout having a thick, creamy consistency.

Stones shall be of the same sizes and placed in the same manner as specified for dry riprap, Class I. Care shall be taken during placing to keep earth or sand from filling spaces between stones. After stones are in place, spaces between them shall be filled with grout from bottom to top and the surface swept with a stiff broom. Riprap shall not be grouted in freezing weather. In hot, dry weather, the work shall be protected from sunlight and kept moist for at least 3 days after grouting by the use of saturated burlap.

- (e) **Erosion Control Stone for Culvert Outlet Protection:** Erosion Control Stone for Class AI, I, & II culvert outlet protection shall conform to the requirements for Dry Rip Rap Class AI, I, & II respectively of (a) herein for weight and shall be placed in a manner to present an irregular or rough surface.

- (f) **Erosion Control Riprap:** Riprap shall consist of sound, nonerodible shot rock or rock excavation, which may be obtained from within the excavation for the typical sections on the project. Erosion control riprap rock shall be not more than 15 inches in its greatest dimension and shall contain a sufficient percentage of smaller rocks to provide a reasonably dense mass with a thickness of at least 8 inches. Riprap shall be placed where shown on the plans or as directed by the Engineer in accordance with the requirements of Section 303.04(h).

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(g) Concrete Riprap in Bags:

1. **Wet mixture:** Riprap shall consist of Class C1 concrete in suitable burlap bags except in brackish or tidal water, where concrete shall be Class A3. Bags shall weigh approximately 100 pounds when 2/3 filled with concrete. Each bag shall be securely tied and immediately placed in the work. When used for foundation protection, bags shall be placed in accordance with the provisions governing placement of stone riprap for foundation protection as specified. When used for slope protection, riprap shall be placed in conformance with the provisions governing placement of dry riprap.
2. **Dry mixture:** Riprap shall conform generally to the requirements for wet mixtures except that the mixture shall consist of the dry ingredients and the requirements for water, consistency, and air will be waived.

Burlap or paper bags will be permitted. Riprap shall be a rectangular solid approximately 3 inches in thickness and shall weigh approximately 80 pounds per bag. Paper bags shall be perforated throughout on approximate 1-inch centers and shall be of adequate seal, thickness, and strength to maintain the integrity of the riprap until setting of the concrete mixture. Bag compositions shall be such that bags will disintegrate without presenting environmental problems.

- (h) **Stone Riprap for Foundation Protection:** Riprap for pier, abutment, and bridge spill slope protection shall conform to the requirements of the applicable specifications.

SECTION 501—UNDERDRAINS

501.01—Description

This work shall consist of constructing underdrains, using pipe, aggregate, and geosynthetics, in accordance with these specifications and in conformity to the lines and grades shown on the plans or as designated by the Engineer.

501.02—Materials

- (a) **Pipe** shall conform to the requirements of Section 232.
- (b) **Aggregate** shall conform to the requirements of Section 202 or 203.
- (c) **Geosynthetics, to include geotextile fabric and prefabricated geocomposite pavement edgedrains**, shall conform to the requirements of Section 245.

501.03—Procedures

- (a) **Excavation:** The trench shall be excavated so that the walls and bottom are free of loose and jagged material. Large depressions shall be filled with sandy material, and sharp contours and rises shall be leveled. Excavated material shall be handled in a way that prevents contamination with the aggregate used to backfill the trench for the underdrain.
- (b) **Placing Geosynthetics:** When geotextile fabric or prefabricated geocomposite pavement edgedrain (PGPE) is required, it shall be placed as shown on the plans. Torn or punctured fabric shall be replaced at the Contractor's expense. Splices, when required for PGPE, shall be made using splice kits furnished by the manufacturer and in

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accordance with the manufacturer's written instructions. Spliced joints shall not damage the panel, shall not impede the open flow area of the panel, and shall maintain the vertical and horizontal alignment of the drain within 5 percent. Splices shall be made in such a manner as to prevent infiltration of the backfill or any fine material into the water flow channel.

- (c) **Installing Pipe:** Perforated pipe shall be placed with the perforations facing downward on a bed of aggregate material. Pipe sections shall be joined with appropriate couplings. Semi-round underdrain pipe shall be placed with the rounded section down.

Wherever the depth of the trench is modified to a lesser depth than shown on the standard drawings, concrete or corrugated pipe shall be used.

Pipe shall be placed with the bell end upgrade. Open joints shall be wrapped with the same geotextile used for lining the excavation.

Upgrade ends of pipe, except for combination underdrains, shall be closed with suitable plugs. Where an underdrain connects with a manhole or catch basin, a suitable connection shall be made through the wall of the manhole or catch basin.

After the Engineer has approved the pipe installation, aggregate backfill material shall be placed and compacted. Pipe and covering at open joints shall not be displaced during subsequent operations.

Outlet pipes shall be installed at the low points of a sag.

Endwalls for outlet pipes shall be placed on a prepared surface that has been compacted to comply with the requirements of Section 303.04. If settlement of the endwall occurs, the Contractor shall make necessary repairs at his expense.

Prior to final acceptance of the underdrain system, the Contractor shall conduct a video inspection of the installed system in accordance with the requirements of VTM-108.

- (d) **Combination Underdrain Outlets:** Pipe shall be placed in the trench with sections securely joined. After the Engineer has approved pipe installation, the trench shall be backfilled with aggregate material in layers not more than 6 inches in depth and thoroughly compacted.
- (e) **Inspection Ports:** Inspection ports shall be installed on the PGPE at a rate of two per mile of installed PGPE or a minimum of four per project. Inspection ports shall meet and be installed in accordance with the manufacturer's specification. The Department will use these ports in conjunction with a borscope camera as part of the basis for acceptance of the PGPE. The Department will perform inspection after PGPE installation but prior to paving of the shoulder. Bends, water flow restrictions, J-shaped panels, tears in the geotextile, debris in pipes, and sags are unacceptable and shall be removed and replaced at no cost to the Department.

SECTION 601—SELECTIVE TREE REMOVAL, TRIMMING, AND CLEANUP

601.01—Description

This work shall consist of selective cutting and disposing of trees, shrubs, and vegetation to improve sight distance, create open vistas, or improve the appearance and condition of trees. This shall be accomplished by removing and disposing of rubbish and fallen and undesirable trees and shrubs, selective pruning, and spraying stumps with an approved herbicide to prevent sprouting.

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601.02—Materials

Herbicide shall conform to the requirements of Section 244.02(a).

601.03—Procedures

Trees and stumps shall be cut in such a manner that remaining stumps are not higher than 4 inches above the ground. Loose roots more than 1 inch in diameter and more than 1 foot in length shall be removed. Only those living trees and shrubs selected by the Engineer shall be removed. Trees to be removed shall be felled in a manner that will not damage the trees and shrubs to be preserved.

Debris shall be disposed of by burning or chipping or in accordance with the requirements of Section 106.04. Burning shall be performed in accordance with the requirements of Section 107.16. Fires shall be located and supervised so that they will not spread or damage vegetation. A mechanical chipper may be used, and the resulting chips spread thinly and uniformly within the immediate area or disposed of as directed by the Engineer.

- (a) **Treating Stumps:** Stumps of living trees and shrubs shall be coated with an herbicide solution within 48 hours after they are cut. The exposed surface of stumps and exposed live roots shall be saturated with herbicide to the point of runoff.
- (b) **Trimming:** Branches and limbs that affect sight distance or the open vista and dead or diseased branches and limbs more than 2 inches in diameter that will hinder the healthy normal growth of trees shall be removed as designated by the Engineer. Cuts shall be made flush at the collar of the supporting trunk or limb.

SECTION 602—TOPSOIL

602.01—Description

This work shall consist of applying topsoil in accordance with the requirements of these specifications and in conformity with the depths and limits shown on the plans or as established by the Engineer.

602.02—Materials

- (a) **Class A topsoil** shall conform to the requirements of Section 244.02(b)1.
- (b) **Class B topsoil** shall conform to the requirements of Section 244.02(b)2.

602.03—Procedures

- (a) **Submittals:** When Class B topsoil is specified, the Contractor shall submit soil test reports to the Engineer for Class B topsoil in accordance with the requirements of Section 244.02(b).
- (b) **Preparing Areas to Receive Topsoil:** Unless otherwise designated on the plans or directed by the Engineer, areas designated to receive topsoil shall be graded, shaped,

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and then scarified or tilled by disking, harrowing, or other approved methods to a depth of approximately 2 inches. Topsoil shall be applied only when the subsoil is in a loose, friable condition. Subsoil on slopes that have been horizontally grooved in accordance with the plans shall not be loosened.

- (c) **Applying Topsoil:** The loose depth of topsoil shall be sufficient to allow the area to conform to the elevations shown on the plans after topsoil settles. After topsoil has been applied, large clods, hard lumps, and stones larger than 3 inches in diameter; brush; roots; stumps; litter; and foreign material shall be removed from the area. Where residential or commercial yards exist, the size of the large clods, hard lumps, and stones shall not exceed 3/4 inch in diameter. Such areas shall be hand raked to provide a smooth yard suitable for mowing by a yard mower. When the topsoiling operation is complete, the area shall be in a condition to receive seed, sod, or plants without further soil preparation. Areas shall be seeded within 7 calendar days after topsoiling is completed.

SECTION 603—SEEDING

603.01—Description

This work shall consist of furnishing and applying fertilizer, lime, mulch, and seed in the quantities specified for areas designated on the plans or selected by the Engineer.

603.02—Materials

- (a) **Seed** shall conform to the requirements of Section 244.02(c).
- (b) **Fertilizer** shall conform to the requirements of Section 244.02(d).
- (c) **Lime** shall conform to the requirements of Section 244.02(e).
- (d) **Mulch** shall conform to the requirements of Section 244.02(g).

603.03—Procedures

Unless otherwise specified, seeding operations shall be performed at the times specified in Sections 303.03(b) and 602.03(b). Seeding operations shall not be performed when the ground is frozen or when soil or weather conditions would prevent proper soil preparation and subsequent operations. When hydroseeding is performed, nozzles or sprays shall not be directed toward the ground in a manner that will cause erosion or runoff. The Contractor shall notify the Engineer at least 48 hours prior to beginning seeding operations.

- (a) **Applying Lime:** Lime shall be uniformly applied to areas to be seeded at the rate of 2 tons per acre. Any approved method may be used.
- (b) **Preparing Soil:** After lime is applied, areas to be seeded shall be prepared in accordance with the following: Slopes 3:1 or flatter shall be loosened to a depth of approximately 3 inches by disking, harrowing, or other approved methods. Loosening of soil on excavated slopes steeper than 3:1 will not be required except to eliminate hard or crusted surfaces. Shoulders and embankment slopes steeper than 3:1 shall be loosened to a depth of

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approximately 1 inch. Clods, loose stones, and other foreign material larger than 3 inches in any dimension shall be removed and disposed of in accordance with the requirements of Section 106.04 or as approved by the Engineer. Gullies, washes, and disturbed areas that develop subsequent to final dressing shall be repaired before they are seeded.

Topsoil, when specified, shall be applied in accordance with the requirements of Section 602.

- (c) **Applying Fertilizer:** When dry fertilizer is used, it shall be applied uniformly to the seeding areas at the time of seeding at the rate of 300 pounds of fertilizer per acre (approximately 45 pounds of nitrogen per acre or 1.0 pound of nitrogen per 1,000 square feet) or as directed by the Engineer. Slow release and slowly soluble fertilizer may be applied through a hydraulic seeder except for sulfur-coated urea (SCU). The method of application for fertilizer products will be approved by the Engineer prior to application of the fertilizer. When applied in liquid form or mixed with water, fertilizer shall provide the same value of nutrients per acre as specified for dry fertilizer. Fertilizer applied in liquid form shall be constantly agitated during application.
- (d) **Applying Seed:** Regular seeding shall consist of uniformly applying seed, fertilizer, and mulch on prepared areas.

Overseeding shall consist of applying seed and fertilizer on areas prepared as directed by the Engineer.

Where temporary seeding is employed as a means of soil stabilization it shall consist of applying seed, fertilizer, and mulch in accordance with the rates specified in the plans or in Section 603.03 of the Specifications to stabilize areas on which grading operations are anticipated to be suspended for durations greater than 14 days. Where temporary seeding is required or directed by the Engineer, the cost for removal of vegetation once grading operations resume shall be included in the price of seeding.

For hydroseeding, seed shall be put in the mixture slowly to result in a uniform mixture before application. Hydroseeding mixtures shall be constantly agitated from the time of mixing until application on the seed bed and used within 8 hours from the beginning of mixing.

If special seed is required in addition to the regular mixture, it will be furnished by the Department and shall be applied with the regular mixture at the Contractor's expense.

Leguminous seeds shall be inoculated or treated with approved cultures as specified by the manufacturer or directed by the Engineer before they are applied or mixed with other seeds to be applied. Seed shall be applied within 24 hours after treatment. When the hydroseeding method is used, leguminous seeds shall be treated with 5 times the amount of inoculant recommended by the manufacturer.

- (e) **Applying Mulch:** Mulch shall be applied in a separate application within 48 hours after completion of the seeding operation. When straw or hay mulch is used, it shall be applied on seeded areas at the rate of approximately 2 tons per acre. When wood cellulose fiber mulch is used, it shall be uniformly applied at the rate of approximately 1,500 pounds net dry weight per acre. Mulch will not be required on overseeded areas.

Straw and hay mulch shall be applied to a uniform thickness in such a manner that not more than 10 percent of the soil surface will be exposed at the conclusion of the mulching operations. Wet straw or wet hay shall not be used. Straw or hay mulch shall be anchored to the seeded surface by spraying with wood cellulose fiber mulch at the rate of 750 pounds per acre; spraying with an emulsified asphalt at the rate of at least 100 gallons per ton of

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mulch in a manner that will protect adjacent property and pedestrian traffic areas; disking or punching the mulch partially into the soil; using approved netting; or using other materials or methods approved by the Engineer. The Contractor may use more than one method on the same project.

SECTION 604—SODDING

604.01—Description

This work shall consist of preparing sod beds; furnishing and placing sod; and furnishing and applying lime, fertilizer, topsoil, and water at locations designated on the plans or by the Engineer.

604.02—Materials

- (a) **Sod** shall conform to the requirements of Section 244.02(h).
- (b) **Fertilizer** shall conform to the requirements of Section 244.02(d).
- (c) **Lime** shall conform to the requirements of Section 244.02(e).

604.03—Procedures

- (a) **Preparing Sod Beds:** Soil on which sod is to be placed shall be shaped to an even surface and graded to such an elevation that sod and adjacent surfaces will have a smooth contour.

Lime shall be uniformly applied to areas designated to receive sod at the rate of approximately 2 tons per acre.

Fertilizer shall be uniformly applied to areas designated to receive sod at the rate of 16 1/2 pounds of 15-30-15 fertilizer, or an equivalent quantity of 1-2-1 fertilizer, and 10 pounds of ureaformaldehyde per 1,000 square feet. Following application of lime and fertilizer, the soil shall be thoroughly cultivated to a depth of 2 to 3 inches and sprinkled with sufficient water to moisten the cultivated soil.

- (b) **Placing Sod:** Sod shall not be placed between June 1 and September 1 or at any time the ambient temperature is below 32 degrees F. Frozen sod shall not be placed, and sod shall not be placed on frozen soil. Sod shall be placed by hand, and joints shall tightly abut without overlapping. Open joints and gaps shall be plugged with sod that has been cut to the size and shape of the opening.

Sod shall be placed on sloping areas beginning at the bottom of the slope. Sod shall be placed in horizontal strips with the long edges of rectangular pads parallel to the contour. When practicable, horizontal joints shall be reasonably straight and vertical joints staggered. In areas where sod pads may be displaced by foot traffic during sodding operations, ladders or treaded planks shall be used.

Sod placed on slopes steeper than 2:1 shall be anchored in place with wood stakes driven flush with the top of the sod. Stakes shall be at least 8 inches in length with a cross-sectional area of approximately 1 square inch. The number and spacing of stakes shall be adequate to hold sod securely in place. Special attention shall be given to anchoring sod placed in drainage ditches, channels, and swales.

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After sod has been placed, joints and gaps that were too small to be effectively plugged with sod shall be filled with loamy topsoil.

Sodded areas shall be watered thoroughly and rolled or tamped to press the root system of the sod into full contact with underlying soil.

Sodded areas shall be kept watered to maintain the life and growth of the sod until final acceptance.

SECTION 605 – PLANTING

605.01—Description

This work shall consist of furnishing and planting trees, shrubs, vines, and other plants of the kinds, sizes, and quantities specified on the plans or by the Engineer and maintaining and replacing plants as specified herein.

605.02—Materials

- (a) **Plants** shall conform to the requirements of Section 244.02(i).
- (b) **Drainage stone** shall conform to the requirements of Section 204.
- (c) **Composted Yard Waste** shall conform to the requirements of Section 244.02 (j).
- (d) **Geotextile Drainage Fabric** shall conform to the requirements of Section 245.
- (e) **Topsoil** shall conform to the requirements of Section 244.02(b)
- (f) **Horticultural Grade Perlite** shall conform to the requirements of Section 244.02(j).
- (g) **Tree Tubes** shall conform to the requirements of Section 244.02(j)
- (h) **Tree Anchors, Staking and Guying Materials** shall conform to the requirements of Section 244.02(j)
- (i) **All other Misc. Planting Materials** shall conform to the requirements of Section 244.02(j) and 244.02(k).

605.03—Procedures

- (a) **Documentation of Confirmed Order:** The Contractor shall submit documentation to the Engineer of a confirmed order of all plant materials 60 days in advance of the proposed planting operation. The documentation shall list the source(s) of supply, all species by common and botanical name, specific variety, and cultivar in the sizes reserved. When special requirements are listed on the planting summary sheet, such as "Specimen Quality," or "Specimen Street Tree", etc., the documentation shall certify that the species reserved meet those specific

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requirements. Once the Documentation of Confirmed Order is received, the Engineer reserves the right to require sample photographs of materials to be supplied. The Engineer also reserves the right to inspect and approve the selection of plant materials at the source of supply prior to delivery. In the event that specific materials are not available, the Contractor shall submit a request for substitutions in accordance with the requirements of (e) herein.

- (b) **Planting Season:** The Planting Season shall be from November 1, through March 31, unless otherwise identified on the plans. The Contractor shall notify the Engineer 48 hours prior to beginning work. All sources of supply, materials, construction schedule, and methods of construction shall be approved by the Engineer prior to beginning work on the project. Plants requiring either spring or fall planting only will be designated on the plans.
- (c) **Sources of Supply:** All plants shall be obtained from a nursery certified by a "Certificate of Registration" in accordance with The Virginia Department of Agriculture and Consumer Services (VDACS), or by a comparable agency responsible for nursery inspection and issuance of a "Certificate of Registration" from the State of origin. A copy of the certification shall accompany each separate delivery of plant materials to the project site, and shall be submitted to the Engineer.
- (d) **Inspecting and Identifying Plants:** Plants will be inspected and identified in accordance with the *Standardized Plant Names* prepared by the Editorial Committee of the American Joint Committee on Horticultural Nomenclature. The Engineer may inspect plants at any time and place. Plants will be inspected immediately prior to being planted. If plants are installed prior to inspection and found to be unsatisfactory, they shall be replaced with approved plants at the Contractor's expense.
- (e) **Substitutions:** No change in the quantity, size, kind, or quality of plants from those specified will be permitted without the written approval of the Engineer. When requesting permission to substitute, the Contractor shall submit to the Engineer written evidence in accordance with the requirements of (a) herein that the specified plants are not available and shall suggest substitute plants that conform to the requirements of the Contract. The Contractor shall indicate the reduced cost, if any, that will accrue to the Department as a result of the substitution. The Engineer may delete plants from the Contract in lieu of approving substitutions.
- (f) **Layout:** Plant locations and outlines of bed areas to receive plants shall be staked or marked by the Contractor and will be inspected by the Engineer for approval prior to plant installation. The Contractor shall notify the Engineer a minimum of 48 hours prior to scheduling the inspection. Planting shall not be permitted until the Engineer has approved the staking layout. Unforeseen conditions such as the location of traffic signs, utilities and drainage items may necessitate adjustments in plant locations, and such adjustments will only be permitted when approved in writing by the Engineer.
- (g) **Delivery:** The Contractor shall notify the Engineer at least 48 hours in advance of the anticipated delivery date for plants. A legible copy of the invoice showing the kinds and sizes of plants in each shipment shall be submitted to the Engineer. A copy of the current Certificate of Nursery Inspection from the State of origin shall accompany each shipment of plants.
- (h) **Labeling:** Plant material delivered to the project shall be legibly identified with a waterproof label as to the genus, species, and size of the plants. When plants are in bales, bundles, boxes, or other containers, a legible label indicating the genus, species, size, and quantity of the plants shall be attached to each container. A

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minimum of 10 percent of each species in each shipment shall be so labeled. Failure to comply with this identification labeling will be cause for rejection.

- (i) **Transporting and Protecting:** Plants transported to the project in open vehicles shall be covered with suitable covers securely fastened to the body of the vehicle. Closed vehicles shall be adequately ventilated to prevent overheating plants. Plants shall be kept moist, fresh, and protected at all times.
- (j) **Storing:** When plants are to be stored, they shall be stored at a location approved by the Engineer. Plants stored for more than 30 days shall not be used unless approved by the Engineer. Unless the Engineer approves other methods of storage, bare-root plants that are not planted within 24 hours after delivery shall be heeled-in in a moist trench dug in the ground. Bundles shall be opened, and plants shall be separated and placed singly in the trench with the roots spread in a natural position. Roots of each layer of plants shall be immediately covered in a manner satisfactory to the Engineer with moist, pulverized soil; moist sawdust; or other approved material. Root-covering materials shall be kept moist at all times. Shade shall be provided as directed by the Engineer. At the discretion of the Engineer, balled material, container-grown material, and plants in plantable pots that are not planted within 48 hours of delivery shall have their root zone protected by wet sawdust or other approved material. Rejected plants shall be removed from the storage area within 24 hours of rejection or, with the written approval of the Engineer, may be marked with yellow paint or otherwise made readily identifiable. If rejected plants have not been removed or acceptably marked within 24 hours, the use of plants from the storage area will not be allowed until rejected plants have been removed or identified by marking.
- (k) **Planting:**
 - 1. **Underground and Aboveground Conditions:** It shall be the responsibility of the Contractor to have marked, the location of all underground utilities with Ticket Information Exchange (TIE) / (Miss Utility) and all other applicable underground utility providers such as sewer and water service, and VDOT traffic signal cable prior to digging. The Contractor shall be responsible for locating and working around aboveground utilities. If underground obstructions or any other unforeseen subsurface or above surface conditions that could interfere with a utility or become detrimental to plant growth are encountered, the Engineer may require that plant pits be enlarged or relocated or that the plants be deleted from the contract.
 - 2. **Planting Trees or Shrubs on Slopes Steeper than 3:1:** Drainage requirements for trees or shrubs on slopes steeper than 3:1 will be determined by percolation tests, with no more than 3 tests per slope, as designated by the Engineer. Slopes for this test are determined from cut and fill slopes shown on the cross sections. Percolation testing shall consist of the following: The Contractor shall auger holes that are 12 inches in diameter and 24 inches in depth. Three holes shall be distributed across the slopes vertically and horizontally. The Contractor shall fill the holes with water and allow them to drain. If soil is extremely dry, fill holes twice and allow to drain. Fill holes again and measure rate at which water percolates into the soil. Water in holes should recede at the rate of 2 inches per hour (minimum) or pit modification for improving drainage shall be required.
 - 3. **Preparing Planting Pits for Trees and Shrubs:** Planting pits shall be excavated to meet the minimum requirements VDOT Road and Bridge Standards unless otherwise indicated on the plans by detailed drawings. Sides of pits that become plastered or glazed shall be scarified. Surplus excavation

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and unsuitable material shall be disposed of in accordance with the requirements of Section 106.04 or as otherwise approved in writing by the Engineer. Preparation of the planting medium (soil mix) shall utilize 3 parts of the original excavated soil from the digging operation thoroughly mixed with 1 part composted yard waste, except where linear or oversize planting pits are specified on the plans.

If the Contractor determines that the original excavated soil is not suitable for reusing with amendments for achieving an acceptable growing medium, the Contractor shall notify the Engineer. The Engineer shall make a determination as to the quality of the soil, and if found to be unacceptable; will direct the Contractor to use topsoil or composted yard waste for use in the soil mix. In such cases, the planting pit, and unsuitable soils surrounding the pit shall be removed as directed by the Engineer. The Engineer reserves the right to have the original soil tested prior to making a determination for replacement.

4. **Preparing Plant Beds:** Plant beds shall be prepared by the Contractor in accordance with the following:
 - a) Plant bed preparation shall only be required on slopes of 3:1 or flatter. Where grass and weeds are present, the Contractor shall treat the designated bed area(s) with a broad spectrum grass and weed killing herbicide at least two weeks prior to beginning bed preparation, or physically remove turf and weeds immediately before bed preparation. The entire area of the plant bed shall be cultivated to a depth of 4 inches by a rotary cultivator or other approved method. The Contractor shall then apply composted yard waste at a depth of three inches over the entire plant bed and re-till to form a homogenous soil medium. Soil shall be cultivated so that there are no clods larger than 2 inches in diameter.
 - b) Any remaining grass, sod, and weeds shall be removed from the bed. Rocks over 3 inches in diameter, clods, roots, and other objectionable material remaining on the surface shall be removed and disposed of in accordance with the requirements of Section 106.04 or as approved in writing by the Engineer. Individual planting pits shall not be dug until after the bed is prepared to the satisfaction of the Engineer.
 - c) Upon completion of planting, the bed shall be hand raked to an even surface and neatly edged with a "V" cut edge located a minimum of 12 inches from the root ball of plants along the outer edge of the bed. Mulch shall be applied to the entire bed area. On certain projects where mulched beds around large quantities of plant materials are used to control weed growth and are not intended as a prepared soil medium, tilling and application of composted organic material throughout the plant bed shall be waived when beds are labeled on the plans as "Bed Preparation Not Required".
5. **Linear Planting Pit:** Areas labeled on the plans and details as "Linear Planting Pit" shall be excavated to the horizontal and vertical dimensions indicated on

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the plans to receive soil mixture. Soil mixture shall consist of 1 part composted yard waste, and 1 part horticultural grade perlite, unless otherwise indicated in the contract documents, and shall include any necessary excavation required for installation of plant underdrain systems. Plant underdrain system(s), as applicable, shall be indicated on the plans, listed as a pay item and installed in accordance with plan details.

Soil mix for linear planting pits shall be installed in 6 inch lifts, lightly compacted by foot or other approved method, and moistened prior to proceeding with next lift. If settlement occurs prior to planting, additional soil mix shall be added at the direction of the Engineer. Prior to planting the Contractor shall till the linear planting pit to a depth of 4 inches, hand rake the area and adjust the grade adjacent to curb or sidewalk to receive 3 inches of mulch.

6. **Oversize Planting Pit:** shall be prepared in accordance with the plan details at locations shown on the plans. Backfill shall consist of one-half part native soil excavated from the plant pit, and one-half part composted yard waste. If native soil is determined by the Engineer to be unsuitable, 100 percent composted yard waste shall be used. If settlement occurs prior to planting, additional soil mix shall be added at the direction of the Engineer. After planting the planting pit shall be neatly edged except when the planting pit falls within a larger bed area.
7. **Installing Trees and Shrubs:** Balled and burlapped and containerized plant materials shall be installed in plant pits in accordance with the requirements of the VDOT Road and Bridge Standards, unless otherwise indicated on the plans. Bare roots of plants shall be spread out in a natural position. Broken or bruised roots shall be pruned. After positioning plants in the planting pit and prior to backfilling, root ball wrapping materials, except metal root ball cages shall be cut and dropped to the bottom of the pit. Root ball wrapping materials shall not be removed from under the root ball. Metal root ball cages shall be cut and removed to a minimum of 6 inches below finished grade. Wrapping materials within root ball cages shall be cut or unwrapped to the same elevation as the cage. All other wrapping materials such as tags, twine and colored marking ribbon shall be removed from the plant unless otherwise directed by the Engineer. The soil mixture shall then be filled in around roots and lightly tamped. Light tamping around root balls shall be performed using a method approved by the Engineer. Foot tamping will be permitted in the bottom of pits before plants are installed, around root balls when there is ample room to accommodate the foot without damage to the ball, and in the planting of bare-root plants after roots have been covered with the soil.

Backfill material in pits shall be saturated with water. The amount of water applied and method of application shall be approved by the Engineer. Failure to water properly at the time each plant is installed will be cause for rejection of the plant. Frozen backfill material shall not be used.

Potted plants shall not be removed from their container until immediately before planting. Containers shall be removed by approved methods that will not damage roots or loosen soil balls. The sides of containerized materials shall be scarified prior to planting.

When planted, watered, and fully settled, plants shall be vertical and shall stand at a height flush with the height of which they were growing.

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8. **Handling Plants during Planting:** Roots of bare-root plants shall be kept covered with moist burlap or other approved material prior to planting. Forest tree seedlings and forest tree transplants shall be carried in a container filled with sufficient mud to puddle roots. When seedling roots have been coated with a protective material, the seedlings shall be protected in accordance with the U.S. Forest Service's recommendations relative to treatment of seedling roots while seedlings are being planted. Plants will be rejected if their roots are exposed to drying conditions at any time.
- (l) **Forming Water Rings and Saucers:** Immediately after the installation of each plant, a saucer shall be formed around the plant pit. Soil used to form the saucer shall be compacted by tamping to prevent runoff of water from the pit. Saucers shall measure 4 to 6 inches in width, and 2 to 3 inches in height after tamping. Saucers will not be required for forest tree seedlings, or forest tree transplants. Water rings and saucers shall be formed on the wetland trees and shrubs planted on slopes and upland areas adjacent to the wetland.
- (m) **Applying Mulch:** Mulch shall be applied uniformly to a 3-inch depth over the entire area of the plant pit or plant bed within 48 hours after completion of planting. Re-mulching at the terminus of the establishment period shall be applied at a depth of 1-1/2 inches. Mulch shall be anchored in a manner satisfactory to the Engineer. Mulch shall not be required for wetland trees and shrubs, or upland forest tree seedlings. Mulch shall be applied to wetland trees and shrubs on slopes and upland areas adjacent to the wetland.
- (n) **Staking, Guying, Anchoring:** Each plant shall be staked and guyed or secured with below ground tree anchors immediately following planting, unless otherwise indicated in the Planting Plan Summary and General Notes. Below ground tree anchors shall be used when specified on detailed drawings in the plans. Staking and guying shall be required for wetland trees and shrubs on slopes and upland areas adjacent to the wetland.
- (o) **Pruning:** Plants that have been freshly pruned before delivery will be rejected. If necessary, plants shall be pruned either immediately before or within 48 hours after they are planted. Pruning of trees and shrubs to be planted on projects shall consist of removing dead, diseased, broken or other branches deemed injurious to the health of the plant, and for removal of sprouts and sucker growth. Care shall be taken to preserve the natural character of the plant. Pruning shall be performed with tools and equipment in excellent working condition that are specifically designed for the appropriate work. All pruning shall be performed in accordance with the current American National Standards Institute (ANSI A300) and as directed by the Engineer. All debris removal including disposal from the pruning operation shall be the responsibility of the Contractor.
- (p) **Pit Drains:** Pit drains or plant underdrain systems shall be installed as shown on the plans.
- (q) **Tree Tubes:** This work shall consist of installing tree tubes on all seedling trees in accordance with the manufacturer's recommendations, the plans and product specifications.

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605.04—Care of Plants

Plant care shall begin immediately after each plant is satisfactorily installed and shall continue until final acceptance. Care shall include but not be limited to replacing displaced mulch, repairing and reshaping water rings or saucers, maintaining stakes and guys as originally installed, watering when needed or as directed by the Engineer, and performing any other work required to keep plants in a healthy condition. Dead, defective, or rejected plants shall be immediately removed and replaced in accordance with the requirements of Section 605.05(b)4.

605.05—Establishment Period

- (a) **Beginning of Establishment Period:** The establishment period shall begin on a date following completion of the planting (spring or fall), when the Contractor receives written confirmation from the Engineer, that all work has been completed in accordance with the requirements of this Section and the plans, and that all plants are living, healthy and in a viable growing condition as determined by the Engineer. Plants that are replaced in order to meet these initial specifications are not considered as "plant replacements."
- (b) **Establishment Period:** The establishment period shall continue through a minimum of one growing season, and shall terminate on the date determined in writing by the Engineer. During the establishment period, the Contractor shall do all work necessary to keep the plants in a healthy growing condition, including, but not limited to the following:
 - 1. **Watering:** The Contractor shall prepare and submit to the Engineer a schedule for watering in accordance with the frequency listed on the project summary sheet. However, the Contractor shall be responsible for watering as frequently as is necessary to maintain an adequate supply of moisture within the root zone of all plantings at all times or if there is less than 1 inch of rainfall in a seven day period during the months of April through September. Water shall not be applied at a force that will displace soil or mulch. Quantities and frequency of watering shown on the plans are for minimum estimating purposes only.
 - a) The Engineer may require the use of watering needles or other approved methods to prevent displacement of soil, mulch and runoff of water. The Engineer may make periodic inspections to ascertain the adequacy of the Contractor's watering and the moisture content of the soil.
 - b) The quantity of water supplied shall not be in excess of that normally required to ensure optimum growing conditions. Watering shall not commence until methods and equipment have been approved by the Engineer. The Engineer may require or suspend watering at any time.
 - 2. **Notification and Scheduling:** When notified by the Engineer that watering is required, the Contractor shall begin watering within 48 hours with sufficient labor and equipment and shall continue to water daily where and as directed, without delays or interruptions, to ensure that the root zone does not become dry at any time. In the event the Contractor fails to begin watering operations

Stormwater Pollution Prevention Plan (SWPPP) Specifications

within 48 hours after notification, the Engineer may proceed with adequate forces, equipment, and materials to perform the watering operations and the entire cost of the watering operations will be deducted from monies due the Contractor.

3. **All establishment period maintenance work**, except watering, shall begin within 7 working days after the Engineer notifies the Contractor that the establishment period has begun.
4. **Plant Replacements:** Between the beginning and ending dates of the establishment period, plants that are dead, defective, or otherwise not in a healthy growing condition as determined by the Engineer shall be removed immediately at the Contractor's expense. Plant replacements shall be made once in the spring if required (Between March 1 and March 31), and once in the fall if required (Between November 1 and December 31), as necessary to replace dead or defective plant materials as directed by the Engineer.
5. **Stakes, and Guys, and/or Below Ground Tree Anchors** shall be repaired or replaced immediately as needed. Stakes and Guys shall be removed when no longer required as directed by the Engineer. Tree anchors shall remain in place.
6. **Eroded Saucer Rings** shall be repaired or replaced as needed and/or as directed by the Engineer.
7. **Mulch** shall be redressed as needed and/or as directed by the Engineer throughout the establishment period.
8. **Re-mulching:** When established as a separate pay item, remulching shall be reapplied to all individual plants and plant beds prior to the terminus of the establishment period at a rate of approximately 1 1/2 inch depth, uniformly over all individual plant pits and plant beds, and/or as directed by the Engineer.
9. **Vegetation Control** shall consist of the control and/or removal of weeds, grass and root growth from plant beds and mulched areas around individual plants. Such weeding shall be performed once in the month of May, June, July, August, and September for a total of five weeding operations over the duration of the establishment period. The Contractor shall submit a schedule for vegetation control for approval by the Engineer prior to the Contractor beginning vegetative control operations.
 - a) Removal of weeds, grass and root growth may be completed by hand or through the application of "pre-emergent" and "post emergent" herbicides as approved by the Engineer. All herbicide applications shall be performed by certified pesticide applicators in accordance with the requirements of Section 601. Additional weeding may be performed when requested by the Engineer and with written agreement from both parties. The Engineer also reserves the right to delete individual weeding cycles at no cost to the Department when necessary. The Contractor shall be responsible for replacing plants that are damaged or that die due to the application of herbicide treatments.
 - b) When herbicides are used for post emergent weed control, the weeds shall be cut to a height of 6 inches or as recommended by the manufacturer if necessary, prior to applying the herbicide. The Engineer reserves the right to change the frequency or delete specific areas

Stormwater Pollution Prevention Plan (SWPPP) Specifications

scheduled for weed control. Other pesticides, adjuvants and plant growth regulators may be used when approved by the Engineer.

- c) Turf maintenance which includes grass and other vegetation around individual plant pits, between groups of plant pits that are 15 feet on center or less, and around the perimeter of plant beds shall be cut to a height of approximately 4 inches. For each individual plant pit, group of plant pits, and plant beds, a perimeter extending 5 feet in width shall be maintained around the outermost plant pits and edge of beds where grass and other vegetation is present, and where such areas exist within the right-of-way or construction easement. Mowing shall be performed once in each month of May through September. Additional mowing may be performed when requested by the Engineer. The Engineer reserves the right to delete individual mowing cycles when deemed necessary by the Engineer.

- 10. **Additional Work**, including pruning of dead, broken or diseased branches, and seasonal spraying with approved insecticides and fungicides, shall be performed to ensure plant survival as approved or directed by the Engineer.

- (c) **Termination of Establishment Period:** Any dead, missing, or defective plants shall be replaced as directed by the Engineer prior to termination of the establishment period. The Engineer shall be notified within 48 hours prior to beginning the replacement work.

The establishment period shall end on a date established by the Engineer, when the Contractor receives written notification from the Engineer that confirms all the requirements of (b) herein have been satisfactorily completed.

605.06—Guarantee

The Contractor's performance bond, furnished in accordance with the requirements of the Contract Documents, shall provide for necessary maintenance during the establishment period and replacements in kind, or with a substitute acceptable to the Engineer, for plants that are not in a healthy growing condition or that have died back to the crown or beyond the normal pruning limit.

SECTION 606—SOIL RETENTION COVERINGS

606.01—Description.

This work shall consist of furnishing and placing protective coverings for soil retention, including seed, fertilizer, lime, topsoil, and water, in accordance with the requirements of these specifications and in conformity to the dimensions, lines, and grades shown on the plans or as established by the Engineer.

606.02—Materials.

Materials shall conform to the requirements of Section 244.02(k).

Stormwater Pollution Prevention Plan (SWPPP) Specifications

606.03—Procedures.

- (a) **Preparing Areas:** Two inches of topsoil shall be applied to the area to be covered. Drainage channels shall be shaped in accordance with the cross section shown on the plans and shall be rolled or tamped to compact soil in place before final shaping.

During shaping operations, a seedbed approximately 3/4 inch in depth shall be provided.

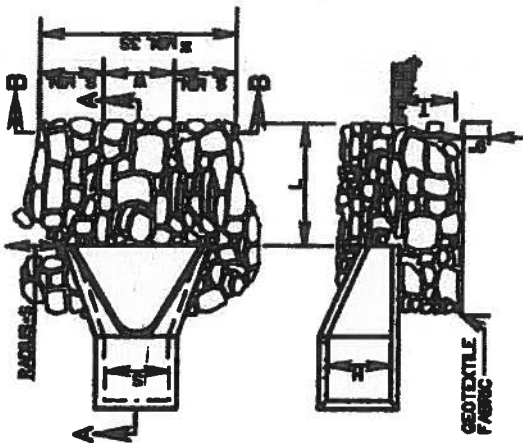
Stones, roots, and other objects that will prevent protective covering from making close contact with the seedbed shall be removed before covering is installed.

- (b) **Applying Seed:** Seed shall be applied in accordance with the requirements of Section 603 except that mulch will not be required. Seed, fertilizer, and lime shall be applied prior to installation of protective coverings.

Seeded areas adjacent to the channel or ditch that are disturbed during installation of covering shall be uniformly reshaped, reseeded, and mulched at the Contractor's expense.

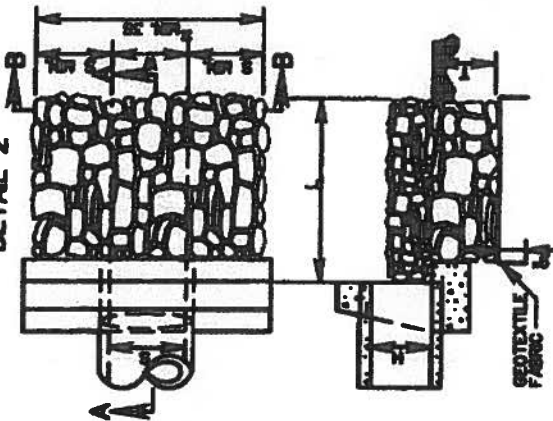
- (c) **Installing Soil Retention Coverings:** Coverings shall be installed in accordance with the standard drawings and manufacturer's recommendations.
- (d) **Watering:** After coverings are installed, seeded areas shall be watered sufficiently to saturate the seedbed. Water shall be applied in a spray, and no additional watering will be required.

DETAIL 1



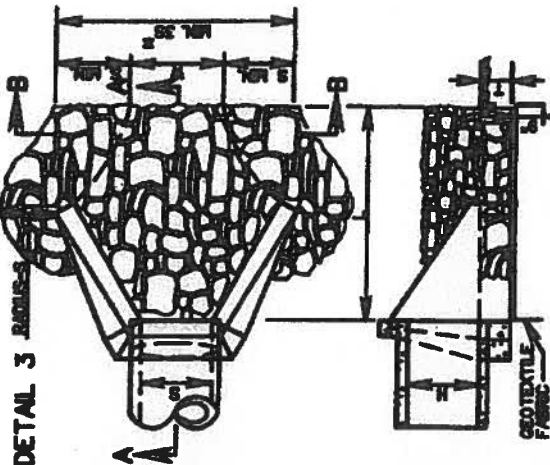
SECTION A-A

DETAIL 2

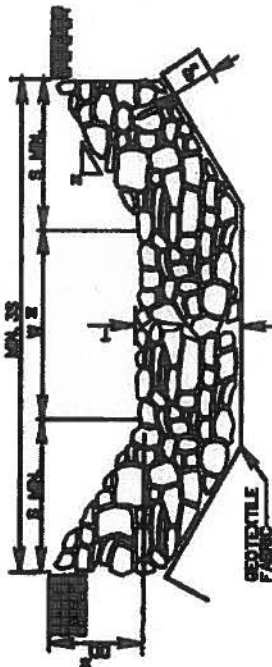


SECTION A-A

EC-1



SECTION A-A



SECTION B-B

TYPE OF OUTLET PROTECTION MATERIAL	MAXIMUM OUTLET VELOCITY (FOR DESIGN STORM)	MINIMUM 17" (CHECKED)
CLASS A1 CLASS A1 DRY REFRAP	6 fps	18
CLASS I CLASS I DRY REFRAP	14 fps	24
CLASS II CLASS II DRY REFRAP	19 fps	36

NOTES:

1. FOR MULTIPLE LINE INSTALLATIONS, DIMENSION S IS TO GOVERN THE PROTECTION OUTSIDE THE CHANNEL WIDTH (W).
2. ON ANY INSTALLATION REQUIRING CULVERT OUTLET PROTECTION WHERE NO ENDWALL OR SUBSECTION IS SPECIFIED ON THE PLANS, CONSTRUCTION IS TO BE IN ACCORDANCE WITH DETAIL 2 SHOWN ABOVE.
3. GEOTEXTILE FABRIC TO BE INSTALLED UNDER CLASS A1, I, AND II MATERIALS IN ACCORDANCE WITH THE SPECIFICATIONS.
4. S = DIAMETER OF CIRCULAR CULVERT OR SPAN FOR BOX, ELLIPTICAL OR ARCH CULVERT. H = DIAMETER OF CIRCULAR CULVERT OR RADIUS/HEIGHT FOR BOX, ELLIPTICAL OR ARCH CULVERT.
5. USE TYPICAL SECTION SHOWN ON PLANS FOR SIDE SLOPE, BOTTOM WIDTH AND DEPTH OF CHANNEL OR MATCH EXISTING DITCH OR NATURAL GROUND.

OUTLET PROTECTION MINIMUM LENGTH (L)	
TYPE A INSTALLATION	3H
TYPE B INSTALLATION	5H

SPECIFICATION REFERENCE

204
245
303
414

CULVERT OUTLET PROTECTION

VIRGINIA DEPARTMENT OF TRANSPORTATION

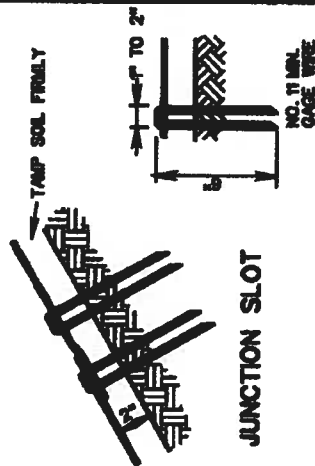
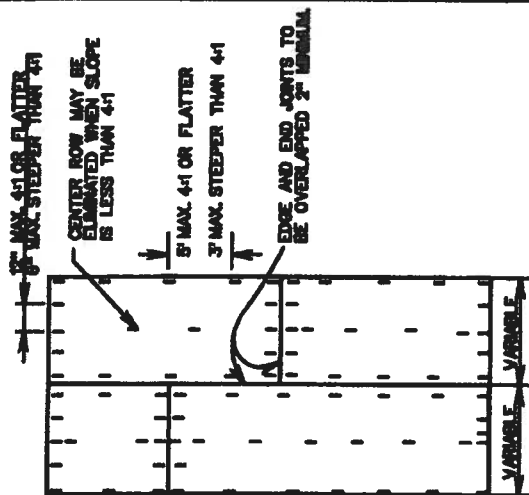
VDOT

ROAD AND BRIDGE STANDARDS

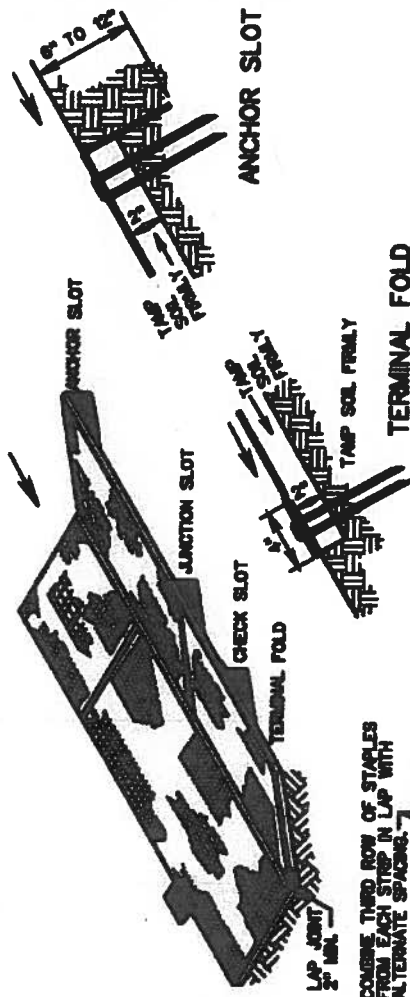
REVISION DATE

SHEET 1 OF 1

TSLO1



SOIL RETENTION MAT

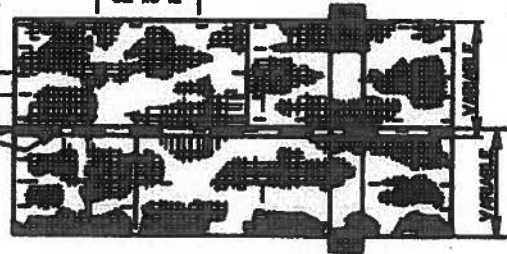


CHECK SLOT



JUNCTION SLOT

- NOTES:
1. APPROXIMATE 200 STAPLES REQUIRED PER 4' X 225' ROLL.
 2. ANCHOR SLOTS, JUNCTION SLOTS AND CHECK SLOTS TO BE TURNED 6" TO 12" AND VARIABLE.
 3. MAX SPACING C-C CHECK SLOTS 100' SLOPE 4X OR LESS 80' SLOPE STEEPER THAN 4X.
 4. STAPLES FORMED FROM NO. 8 STEEL WIRE 8" STAPLE MINIMUM LENGTH FOR SANDY SOIL 8" STAPLE MINIMUM LENGTH FOR OTHER SOIL.



PLAN VIEW STAPLING DIAGRAM

GENERAL NOTES:

1. BASIS OF PAYMENT TO BE SQUARE-YARDS OF PROTECTIVE COVERING COMPLETE IN PLACE. PROTECTIVE COVERING IS TO BE LOCATED AS INDICATED ON THE PLANS IN ACCORDANCE WITH THE DIMENSIONS SPECIFIED ON TYPICAL SECTION.
2. 7"-TOP" STAPLES OR OTHER MANUFACTURER'S DESIGN APPROVED BY THE ENGINEER MAY BE SUBSTITUTED FOR THE STAPLES SHOWN.
3. JUTE MESH OR SOIL RETENTION MAT IN ACCORDANCE WITH THE SPECIFICATIONS MAY BE USED AT THE OPTION OF THE CONTRACTOR.
4. WIDTH OF MATERIAL MAY VARY FROM MINIMUM DIMENSION BY INCREMENTS OF 4' OR 5 FEET.
5. FOR SOURCES OF APPROVED MATERIAL SEE VDOT'S APPROVED PRODUCTS LIST FOR STD. EC-2 MATERIAL.

VDOT

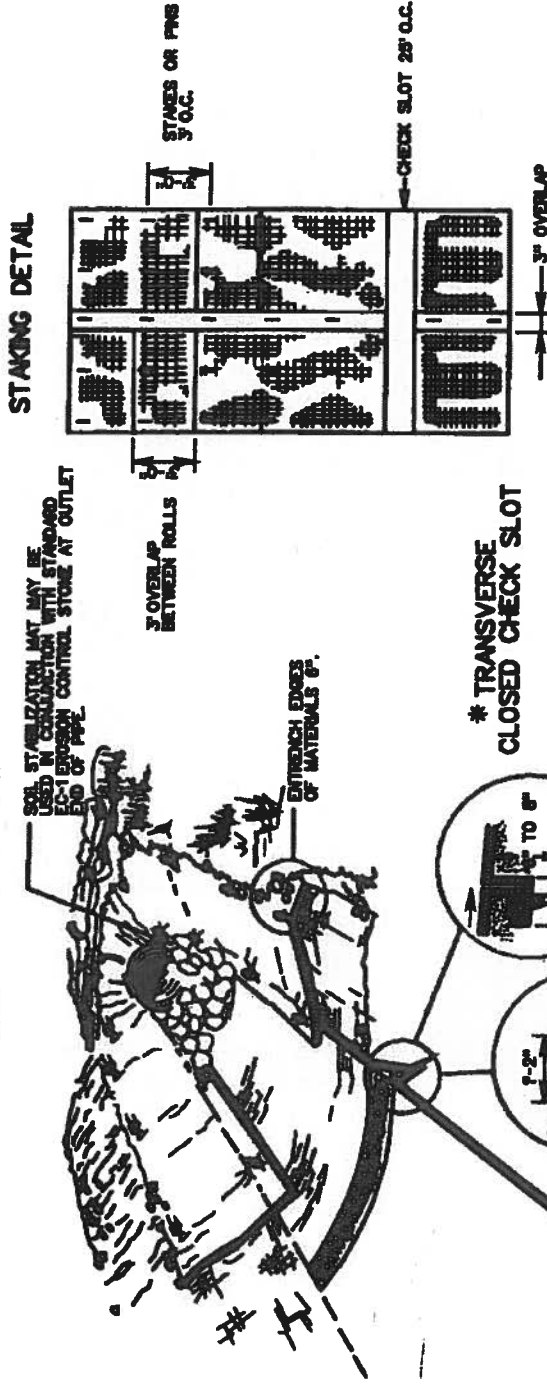
ROAD AND BRIDGE STANDARDS	REVISION DATE
SHEET 1 OF 1	113.02

PROTECTIVE COVERING INSTALLATION CRITERIA

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE	244 606
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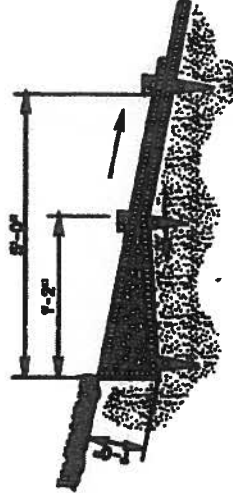
TYPICAL INSTALLATION AT END OF PIPE



* TRANSVERSE CHECK SLOT TO BE CONSTRUCTED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION FOR PRETENDED INSTALLATION.

* TRANSVERSE CLOSED CHECK SLOT

* TRANSVERSE OPEN CHECK SLOT

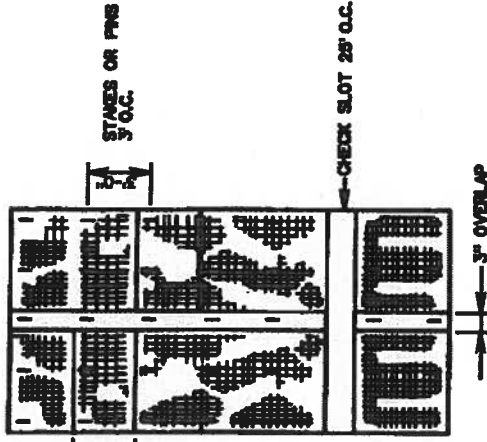


NOTES:

1. STAKES SHALL BE WOOD OR METAL AS RECOMMENDED BY THE MANUFACTURER AND SHALL BE A MINIMUM OF 2\"/>

UPSTREAM AND DOWNSTREAM TERMINAL

STAKING DETAIL



SPECIFICATION REFERENCE

244 608

SOIL STABILIZATION MAT DITCH INSTALLATION TYPE A OR B

VIRGINIA DEPARTMENT OF TRANSPORTATION

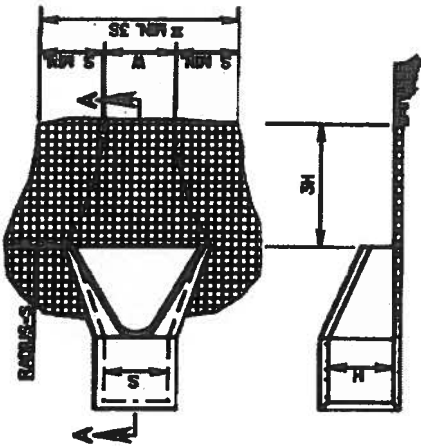
VDOT

ROAD AND BRIDGE STANDARDS

REVISION DATE SHEET 1 OF 3

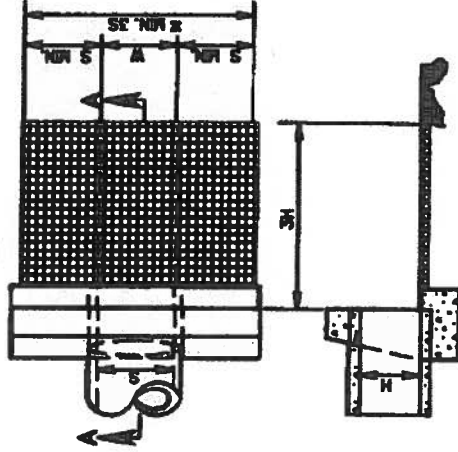
113.03

DETAIL 1



SECTION A-A

DETAIL 2



SECTION A-A

NOTES:

1. FOR MULTIPLE LINE INSTALLATIONS, DIMENSION S IS TO GOVERN THE PROTECTION OUTSIDE THE CHANNEL WIDTH (W).
2. ON ANY INSTALLATION REQUIRING CULVERT OUTLET PROTECTION WHERE NO ENDWALL OR EROSION IS SPECIFIED ON THE PLANS, CONSTRUCTION IS TO BE IN ACCORDANCE WITH DETAIL 2 SHOWN ABOVE.
3. SOIL STABILIZATION MAT TYPE B SHALL BE USED FOR CULVERT OUTLET PROTECTION WHERE THE OUTLET VELOCITY IS 6 FPS OR LESS FOR THE DESIGN STORM AND THE TOTAL HYDRAULIC OPENING IS LESS THAN 7 SQUARE FEET. IF THE TOTAL HYDRAULIC OPENING IS 7 SQUARE FEET OR GREATER, OR THE DESIGN STORM OUTLET VELOCITY IS GREATER THAN 6 FPS USE STANDARD EC-1.
4. S - DIAMETER OF CIRCULAR CULVERT OR SPAN FOR BOX, ELLIPTICAL OR ARCH CULVERT.
H - DIAMETER OF CIRCULAR CULVERT OR RISE/HEIGHT FOR BOX, ELLIPTICAL OR ARCH CULVERT.
5. USE TYPICAL SECTION SHOWN ON PLANS FOR SIDE SLOPE, BOTTOM WIDTH AND DEPTH OF CHANNEL OR MATCH EXISTING DITCH OR NATURAL GROUND.

VDOT

ROAD AND BRIDGE STANDARDS

SHEET 2 OF 3 REVISION DATE

10.04

SOIL STABILIZATION MAT CULVERT OUTLET PROTECTION INSTALLATION

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION
REFERENCE

204

246

303

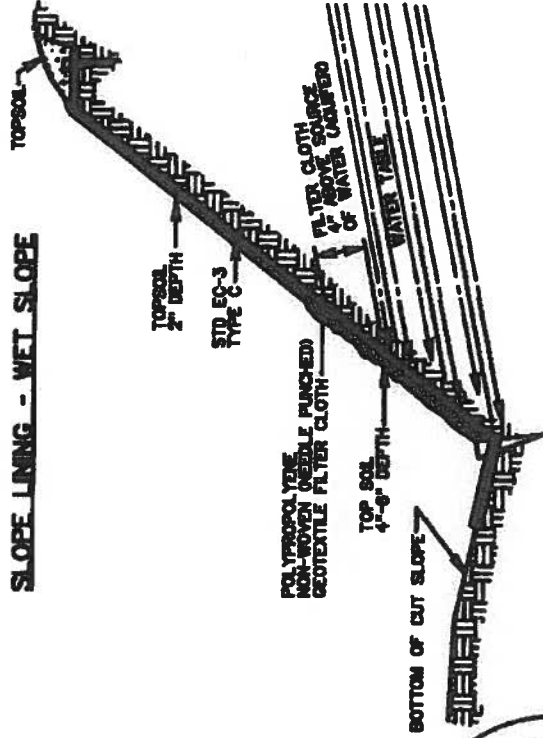
414

ED-3

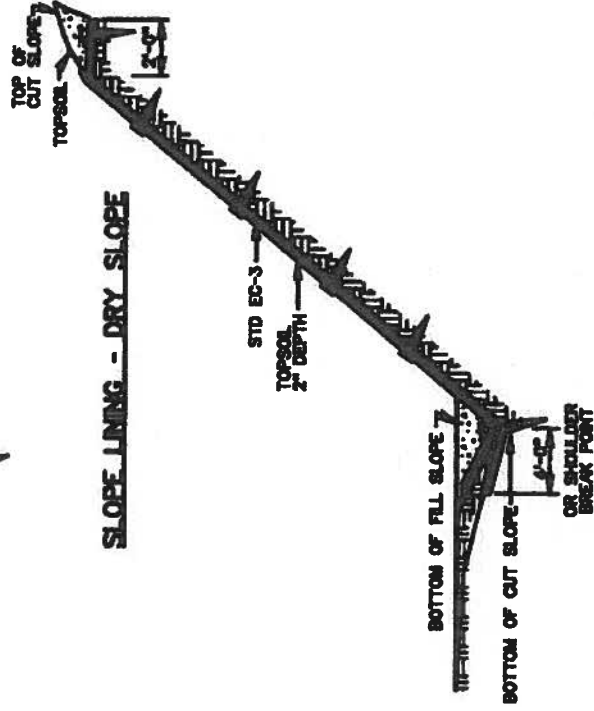
FILL SLOPE SECTION

DROP STD EC-3 MATERIAL VERTICALLY DOWNSLOPE

SLOPE LINING - WET SLOPE



SLOPE LINING - DRY SLOPE



TOE OF FILL
MAINTAIN SLOPE ANGLE

BERM

TRENCH INTO BERM AND PROGRESS DOWNSLOPE

NOTE:

1. SLOPE SURFACE SHALL BE SMOOTH AND FREE OF ROCKS, LUMPS OF DIRT, GRASS, AND STICKS. MAT SHALL BE PLACED FLAT ON SURFACE FOR PROPER SOIL CONTACT.
2. STAKES SHALL BE WOOD OR METAL AS RECOMMENDED BY THE MANUFACTURER AND SHALL BE A MINIMUM OF 18 INCHES IN LENGTH.
3. BASIS OF PAYMENT SHALL BE SQUARE YARDS OF STANDARD EC-3 (TYPE C) IN PLACE.
4. SOIL STABILIZATION MAT TYPE C SHALL BE IN ACCORDANCE WITH THE APPROVED PRODUCT LIST.
5. TOPSOIL SHALL BE SPREAD TO A UNIFORM THICKNESS PRIOR TO APPLICATION OF SEED AND MULCH.
6. FOR SOURCES OF APPROVED MATERIALS SEE VDOT'S APPROVED PRODUCTS LIST FOR STD. EC-3, TYPE C MATERIALS.
7. SLOPES 1 1/4:1 AND FLATTER SHALL BE BACKFILLED WITH TOPSOIL AT 2 INCH DEPTH. SEED SHALL BE APPLIED TO THE TOPSOIL AND MULCHED WITH TYPE 100LH.
8. SLOPES STEEPER THAN 1 1/4:1 SHALL BE SEEDDED IMMEDIATELY PRIOR TO INSTALLATION OF STD. EC-3 TYPE C MATERIAL.

SPECIFICATION
REFERENCE

244
600

SOIL STABILIZATION MAT - SLOPE INSTALLATION TYPE C

VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT

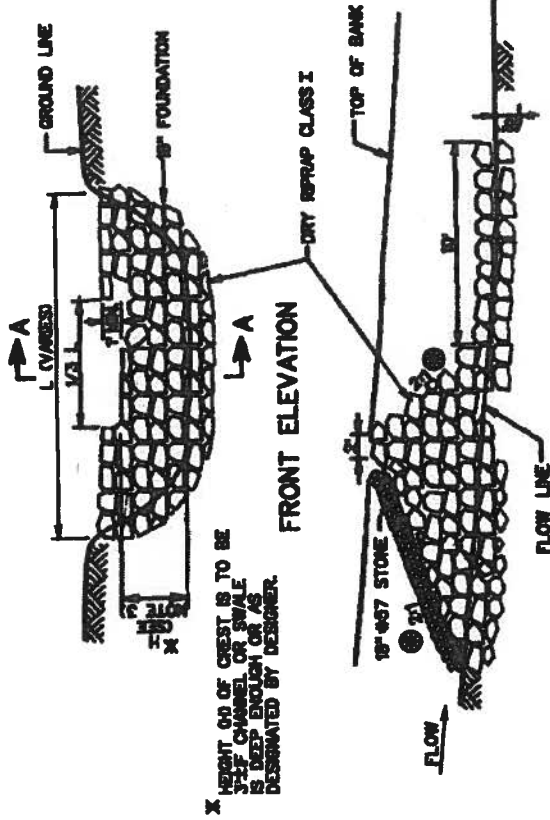
ROAD AND BRIDGE STANDARDS

REVISION DATE

SHEET 3 OF 3

113.05

TYPICAL DETAIL FOR ROCK CHECK DAM TYPE I



X HEIGHT OF CREST IS TO BE 3'-6\"/>

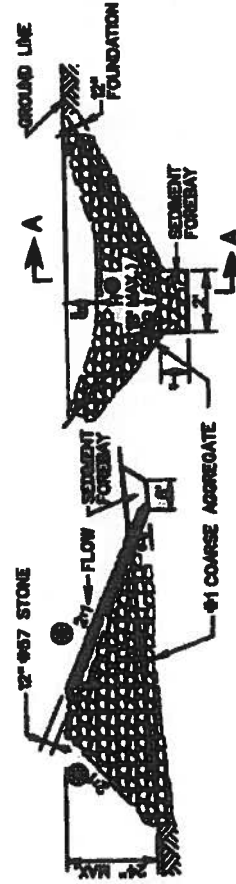
SUGGESTED ROCK CHECK DAM SPACING



L - $H/2$ WHERE:
H - HEIGHT OF DAM CREST IN FEET
S - CHANNEL SLOPE IN FT/FT
L - CHECK DAM SPACING IN FEET THE DISTANCE SUCH THAT POINTS A AND B ARE OF EQUAL ELEVATION

CHECK DAM SPACING, L, TO BE DETERMINED FROM THE EQUATION. IN STEEP SLOPE AREAS THE CHECK DAM SPACING IS NOT TO BE LESS THAN 20'.

TYPICAL DETAIL FOR ROCK CHECK DAM TYPE II



FRONT ELEVATION

SECTION A-A

NOTES:

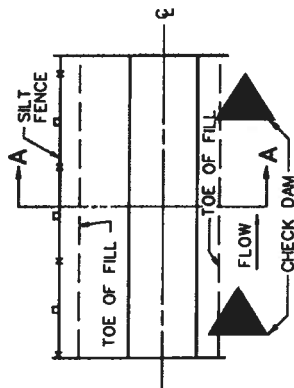
1. ROCK CHECK DAMS THAT ARE DESIGNATED ON THE PLANS AS A STORMWATER MANAGEMENT CROSSLINK ARE TO BE LEFT IN PLACE AS A PERMANENT INSTALLATION.
2. WHERE DRAINAGE AREAS EXCEED 1 ACRE OR DITCH GRADE EXCEEDS 3% A TEMPORARY SEDIMENT FOREBAY SHALL BE INSTALLED WITH MINIMUM DIMENSIONS OF 12' DEPTH, 2' WIDTH AND 6' LENGTH.
3. F. CHECK DAMS IS LOCATED INSIDE CLEAR ZONE AND ADJACENT TO A TRAVELWAY SLOPE FACING ON COMING TRAFFIC IS TO BE 6:1 AND MAXIMUM H IS TO BE 12'.
4. ALTERNATIVE MATERIALS ON VDOT'S SPEL LIST MAY BE SUBSTITUTED AT NO ADDITIONAL COST TO THE DEPARTMENT.
5. SEE STANDARD EC-8 FOR DETAILS FOR ROCK CHECK DAMS IN ROADSIDE DITCHES.
6. CHECK DAM SHALL NOT BE USED FOR LOCATIONS IN LIVE STREAM.

VDOT		ROAD AND BRIDGE STANDARDS		SPECIFICATION REFERENCE	
SHEET 1 OF 1		REVISION DATE		107	
113.08				203	

ROCK CHECK DAMS TYPE I & II

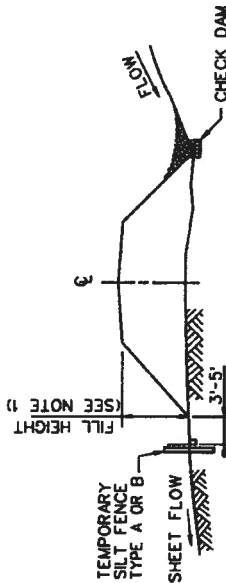
VIRGINIA DEPARTMENT OF TRANSPORTATION

TYPICAL DETAIL FOR TEMPORARY SILT FENCE/CHECK DAM AT TOE OF FILL



NOTE:

CHECK DAM IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE ROAD AND BRIDGE SPECIFICATIONS, AND STANDARD EC-4.

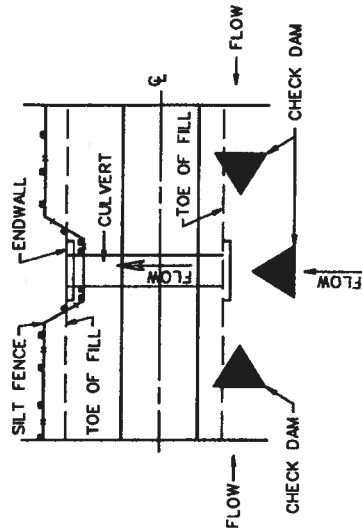


SECTION A-A

NOTES FOR SILT FENCE TYPE A & B:

1. USE OF TYPE A SILT FENCE IS LIMITED TO A FILL HEIGHT OF 20 FEET OR LESS.
2. TYPE B SILT FENCE MUST BE USED WHERE THE FILL HEIGHT EXCEEDS 20 FEET.
3. ALL POSTS SHALL BE DRIVEN 24" MIN. INTO THE GROUND AND SHALL EXTEND 6" ABOVE THE FILTER FABRIC (TYPE A) OR WIRE FENCE (TYPE B).
4. WOODEN POSTS SHALL BE OAK AND HAVE MIN. DIMENSIONS OF 2" BY 2". STEEL POSTS SHALL HAVE A MINIMUM WEIGHT OF 1.33 POUNDS PER LINEAR FOOT.
5. GEOTEXTILE FABRIC SHALL BE EMBEDDED 12" INTO THE GROUND (6" VERTICALLY AND 6" HORIZONTALLY ALONG THE BOTTOM OF TRENCH) AS SHOWN IN DETAILS A(2) & B(2) ON SHEETS 2 AND 3.
6. SLICING IS AN APPROVED ALTERNATIVE TO TRENCHING FOR ANCHORING THE GEOTEXTILE FABRIC INTO THE GROUND SHOWN IN DETAILS A(2) & B(2) ON SHEETS 2 AND 3. SLICING SHALL BE ACCOMPLISHED IN ACCORDANCE WITH SECTION 303 OF THE ROAD AND BRIDGE SPECIFICATIONS.
7. WHEN TWO SEPARATE SECTIONS OF GEOTEXTILE FABRIC ADJOIN EACH OTHER, THEY SHALL OVERLAP BY 6" AND BE DOUBLE FOLDED.
8. GEOTEXTILE FABRIC SHALL BE FASTENED SECURELY TO THE POSTS (TYPE A & B) AND WIRE FENCE (TYPE B ONLY). THE ATTACHMENTS TO THE WIRE FENCE SHALL BE MADE WITH TIES SPACED EVERY 24" HORIZONTALLY AT BOTH THE TOP AND VERTICAL MIDPOINT OF THE GEOTEXTILE FABRIC.
9. WIRE FENCE (TYPE B ONLY) SHALL BE FASTENED SECURELY TO THE FENCE POSTS WITH WIRE TIES AND EMBEDDED A MINIMUM OF 2" IN THE GROUND.
10. WIRE FENCE (TYPE B ONLY) SHALL BE A MINIMUM OF 14 GAUGE WELDED WIRE WITH A MESH SPACING OF 2" BY 4". ALTERNATIVE MESH SPACING MAY BE APPROVED BY THE ENGINEER, BUT MUST BE NO MORE THAN 6" BY 6".
11. FOR AREAS REQUIRING TYPE B SILT FENCE, A MINIMUM LENGTH OF 100 LINEAR FEET SHALL BE INSTALLED.
12. AS AN ALTERNATIVE TO UTILIZING TYPE B SILT FENCE, TWO ROWS OF TYPE A SILT FENCE MAY BE PLACED PARALLEL TO EACH OTHER WITH 3' TO 5' BETWEEN THE TWO ROWS. THIS OPTION MAY BE USED AT ALL LOCATIONS SPECIFYING TYPE B SILT FENCE UNLESS OTHERWISE PROHIBITED BY THE PLANS. SEE DETAIL ON SHEET 3 (BOTTOM RIGHT).
13. MATERIALS FOR ALL SILT FENCE SHALL CONFORM TO THE REQUIREMENTS OF SECTION 242 OF THE VDOT ROAD & BRIDGE SPECIFICATIONS.

TYPICAL DETAIL FOR TEMPORARY SILT FENCE/CHECK DAM AT CULVERT



NOTE:

CHECK DAM IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE ROAD AND BRIDGE SPECIFICATIONS, AND STANDARD EC-4.

SPECIFICATION
REFERENCE

107
242
245
303

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

TEMPORARY SILT BARRIERS SILT FENCE (TYPE A & B) AND BRUSH BARRIER

VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT

ROAD AND BRIDGE STANDARDS

REVISION DATE

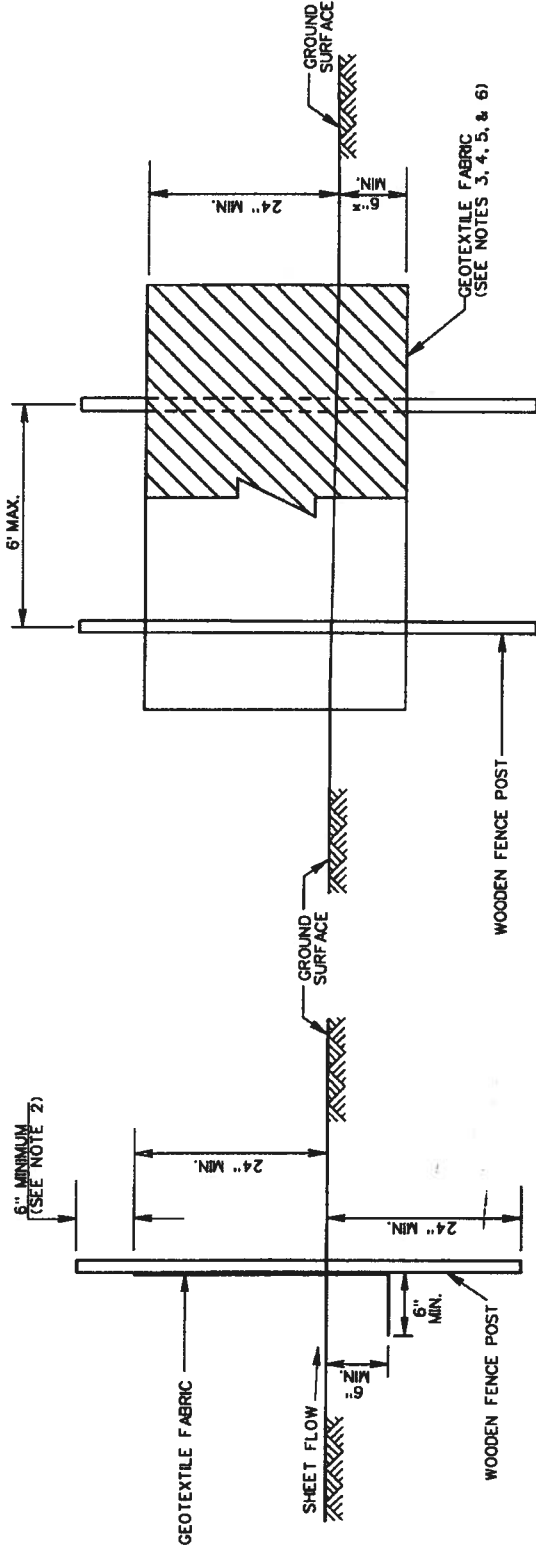
08/14

SHEET 1 OF 4

113.07

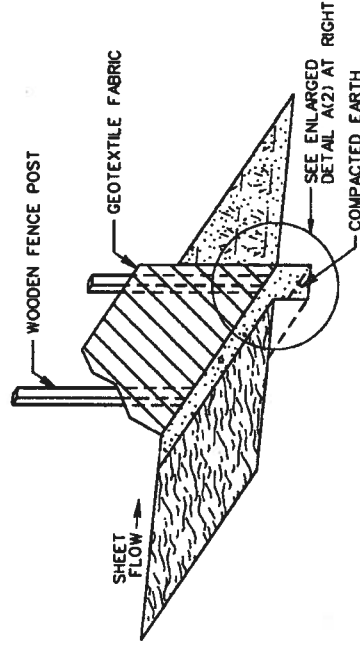
EC-5

SILT FENCE TYPE A SEE SHEET 1 FOR NOTES

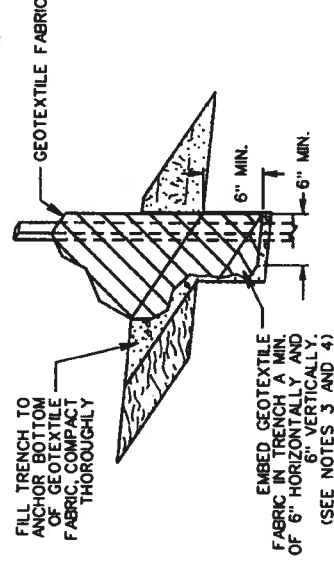


SECTION VIEW

PROFILE VIEW



DETAIL A(1)

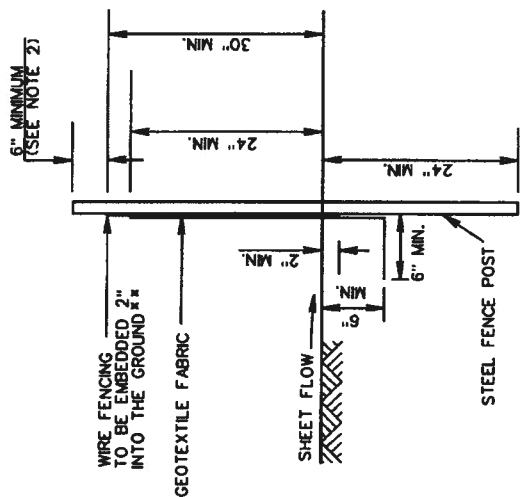


DETAIL A(2)

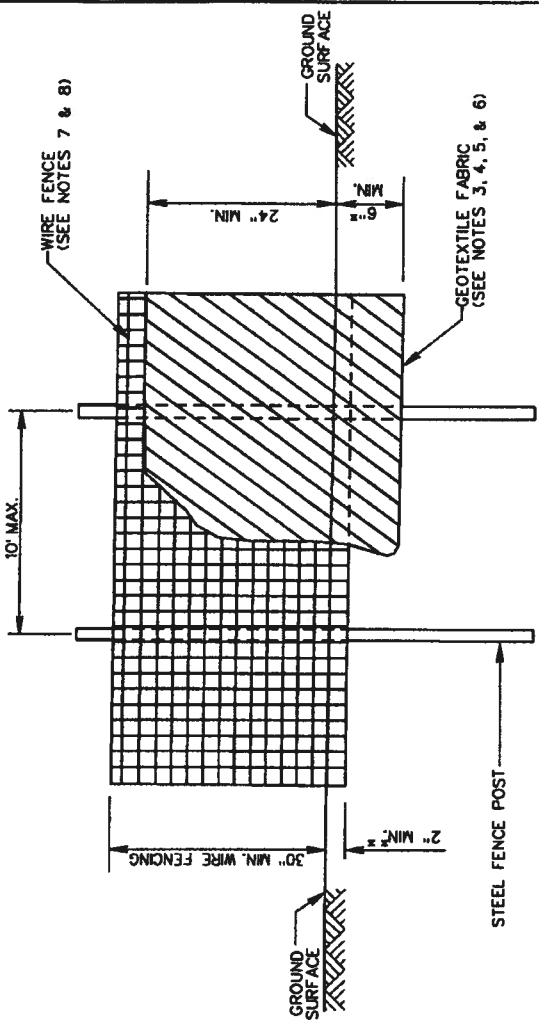
VDOT		A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.	
ROAD AND BRIDGE STANDARDS		TEMPORARY SILT BARRIERS	
SHEET 2 OF 4		SILT FENCE (TYPE A & B) AND BRUSH BARRIER	
113.07A		VIRGINIA DEPARTMENT OF TRANSPORTATION	
REVISION DATE		SPECIFICATION REFERENCE	
08/14		107	
		242	
		245	
		303	

SILT FENCE TYPE B
SEE SHEET 1 FOR NOTES

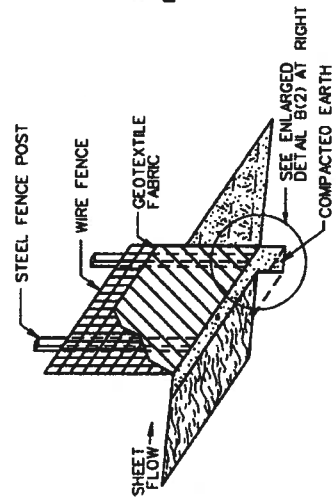
EC-5



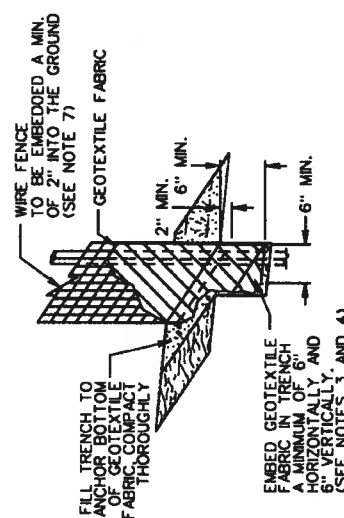
SECTION VIEW



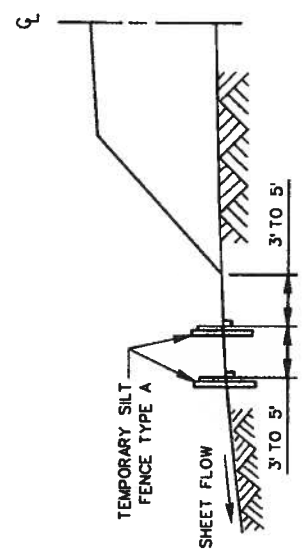
PROFILE VIEW



DETAIL B(1)



DETAIL B(2)



ALTERNATIVE SILT FENCE TYPE B
(SEE NOTE 10)

SPECIFICATION
REFERENCE

107
242
245
303

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

TEMPORARY SILT BARRIERS
SILT FENCE (TYPE A & B) AND BRUSH BARRIER
VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT

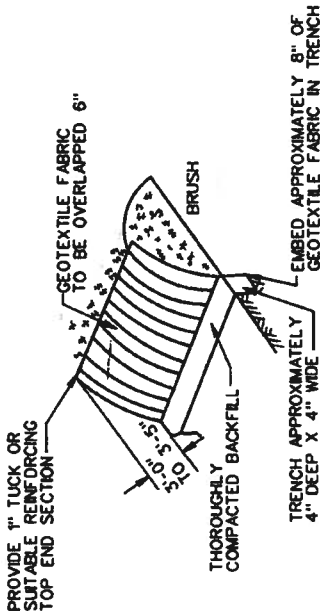
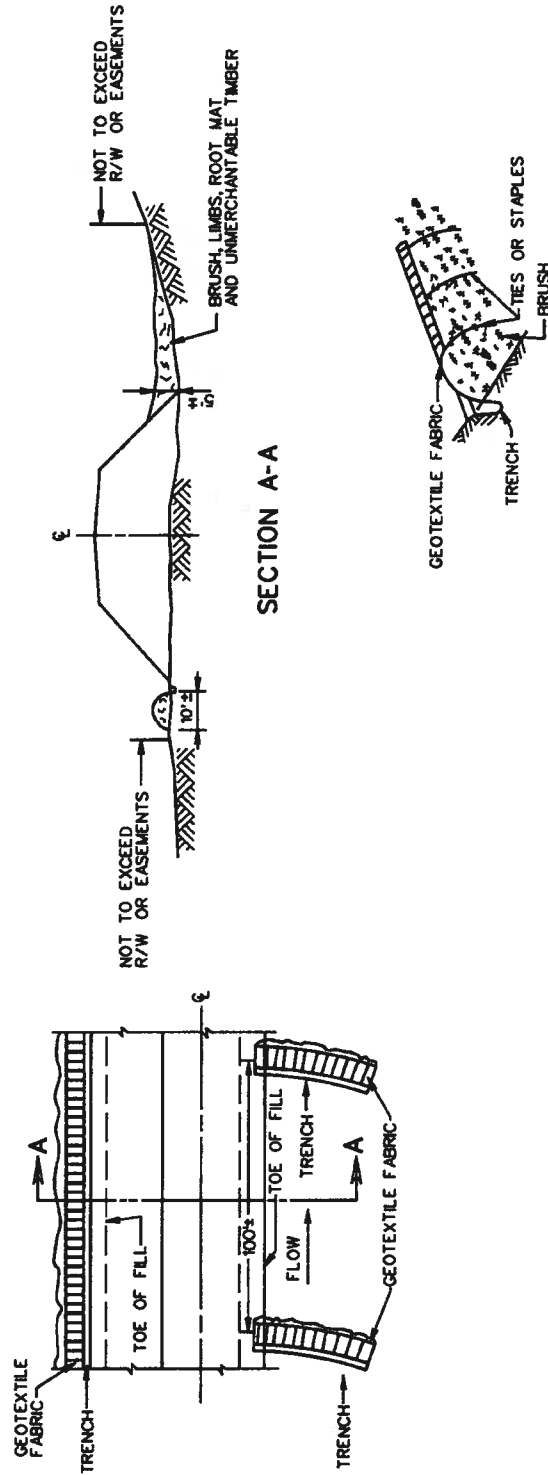
ROAD AND BRIDGE STANDARDS

REVISION DATE
08/14

SHEET 3 OF 4

113.07B

SILT BARRIERS **TYPICAL DETAIL FOR BRUSH BARRIER** **(TO BE USED AT ALL APPLICABLE LOCATIONS)**



FRONT ISOMETRIC

BACK ISOMETRIC

NOTES:

- BRUSH BARRIERS SHALL BE CONSTRUCTED AT LOCATION SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. BRUSH SHALL BE PILED AGAINST EXISTING TREES TO PREVENT MOVEMENT OF BARRIER. BRUSH SHALL BE PILED AS TIGHTLY AS POSSIBLE AND WEIGHTED DOWN BY UNMERCHANTABLE LOGS.
- GEOTEXTILE FABRIC CONFORMING TO THE ROAD AND BRIDGE SPECIFICATIONS SHALL BE INSTALLED AS DETAILED ABOVE. GEOTEXTILE FABRIC MAY ALSO BE ATTACHED TO EXISTING FENCES WHEN SPECIFIED ON THE PLANS OR DIRECTED BY THE ENGINEER.
- NO BRUSH WILL BE DESTROYED OR REMOVED FROM THE PROJECT UNTIL ALL BRUSH SILT BARRIERS ARE IN PLACE AND HAVE BEEN INSPECTED AND APPROVED BY THE ENGINEER.
- DIMENSIONS SHOWN ARE APPROXIMATE ONLY.

VDOT

ROAD AND BRIDGE STANDARDS

SHEET 4 OF 4 REVISION DATE

113.08 08/14

TEMPORARY SILT BARRIERS **SILT FENCE (TYPE A & B), AND BRUSH BARRIER**

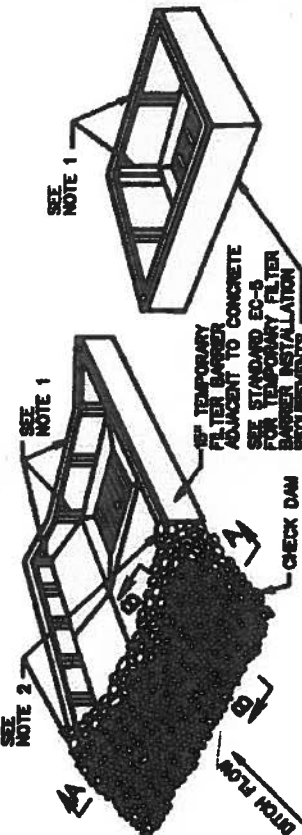
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION
REFERENCE

107

303

INLET PROTECTION (TYPE A)

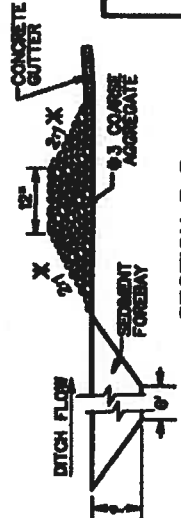


TYPICAL TREATMENT FOR DROP INLET WITH CONCRETE GUTTER



SECTION A-A

X' CHECK DAM IS LOCATED INSIDE CLEAR ZONE AND ADJACENT TO A TRAVELWAY SLOPE FACING ON COMING TRAFFIC IS TO BE 6'1" AND MAXIMUM H IS TO BE 12".

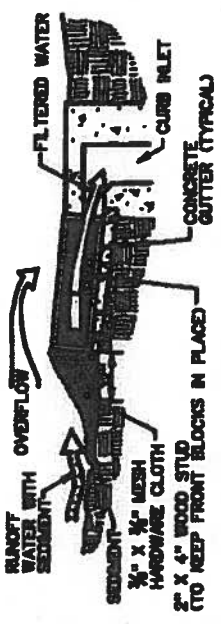
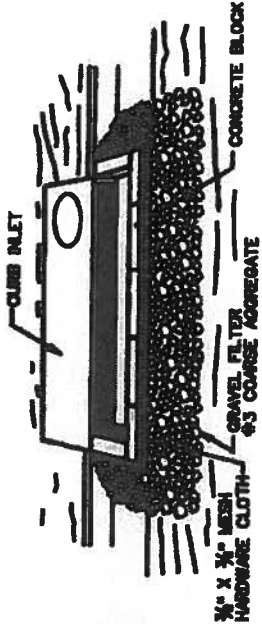


SECTION B-B

NOTES

1. POSTS AND TOP RAIL SHALL BE A NOMINAL 2 1/4" X 2 1/2" OR A 3" DIA. NO. 2 SOUTHERN PINE, A NOMINAL 2" X 2" OAK, OR STEEL HAVING A MIN. WEIGHT OF 1.25 LBS. PER LINEAR FOOT AND A MIN. LENGTH OF 6' FOR TEMPORARY SILT FENCES.
2. END OF FILTER BARRIER TO BE EMBEDDED INTO AGGREGATE.
3. IF A DROP INLET IS LOCATED IN A SAG IN THE DITCH GRADE, A CHECK DAM IS REQUIRED FOR EACH SIDE OF THE INLET THAT RECEIVES DITCH FLOW.
4. WHERE DRAINAGE AREAS EXCEED ONE ACRE OR DITCH GRADE EXCEEDS 3% A TEMPORARY SEDIMENT FOREBAY SHALL BE INSTALLED WITH MINIMUM DIMENSIONS OF 12' DEPTH, 2' WIDTH AND 6' LENGTH.

INLET PROTECTION (TYPE B)



SECTION VIEW

SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE AT CURB INLETS WHERE AN OVERFLOW CHANNEL IS PRESENT TO PREVENT EXCESSIVE FLOODING IN FRONT OF THE STRUCTURE.

NOTE:

GEOTEXTILE PRODUCTS DESIGNED TO BE INSERTED INTO GRATED DROP INLETS OR DESIGNED TO COVER THE SLOTS OF SLOT DROP INLETS, THAT HAVE BEEN APPROVED FOR USE ON VDOT PROJECTS AND ARE FOUND ON VDOT'S SPEL LIST, MAY BE SUBSTITUTED FOR THE DROP INLET PROTECTION DEVICES DETAILED HEREON.

SPECIFICATION REFERENCE

- 207
- 242
- 303

INLET PROTECTION (TYPE A AND B)

VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT

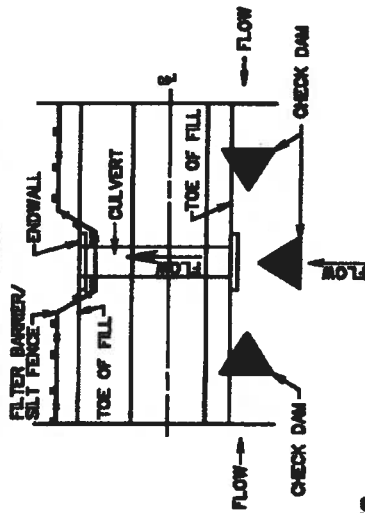
ROAD AND BRIDGE STANDARDS

REVISION DATE

SHEET 1 OF 2

11.09

TYPICAL DETAIL FOR INSTALLATION OF TEMPORARY FILTER BARRIER/SILT FENCE/CHECK DAM AT CULVERT



NOTES:

1. IF ANY PORTION OF FILL IS GREATER THAN 6', SILT FENCE IS REQUIRED.
2. IF FILL HEIGHT IS LESS THAN 6', FILTER BARRIER IS REQUIRED.
3. ROCK CHECK DAM IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE ROAD AND BRIDGE SPECIFICATIONS, AND STANDARD EC-4.
4. FILTER BARRIER/SILT FENCE IS TO BE INSTALLED IN ACCORDANCE WITH THE ROAD AND BRIDGE SPECIFICATIONS, AND STANDARD EC-8.

* INSTALLATION DETAIL ONLY - ROCK CHECK DAMS, FILTER BARRIER, AND SILT FENCE TO BE PAID FOR IN ACCORDANCE WITH THE ROAD AND BRIDGE SPECIFICATIONS.

VDOT

ROAD AND BRIDGE STANDARDS

SHEET 2 OF 2 REVISION DATE

113.10

INLET PROTECTION (TYPE C)

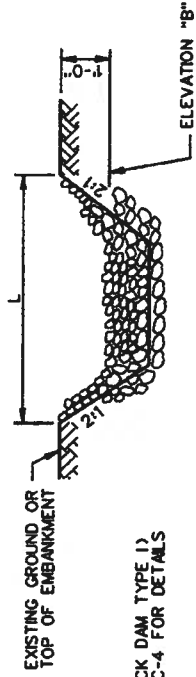
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION
REFERENCE

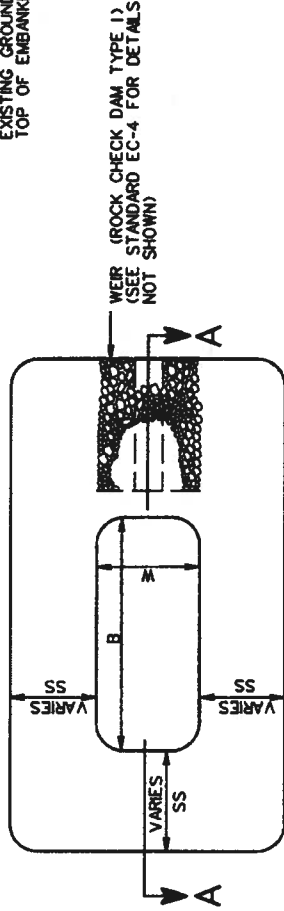
107

242

303



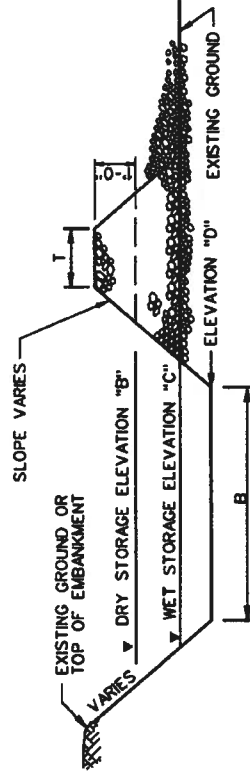
TYPICAL SECTION THRU WEIR
(ROCK CHECK DAM TYPE 1)



PLAN-VIEW OF TEMPORARY SEDIMENT TRAP

NOTES:

1. CHECK DAM IS SHOWN FOR ILLUSTRATION ONLY AND IS NOT INCLUDED IN PAYMENT FOR SEDIMENT TRAP.
2. THE SEDIMENT STORAGE VOLUME SHALL BE 134 CUBIC YARDS/ACRE OF TOTAL CONTRIBUTING DRAINAGE AREA AND SHALL CONSIST OF HALF IN THE FORM OF WET STORAGE AND HALF IN THE FORM OF DRY STORAGE.
3. SEE PLANS FOR DIMENSIONS AND ELEVATIONS.



TYPICAL SECTION (A-A) THRU
TEMPORARY SEDIMENT TRAP

SPECIFICATION
REFERENCE

107
303

TYPICAL SEDIMENT TRAP

VIRGINIA DEPARTMENT OF TRANSPORTATION

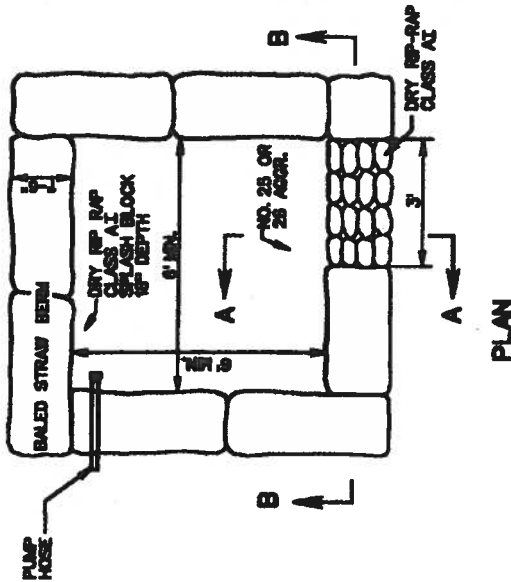
VDOT

ROAD AND BRIDGE STANDARDS

REVISION DATE
01/13

SHEET 1 OF 1
113.11

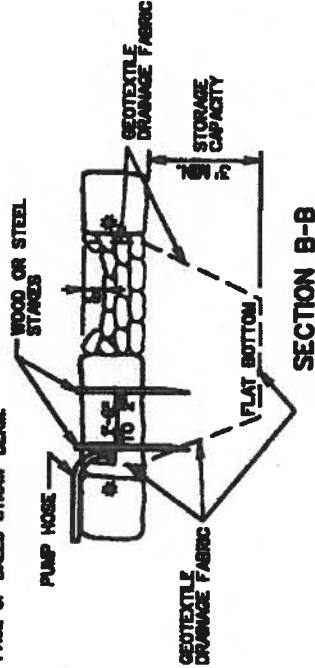
TYPICAL DEWATERING BASIN



GEOTEXTILE DRAINAGE FABRIC
NO. 25 OR 28 AGGR.
4" DEPTH
2" DRY RP RAP
CLASS AC
1'-0" FLOW

SECTION A-A

* GEOTEXTILE DRAINAGE FABRIC TO COVER INSIDE FACE OF BALED STRAW BED.

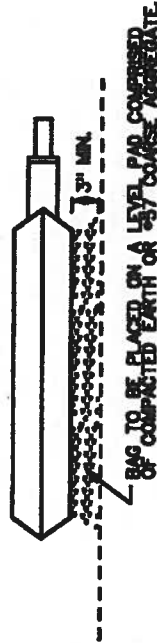


SECTION B-B

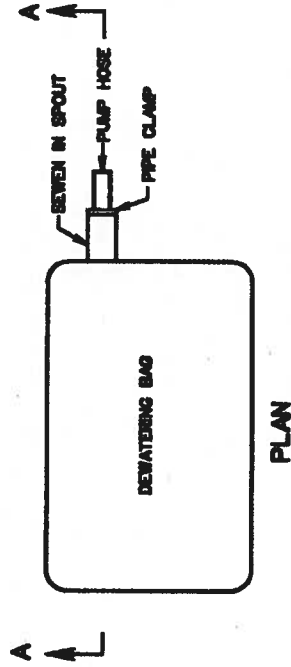
NOTES:

1. DEWATERING BASIN SIZE SHALL BE DETERMINED BY THE FORMULA:
 $18 \times \text{GAL./MIN. OF PUMP} \div \text{CU. FT. OF STORAGE CAPACITY}$
2. THIS WORK SHALL CONSIST OF THE CONSTRUCTION OF A DEWATERING BASIN FOR THE PURPOSE OF RECEIVING SEDIMENT-LAYERED WATER PLUMBED FROM A CONSTRUCTION SITE TO ALLOW FOR FILTRATION BEFORE IT REENTERS THE WATERWAY. PUMPING INTO THESE BASINS SHALL CEASE WHEN THE FLOW FROM THE BASIN BECOMES SEDIMENT-LAYERED.
3. SURFACE WATER FLOW SHALL BE DIVERTED AROUND THIS DEVICE.
4. THE OUTFALL FROM THE BASINS SHALL HAVE A STABILIZED CONVEYANCE TO RECEIVING WATERS.
5. ONCE THE DEWATERING BASIN BECOMES FILLED TO HALF OF THE STORAGE CAPACITY, ACCUMULATED SEDIMENT SHALL BE REMOVED AND DISPOSED OF IN AN APPROVED DISPOSAL AREA OUTSIDE OF THE 100-YEAR FLOODPLAIN UNLESS OTHERWISE APPROVED ON THE PLANS.
6. SEDIMENT CONTROL DEVICES ARE TO REMAIN IN PLACE UNTIL ALL DISTURBED AREAS ARE STABILIZED AND THE SEDIMENT HAS BEEN REMOVED. GROUND CONTIGUOUS SHALL BE RETURNED TO THEIR ORIGINAL CONDITION UNLESS SPECIFICALLY APPROVED OTHERWISE BY THE ENGINEER.
7. SYNTHETIC PRODUCTS THAT HAVE BEEN APPROVED FOR USE ON VDOT PROJECTS AND FOUND ON VDOT'S SPEC LIST MAY BE USED IN LIEU OF THIS DESIGN. HOWEVER, VDOT WILL ONLY COMPENSATE THE CONTRACTOR UP TO THE BID PRICE PER EACH AT EACH SITE.

TYPICAL SYNTHETIC PRODUCT



SECTION A-A



PLAN

VDOT

ROAD AND BRIDGE STANDARDS

SHEET 1 OF 1 REVISION DATE

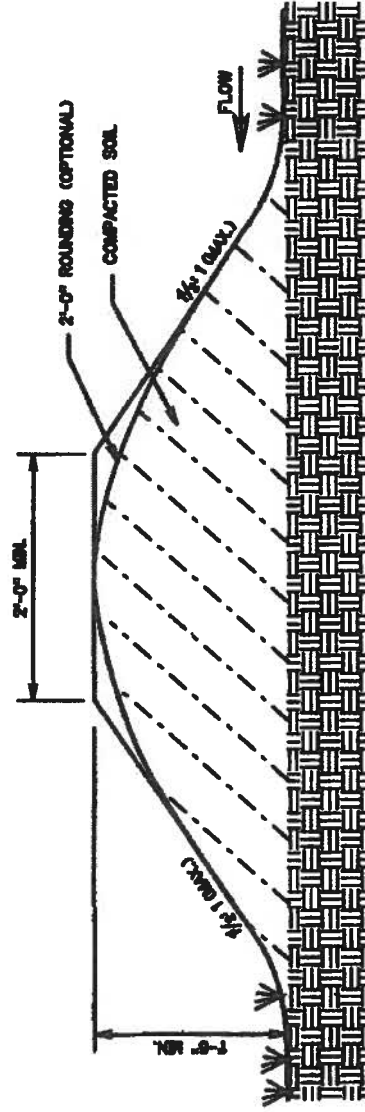
113.12

DEWATERING BASIN

SPECIFICATION REFERENCE

VIRGINIA DEPARTMENT OF TRANSPORTATION

107
303



TEMPORARY DIVERSION DIKE

NOTE:

1. THE CHANNEL CREATED BEHIND THE DIKE SHALL HAVE A POSITIVE GRADE TO A STABILIZED OUTLET. THE CHANNEL SHALL BE STABILIZED, AS NECESSARY, TO PREVENT EROSION.
2. TEMPORARY DIVERSION DIKE WILL BE MEASURED AND PAID FOR IN ACCORDANCE WITH SECTION 303 OF THE SPECIFICATIONS.

SPECIFICATION
REFERENCE

303

TEMPORARY DIVERSION DIKE

VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT

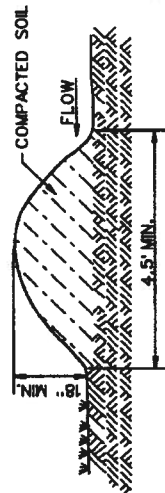
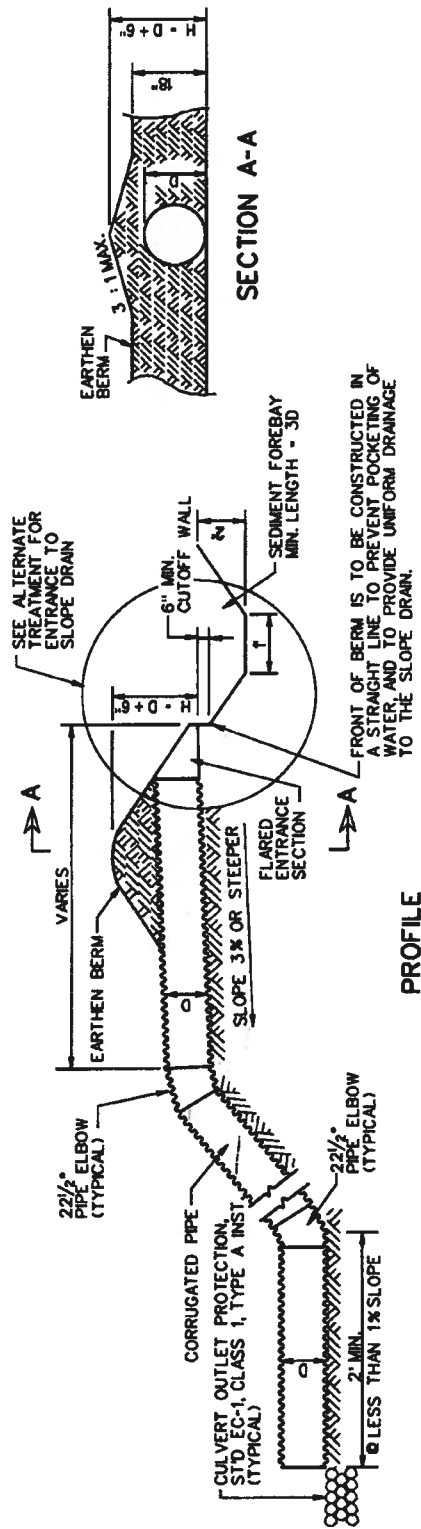
ROAD AND BRIDGE STANDARDS

REVISION DATE

SHEET 1 OF 1

113.13

TEMPORARY BERM & SLOPE DRAIN



EARTHEN BERM

EARTHEN BERM SHALL BE INSTALLED IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS OR AS DIRECTED BY THE ENGINEER.

SIZE OF SLOPE DRAIN	
MAXIMUM DRAINAGE AREA (ACRES)	MINIMUM PIPE DIAMETER, D (IN.)
0.5	12
1.5	18
2.5	21
3.0	24

NOTES

1. SLOPE DRAIN SHALL BE SECURELY STAKED TO THE SLOPE, AT 10' (OR LESS) INTERVALS.
2. THE SLOPE DRAIN SECTIONS SHALL BE SECURELY FASTENED TOGETHER AND HAVE WATER TIGHT FITTINGS.

VDOT

ROAD AND BRIDGE STANDARDS

SHEET 1 OF 1
113.14

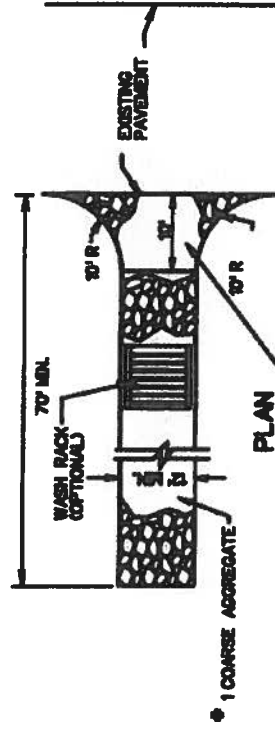
TEMPORARY BERM & SLOPE DRAIN

VIRGINIA DEPARTMENT OF TRANSPORTATION

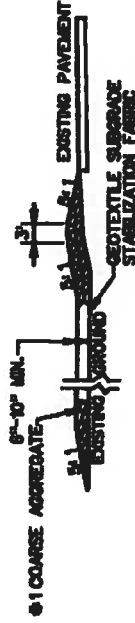
SPECIFICATION REFERENCE

107
303

MINIMUM REQUIREMENTS FOR STABILIZED CONSTRUCTION ENTRANCE



6" MINIMUM DEPTH 1 COARSE AGGREGATE WITH MINIMUM
10' CLOSEST TO ROADWAY CAPPED WITH 4" MINIMUM DEPTH
#66 OR #78 AGGREGATE, AS DIRECTED BY THE ENGINEER.



PROFILE

1. SURFACE WATER SHALL BE PIED UNDER THE CONSTRUCTION ENTRANCE. IF PAVING IS IMPRACTICAL, A MOUNTABLE BARRI WITH 5:1 SLOPES WILL BE PERMITTED.
2. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRUCKS OR FLORING TO ENTER ONTO PUBLIC RIGHT OF WAY. THIS MAY INCLUDE FORTS TO PREVENT TRUCKS FROM ENTERING. ANY TRUCKS MAY BE REQUIRED TO STOP AND BE CLEANED OF ANY MATERIALS BEFORE ENTERING. ALL SEDIMENT SHALL BE REMOVED IMMEDIATELY.
3. WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHT OF WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DROPS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
4. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER HEAVY USE AND EACH RAIN.

SPECIFICATION
REFERENCE

107
303

STABILIZED CONSTRUCTION ENTRANCE

VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT

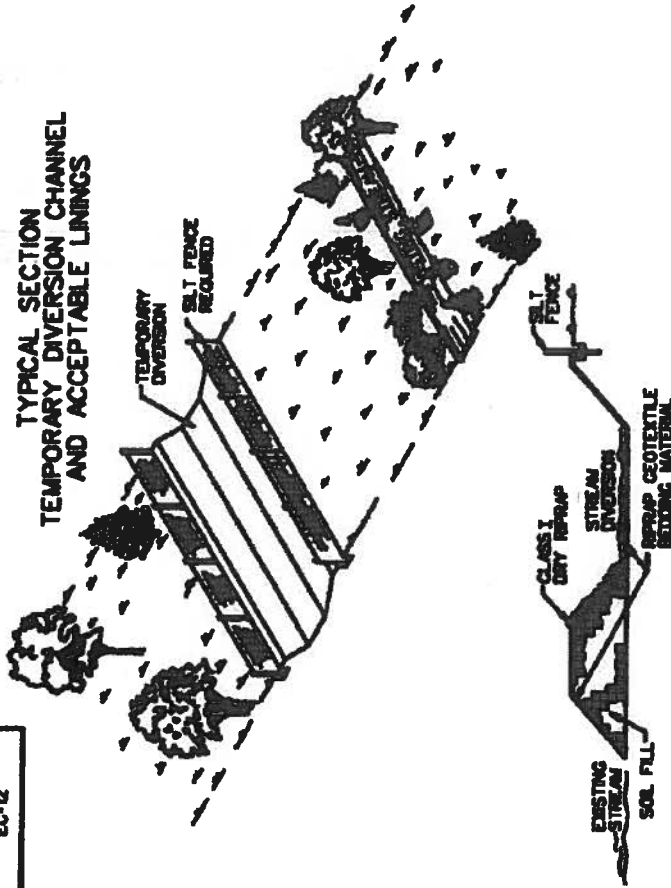
ROAD AND BRIDGE STANDARDS

REVISION DATE

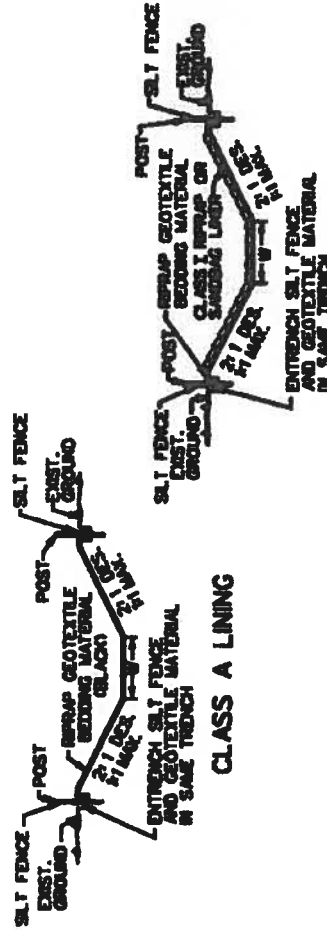
SHEET 1 OF 1

10.15

TYPICAL SECTION TEMPORARY DIVERSION CHANNEL AND ACCEPTABLE LININGS



DAM DETAIL



CLASS B LINING

BOTTOM WIDTH OF TEMPORARY DIVERSION CHANNEL SHALL APPROXIMATE THE BOTTOM WIDTH OF THE NATURAL STREAM CHANNEL.

STREAM DIVERSION GENERAL NOTES

SLOPES

NATURAL SLOPES OF SOIL SHALL BE IN STEEP AND GRACE SURFACES TO MAINTAIN CORRECT FLOW OF WATER IN THE DIVERSION.

EXCAVATION

IN EXCAVATION MATERIAL SHALL BE STORED OR STOCKPILED NEXT TO THE DIVERSION OR IN SUCH A MANNER THAT EROSION OF THE STREAM COULD OCCUR.

PIPE CULVERTS

PIPE CULVERTS MAY BE USED TO PASS A STREAM PROVIDED THEY ARE PROPERLY SUPPORTED AND THE FLOW OF WATER IS NOT OBSTRUCTED. THE DIVERSION SHALL BE MAINTAINED UNTIL THE CULVERT IS PROPERLY INSTALLED AND THE FLOW OF WATER IS NOT OBSTRUCTED.

WHEN THE CONTRACTOR USES PIPE CULVERTS IN LAY OF THE DIVERSION CHANNEL, THE DIVERSION SHALL BE MAINTAINED UNTIL THE CULVERT IS PROPERLY INSTALLED AND THE FLOW OF WATER IS NOT OBSTRUCTED.

LINING

THE CONTRACTOR SHALL MAINTAIN THE CENTER OF THE DIVERSION CHANNEL OF THE DIVERSION CHANNEL. THE DIVERSION CHANNEL SHALL BE MAINTAINED UNTIL THE CULVERT IS PROPERLY INSTALLED AND THE FLOW OF WATER IS NOT OBSTRUCTED.

STEEL SHEET PILING SHALL BE USED AT THE DIVERSION CHANNEL. THE DIVERSION CHANNEL SHALL BE MAINTAINED UNTIL THE CULVERT IS PROPERLY INSTALLED AND THE FLOW OF WATER IS NOT OBSTRUCTED.

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STEEL SHEET PILING SHALL BE USED AT THE DIVERSION CHANNEL. THE DIVERSION CHANNEL SHALL BE MAINTAINED UNTIL THE CULVERT IS PROPERLY INSTALLED AND THE FLOW OF WATER IS NOT OBSTRUCTED.

GENERAL

THE DIVERSION CHANNEL SHALL BE MAINTAINED UNTIL THE CULVERT IS PROPERLY INSTALLED AND THE FLOW OF WATER IS NOT OBSTRUCTED.

STEEL SHEET PILING SHALL BE USED AT THE DIVERSION CHANNEL. THE DIVERSION CHANNEL SHALL BE MAINTAINED UNTIL THE CULVERT IS PROPERLY INSTALLED AND THE FLOW OF WATER IS NOT OBSTRUCTED.

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STEEL SHEET PILING SHALL BE USED AT THE DIVERSION CHANNEL. THE DIVERSION CHANNEL SHALL BE MAINTAINED UNTIL THE CULVERT IS PROPERLY INSTALLED AND THE FLOW OF WATER IS NOT OBSTRUCTED.

VDOT

ROAD AND BRIDGE STANDARDS

SHEET 1 OF 1

REVISION DATE 4/08

TEMPORARY DIVERSION CHANNEL

REVISION DATE 4/08

VDOT

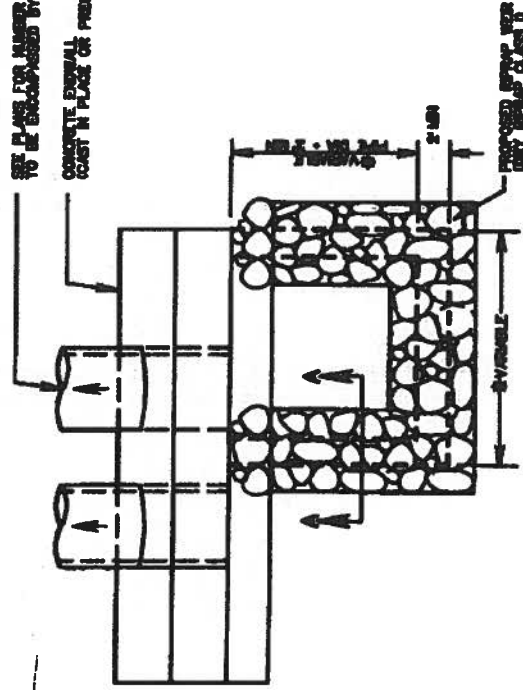
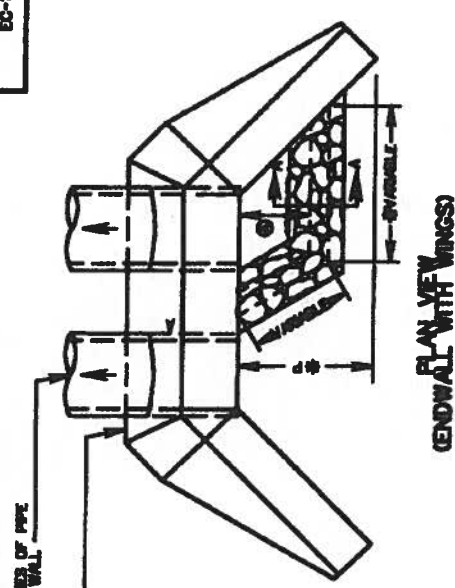
REVISION DATE 4/08

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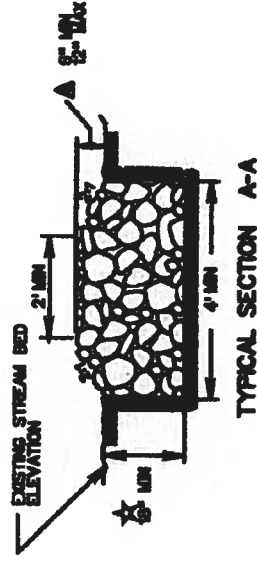
302

303

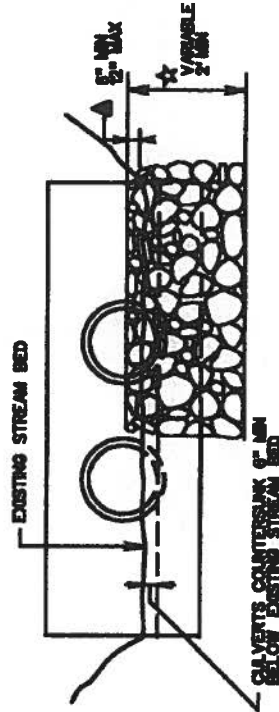
414



PLAN VIEW
(ENDWALL WITHOUT WINGS)



TYPICAL SECTION A-A



END VIEW

LEGEND

- ① 6" MINIMUM OR 1/2 P.
- * DIMENSION VARIES ACCORDING TO PIPE SIZE, SKEW AND ENDWALL DIMENSIONS
- ★ DEPTH OF FOUNDATION TO BE VARIABLE ACCORDING TO SITE CONSTRAINTS OR AS DIRECTED BY THE ENGINEER
- ▲ THE PROPOSED HEIGHT OF THE RIPRAP WEIR FROM THE EXISTING STREAM BED TO THE TOP OF WEIR IS TO BE SPECIFIED ON THE ROADWAY PLAN. THE DIMENSION (HEIGHT OF WEIR ABOVE STREAM BED) CAN BE A MINIMUM OF 6" OR ANY VARIABLE DIMENSION TO A MAXIMUM OF 24".

NOTES:

1. THE TOP WIDTH OF THE WEIR IS VARIABLE AND IS TO BE ADJUSTED AS REQUIRED TO DIRECT THE LOW FLOW TO THE BARRELS DESIGNATED ON THE PLAN.
2. FOR SKEWED ENDWALLS, RIPRAP WEIR SIDES ARE TO BE CONSTRUCTED PARALLEL WITH PIPE SKEW.
3. REFER TO APPLICABLE ENDWALL STANDARD DRAWING FOR DIMENSIONS NOT SHOWN HEREIN.
4. BASIS OF PAYMENT TO BE PAID FOR AS SQ.YDS. OR TONS OF RIPRAP CLASS 1.

SPECIFICATION
REFERENCE

107
303

LOW FLOW DIVERSION FOR MULTIPLE LINE CULVERT INSTALLATIONS

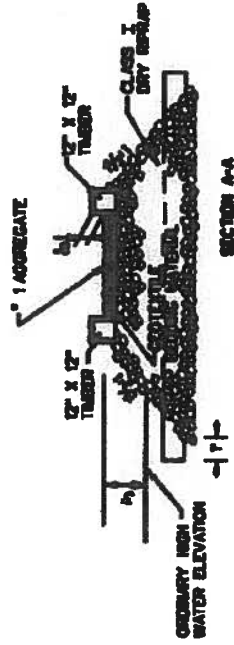
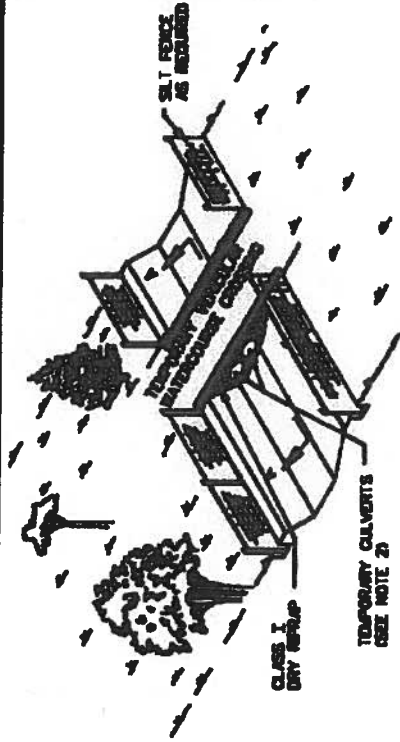
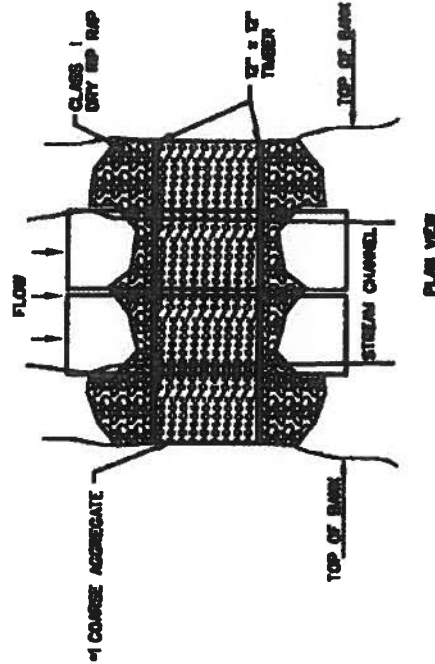
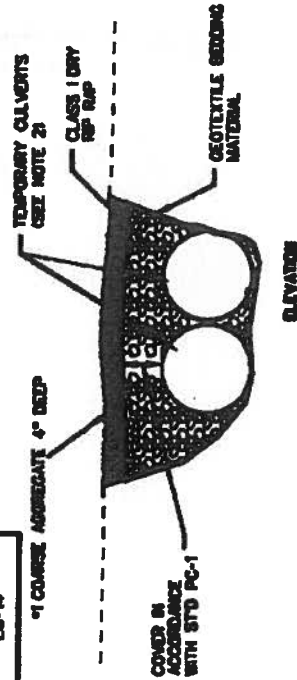
RIPRAP WEIRS

ROAD AND BRIDGE STANDARDS

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SHEET 1 OF 1
113.17

VERMONT DEPARTMENT OF TRANSPORTATION

EC-14



NOTE:

1. THE CULVERT(S) SHALL BE SIZED TO CONVEY THE FLOW OF A TWO YEAR STORM EVENT. THE ELEVATION OF THE TWO YEAR EVENT SHALL BE AT OR BELOW THE LOWEST SURFACE ELEVATION OF THE CROSSING. THE REQUIRED MATERIALS AND METHODS SHALL BE DETERMINED USING THE APPROPRIATE HYDROLOGICAL DESIGN TECHNIQUES. A TEMPORARY VEHICULAR WATERCOURSE CROSSING SHOULD ONLY BE UTILIZED WHERE THE DRAINAGE AREA IS NO GREATER THAN 1 SQUARE MILE. THE DEPTH OF STONE COVER OVER THE CULVERT(S) SHALL BE IN ACCORDANCE WITH STANDARD PC-1.

2. AN ALTERNATIVE TEMPORARY VEHICULAR WATERCOURSE CROSSING DESIGN MAY BE USED PROVIDED IT IS SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL IN ACCORDANCE WITH ROAD AND BRIDGE SPECIFICATIONS 603.0 AND 607.02.

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ROAD AND BRIDGE STANDARDS

SHEET 1 OF 1 REVISION DATE

115.18 4/08

TEMPORARY VEHICULAR WATERCOURSE CROSSING

VIRGINIA DEPARTMENT OF TRANSPORTATION

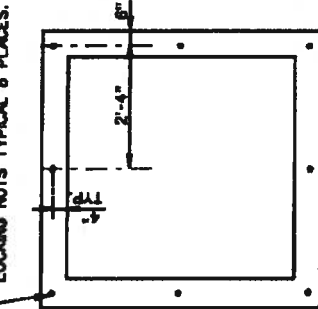
SPECIFICATION REFERENCE

302
303
414

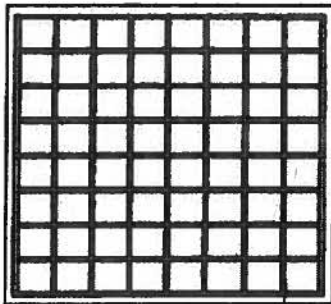
NOTES:

1. COST OF TRASH RACK AND DEBRIS RACK ARE TO BE INCLUDED IN THE BID PRICE FOR THE STORMWATER MANAGEMENT DRAINAGE STRUCTURE.
2. STRUCTURE MAY BE PRECAST OR CAST IN PLACE. SEE SHEET 2 OF 3 FOR DETAILS ON PRECAST STRUCTURE.
3. WEEP HOLES SHALL NOT BE PROVIDED.
4. STEPS ARE TO BE PROVIDED WHEN HEIGHT OF STRUCTURE IS 4'-0" OR GREATER ABOVE INVERT OF OUTLET PIPE. FOR STEP DETAILS SEE STANDARD ST-1.
5. FOR DETAILS ON METAL PLATE, DEBRIS RACK AND TRASH RACK SEE STANDARD SWM-DR.
6. MARK HEIGHT OF STRUCTURE IN BLACK, WITH 4" HIGH NUMERALS AND 1" WIDE HORIZONTAL STRIPES AT 4' INTERVALS FROM INVERT OF WATER QUALITY ORFICE (ALL VISIBLE SIDES).
7. THE PERMANENT STORMWATER MANAGEMENT DRAINAGE STRUCTURE, STANDARD SWM-1 MAY BE MODIFIED WHERE THE STORMWATER MANAGEMENT BASIN IS TO BE USED AS A TEMPORARY SEDIMENT BASIN DURING PROJECT CONSTRUCTION. SEE STANDARD SWM-DR, SHEET 1 OF 3, FOR TEMPORARY MODIFICATION DETAILS.
8. THE SIZE OF THE WATER QUALITY ORFICE SHALL BE SPECIFIED ON THE PLANS. ADDITIONAL OPENINGS IN THE STORMWATER MANAGEMENT DRAINAGE STRUCTURE TO BE PROVIDED WHEN SPECIFIED ON THE PLANS.

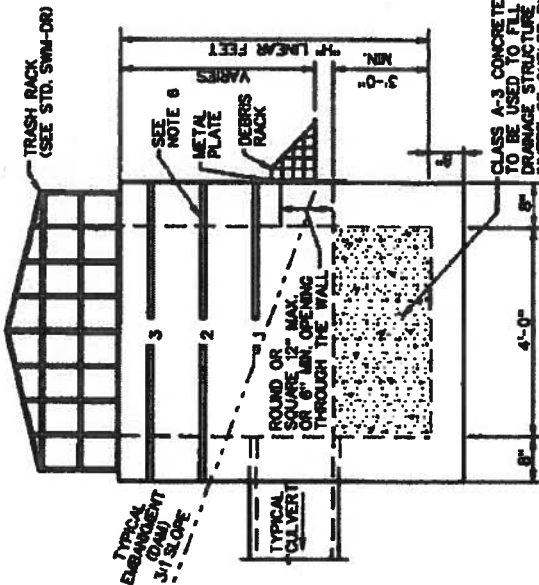
3/4" DIA X 6" LG. ADHESIVE BOLTS
W/FLAT WASHERS AND SELF-
LOCKING NUTS TYPICAL @ PLACES.



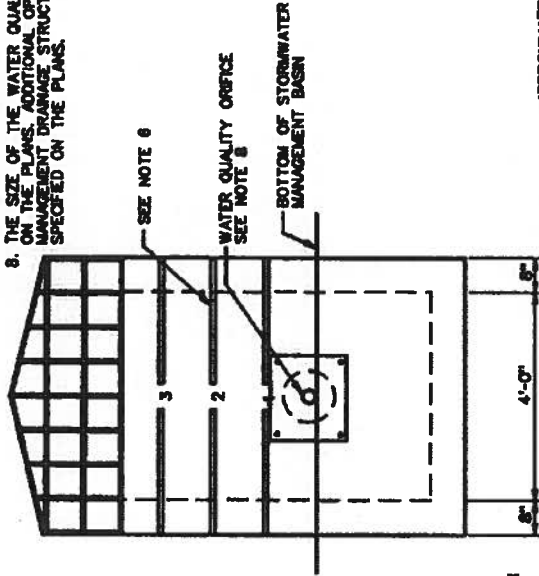
PLAN VIEW
(TRASH RACK NOT SHOWN)



PLAN VIEW



SIDE VIEW
SWM DRAINAGE STRUCTURE



FRONT VIEW
(DEBRIS RACK NOT SHOWN)

PIPE SIZE	12"	15"	18"	24"	30"	36"	42"
MINIMUM DEPTH H	5'-0"	5'-3/4"	5'-6 1/2"	6'-1"	6'-7 1/2"	7'-2"	7'-8 1/2"
CU YDS. CONCRETE	2.865	2.773	2.878	3.078	3.624	3.437	3.588

INCREMENT PER FOOT OF ADDITIONAL DEPTH "H" = 0.461 CU YDS.

**CAST IN PLACE STORMWATER MANAGEMENT
DRAINAGE STRUCTURE**

SPECIFICATION
REFERENCE

302

VDOT

ROAD AND BRIDGE STANDARDS

REVISION DATE
08/70

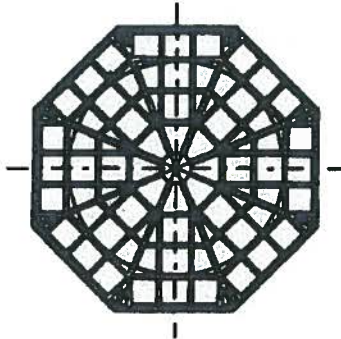
SHEET 1 OF 3

114.01

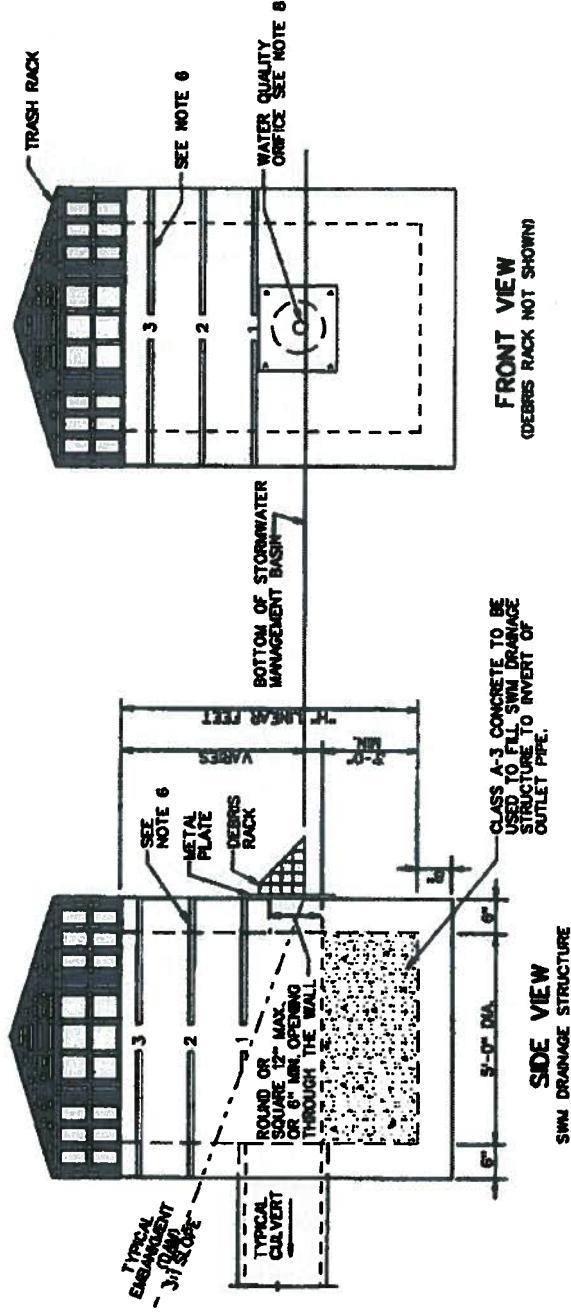
VIRGINIA DEPARTMENT OF TRANSPORTATION

NOTES:

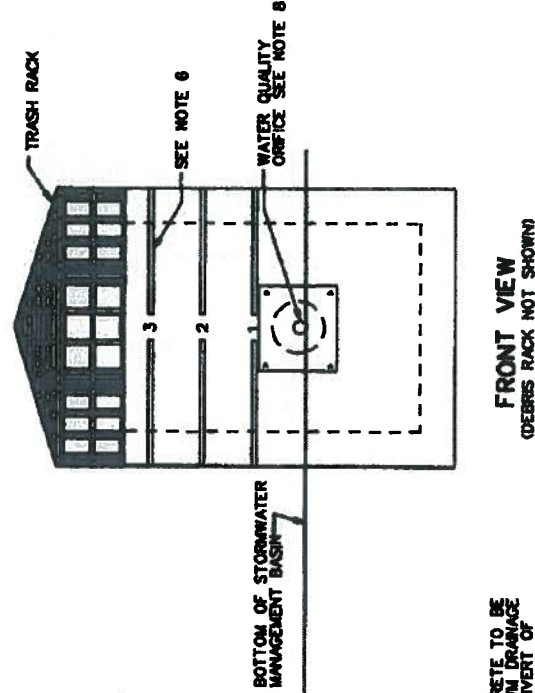
1. COST OF TRASH RACK AND DEBRIS RACK ARE TO BE INCLUDED IN THE PRICE BIDD FOR THE STORMWATER MANAGEMENT DRAINAGE STRUCTURE.
2. STRUCTURE MAY BE PRECAST OR CAST IN PLACE. SEE SHEET 1 OF 3 FOR DETAILS ON CAST IN PLACE STRUCTURE.
3. WEIR HOLES SHALL NOT BE PROVIDED. ANY LIFT HOLES SHALL BE PLUGGED.
4. STEPS ARE TO BE PROVIDED WHEN HEIGHT OF STRUCTURE IS 4'-0" OR GREATER ABOVE INVERT OF OUTLET PIPE. FOR STEP DETAILS SEE STANDARD ST-1.
5. SEE STANDARD SWM-OR FOR DETAILS ON PLATE, DEBRIS RACK AND TRASH RACK.
6. MARK HEIGHT OF STRUCTURE IN BLACK, WITH 4" HIGH NUMERALS AND 1" WIDE HORIZONTAL STRIPES AT 1' INTERVALS FROM INVERT OF WATER QUALITY ORifice (ALL VISIBLE SIDES).
7. THE PERMANENT STORMWATER MANAGEMENT DRAINAGE STRUCTURE, STANDARD SWM-1 MAY BE MODIFIED WHERE THE STORMWATER MANAGEMENT BASIN IS TO BE USED AS A TEMPORARY SEDIMENT BASIN DURING PROJECT CONSTRUCTION. SEE STANDARD SWM-OR, SHEET 1 OF 5 FOR TEMPORARY MODIFICATION DETAILS.
8. THE SIZE OF THE WATER QUALITY ORifice SHALL BE SPECIFIED ON THE PLANS. ADDITIONAL OPENINGS IN THE STORMWATER MANAGEMENT DRAINAGE STRUCTURE TO BE PROVIDED WHEN SPECIFIED ON THE PLANS.



PLAN VIEW



SIDE VIEW
SWM DRAINAGE STRUCTURE



FRONT VIEW
DEBRIS RACK NOT SHOWN



ROAD AND BRIDGE STANDARDS

SHEET 2 OF 3
REVISION DATE 08/10

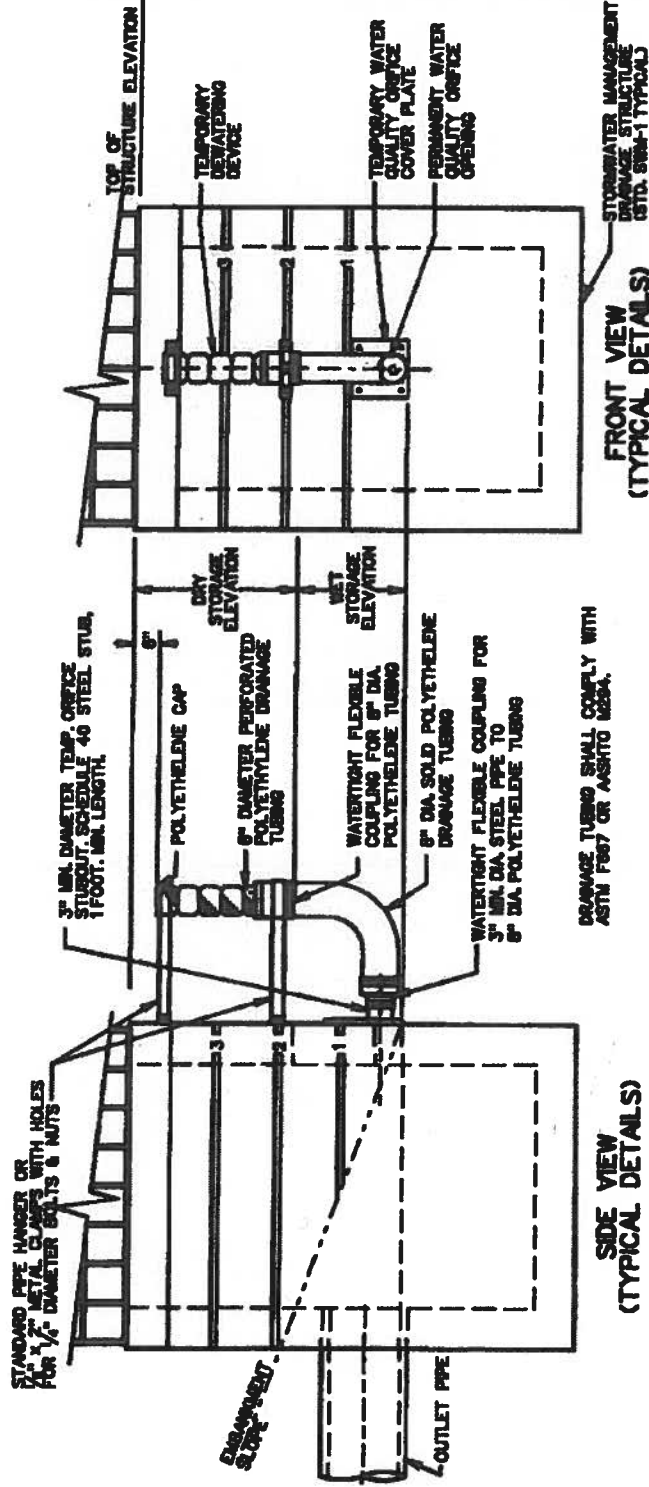
PRECAST STORMWATER MANAGEMENT DRAINAGE STRUCTURE

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

100
302

SWM-03



NOTES:

1. THESE DETAILS ARE TO BE USED TO MODIFY THE PERMANENT STORMWATER MANAGEMENT DRAINAGE STRUCTURE WHEN THE STORMWATER MANAGEMENT BASIN IS TO BE USED FOR A TEMPORARY SEDIMENT BASIN DURING PROJECT CONSTRUCTION.
2. GRADE STORMWATER MANAGEMENT BASIN AS SHOWN IN PLANS.
3. ALL OPENINGS (IF ANY) IN SIDE OF STRUCTURE (OTHER THAN PERMANENT WATER QUALITY OFFICE) ARE TO BE COVERED WITH SOLID METAL PLATES WHILE THE BASIN IS BEING USED FOR SEDIMENT CONTROL.
4. DEWATERING DEVICE AND COMPONENTS AND TEMPORARY METAL PLATES (IF ANY), AS SHOWN IN THE DETAIL, ARE TO BE REMOVED AND PERMANENT STEEL PLATE WITH WATER QUALITY OFFICE IS TO BE INSTALLED WHEN BASIN IS NO LONGER NEEDED FOR SEDIMENT CONTROL.
5. SIMILAR DEVICE MAY ALSO BE USED ON OTHER STORMWATER MANAGEMENT DRAINAGE STRUCTURES.
6. COST OF TEMPORARY DEWATERING DEVICE AND TEMPORARY METAL PLATES (IF ANY) SHALL BE INCLUDED IN THE BID PRICE FOR STORMWATER MANAGEMENT DRAINAGE STRUCTURE.
7. THE TEMPORARY 8" DIA. POLYETHYLENE DRAINAGE TUBING IS TO BE SOLD FOR THE LENGTH BELOW WET STORAGE ELEVATION AND IS TO BE PERFORATED ABOVE THE WET STORAGE ELEVATION. THE COUPLING IS TO BE WATERTIGHT.

VDOT

ROAD AND BRIDGE STANDARDS

SHEET 1 OF 5 REVISION DATE

11A.04

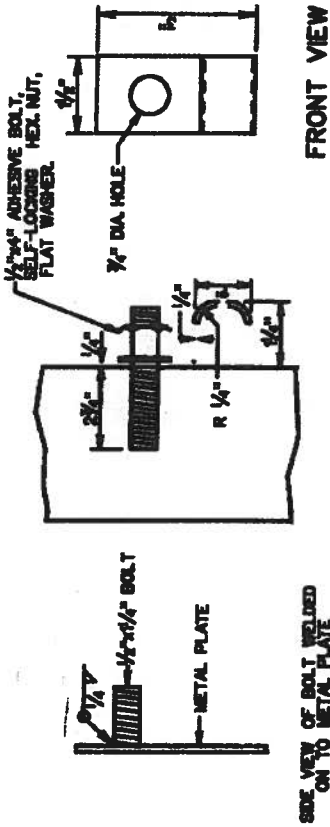
STORMWATER MANAGEMENT (SWM) DETAILS

VIRGINIA DEPARTMENT OF TRANSPORTATION

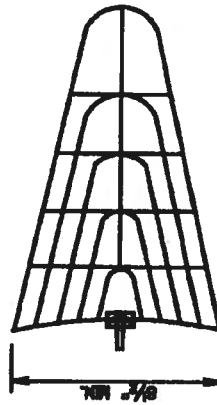
SPECIFICATION REFERENCE

302

1. COST OF DEBRIS RACK, METAL PLATE, AND DEBRIS RACK HOLDER TO BE INCLUDED IN THE BID PRICE FOR THE SWM DRAINAGE STRUCTURE.
2. DEBRIS RACK MAY BE FABRICATED FROM WELDED 1/2" DIAMETER BARS OR 1/2" THICK HIGH DENSITY POLYETHYLENE METAL COMPONENTS OF DEBRIS RACK MUST NOT BE GALVANIZED.
3. DEBRIS RACK TO BE HINGED AS SHOWN OR CONSTRUCTION MAY SUBSTITUTE A COMPARABLE DESIGN AS APPROVED BY THE ENGINEER.
4. THE LOCATION OF THE DEBRIS RACK HOLDER WHEN HINGED BOLT IS LOCATED ON THE METAL PLATE THE 1/4" DIA BOLT LENGTH IS TO BE REDUCED 1/4" LG. AND WELDED TO THE PLATE. DEBRIS RACK HOLDER AND ALL HARDWARE IS TO BE GALVANIZED.

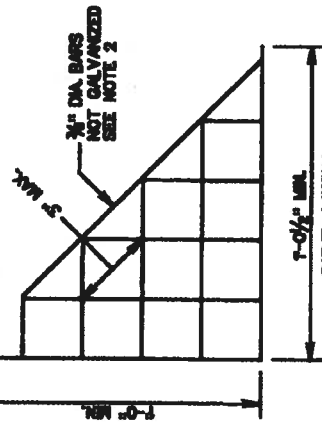


SIDE VIEW
DETAIL FOR DEBRIS RACK HOLDER



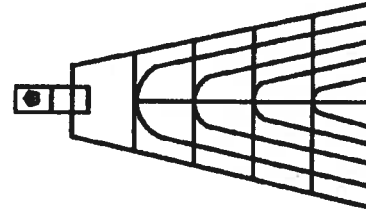
TOP VIEW

TOP TO BE HINGED TO ALLOW
ACCESS TO WATER QUALITY OFFICE
(SEE HOLDER DETAIL ABOVE)



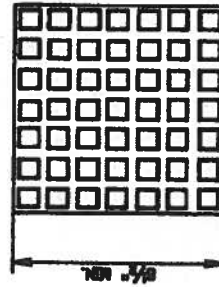
SIDE VIEW

METAL



FRONT VIEW

DETAIL FOR DEBRIS RACK
(FOR WATER QUALITY OFFICE)



TOP TO BE HINGED TO ALLOW
ACCESS TO WATER QUALITY
OFFICE (SEE NOTE 3)

2 1/2\"/>

HIGH DENSITY POLYETHYLENE

STORMWATER MANAGEMENT (SWM) DETAILS **DEBRIS RACK, METAL PLATE, WATER QUALITY OFFICE, CONCRETE GRADLE** **(FOR SWM DRAINAGE STRUCTURES, SWM RISER PIPES AND SWM DAMS)**

SPECIFICATION
REFERENCE

302

VDOT

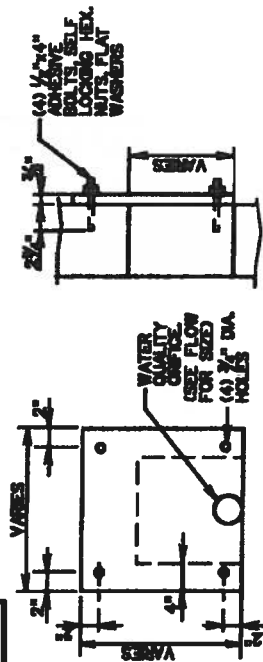
ROAD AND BRIDGE STANDARDS

REVISION DATE SHEET 2 OF 5

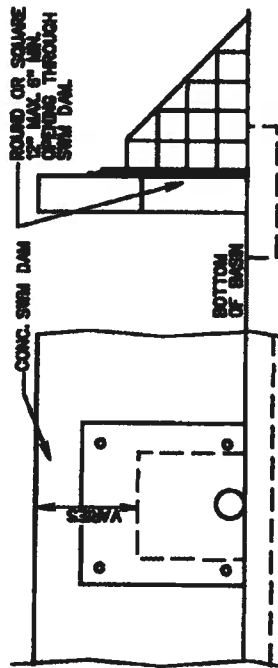
114.09

VIRGINIA DEPARTMENT OF TRANSPORTATION

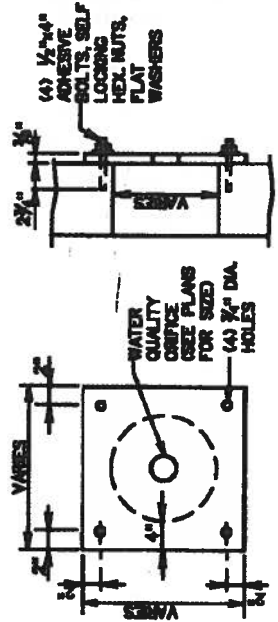
SWM-DR



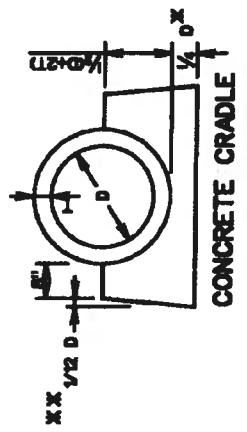
SWM DAM METAL PLATE DETAIL
(NOT GALVANIZED)



DETAIL FOR METAL PLATE AND
WATER QUALITY ORIFICE
TYPICAL SWM DAM

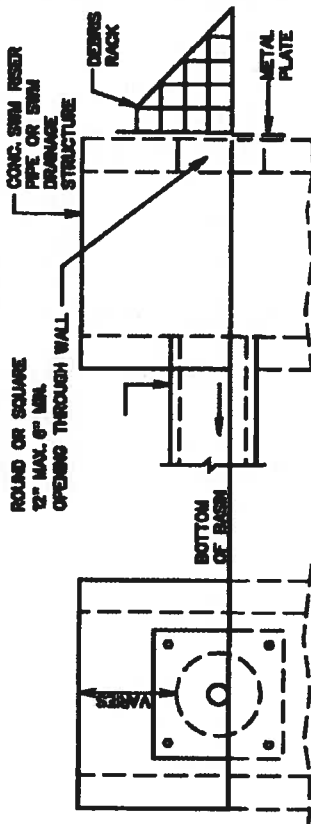


METAL PLATE DETAIL
(NOT GALVANIZED)



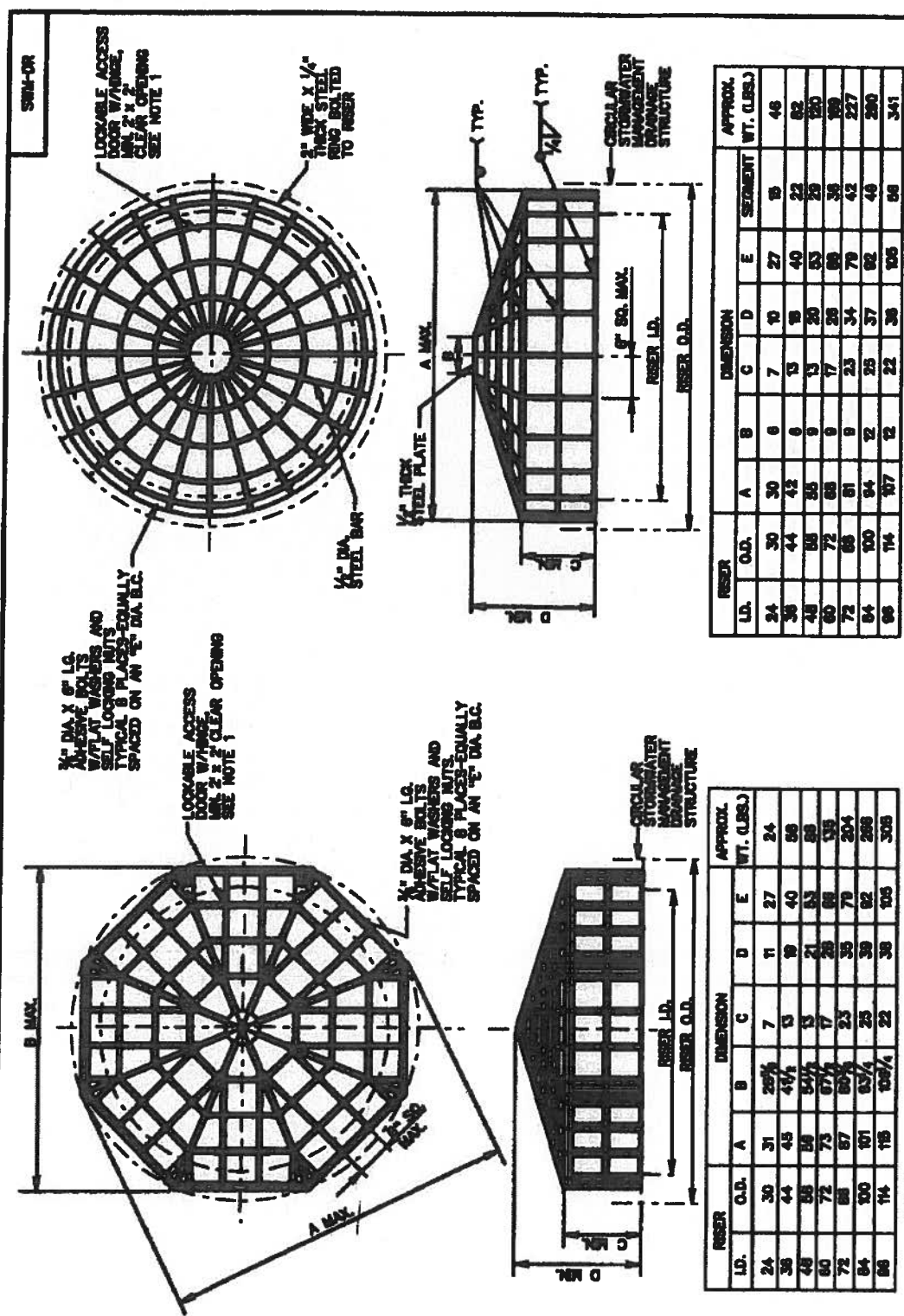
PIPE SIZE INCHES	CRADLE BOTTOM WIDTH INCHES	CRADLE HEIGHT TOP WIDTH INCHES	INCREMENT IN CUBIC YARDS, PER LINEAR FOOT OF PIPE
12	34	14	0.063
16	38	15.75	0.10
18	42	17.5	0.129
24	50	21	0.188
30	58	26	0.233
36	66	31	0.307
42	74	36	0.360

CONCRETE SHALL BE CLASS AS
X BUT NOT LESS THAN 8"
X X IF THE PIPE IS Laid IN AN EXCAVATED TRENCH THEN
THE SIDE WALLS MAY CONFORM TO THE TRENCH SHAPE
OR THE TRENCH MAY BECOME THE CRADLE FORM.
CONCRETE CRADLE IS TO BE INSTALLED UNDER THE ENTIRE
LENGTH OF CULVERT AT EACH STORMWATER MANAGEMENT BASIN.
CONCRETE CRADLE IS TO BE PAID FOR AS MISCELLANEOUS
CONCRETE AND SUMMARIZED IN CUBIC YARDS FOR EACH PIPE LOCATION



DETAIL FOR METAL PLATE AND
WATER QUALITY ORIFICE
TYPICAL SWM DRAINAGE STRUCTURE

STORMWATER MANAGEMENT (SWM) DETAILS
DEBRIS RACK, METAL PLATE, WATER QUALITY ORIFICE, CONCRETE CRADLE
(FOR SWM DRAINAGE STRUCTURES, SWM RISER PIPES AND SWM DAMS)



HIGH DENSITY POLYETHYLENE

NOTES:
 1. A HAZ. LOCKABLE ACCESS DOOR SHALL BE PROVIDED ON ALL TRASH RACKS. THE TOTAL WEIGHT OF THE TRASH RACK IS GREATER THAN 75 LBS OR IF THE TRASH RACK IS TO BE PLACED ON A SWM-1 WITH AN "H" DIMENSION GREATER THAN 7'-2".

METAL

2. ANTI-VORTEX PLATE IS TO BE USED WHEN SPECIFIED ON THE PLANS. COST OF FURNISHING AND PLACING THE ANTI-VORTEX PLATE IS TO BE INCLUDED IN THE BID PRICE FOR THE STRUCTURE.

RISER	DIMENSION					APPROX. WT. (LBS.)
	L.D.	O.D.	A	B	E	
24	30	30	6	7	10	46
36	44	44	6	13	18	82
48	58	58	9	13	26	120
60	72	72	9	17	36	158
72	86	86	9	23	34	227
84	100	100	12	25	37	280
96	114	114	12	22	36	341

RISER	DIMENSION					APPROX. WT. (LBS.)
	L.D.	O.D.	A	B	E	
24	30	31	28 1/2	7	11	24
36	44	45	41 1/2	13	19	56
48	58	59	54 1/2	13	21	88
60	72	73	67 1/2	17	26	135
72	86	87	80 1/2	23	35	179
84	100	101	93 1/2	25	39	268
96	114	115	106 1/2	22	38	305

SPECIFICATION REFERENCE

302

STORMWATER MANAGEMENT DETAILS TRASH RACK FOR SWM DRAINAGE STRUCTURES

VDOT

ROAD AND BRIDGE STANDARDS

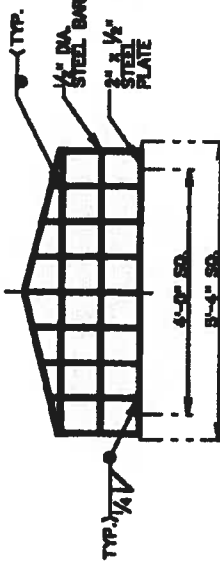
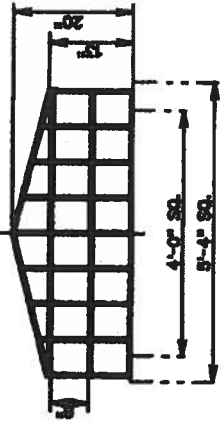
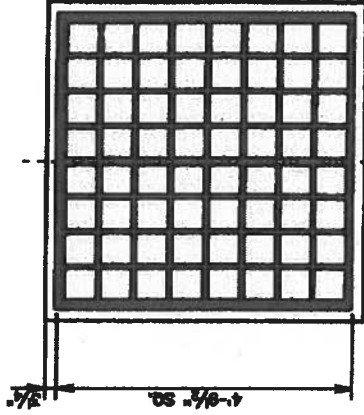
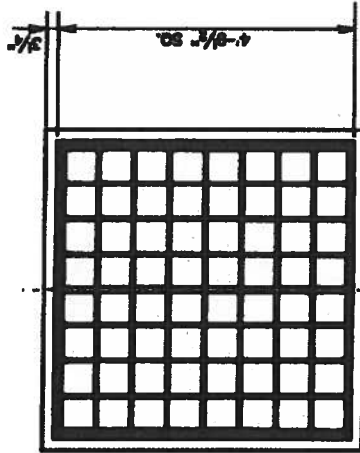
REVISION DATE

SHEET 4 OF 5

VIRGINIA DEPARTMENT OF TRANSPORTATION

114.07

SWM-DR



1/2" DIA. X 8" LG.
ADHESIVE BOLTS
WITH LOCKWASHERS AND
NUTS
TYPICAL PLACES EQUALLY
SPACED ON AN "E" DIA. B.C.

NOTE:
A HINGED, LOCKABLE ACCESS DOOR
WITH A MINIMUM 2' X 2' CLEAR OPENING
SHALL BE PROVIDED ON ALL TRASH RACKS.

HIGH DENSITY POLYETHYLENE

APPROVAL	WT. (LBS.)
	95

METAL (STEEL)

APPROVAL	WT. (LBS.)
	188

VDOT

ROAD AND BRIDGE STANDARDS

SHEET 5 OF 5 REVISION DATE

114.08

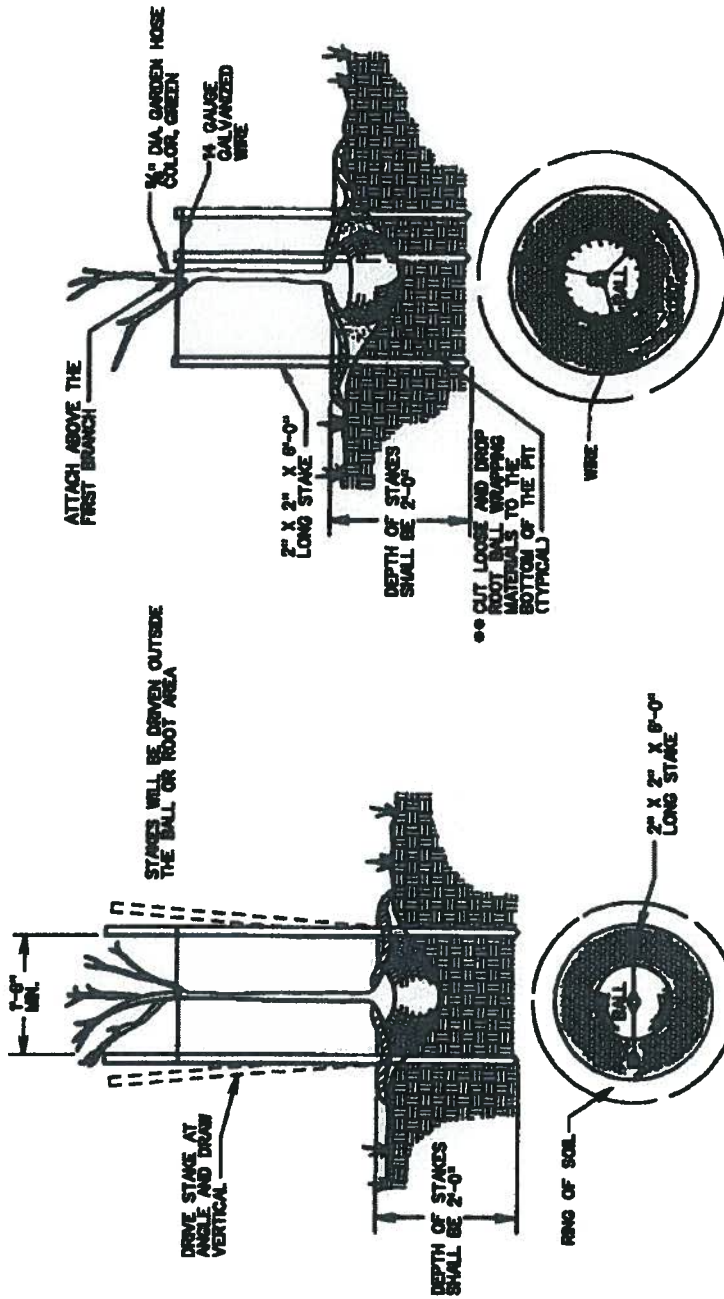
STORMWATER MANAGEMENT DETAILS TRASH RACK FOR SWM DRAINAGE STRUCTURES

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION
REFERENCE

302

STAKING, GUYING



5
(L-3) **DOUBLE STAKING & STAKE PLACEMENT**

DECIDUOUS TREES LESS THAN 2" IN CALIPER
EVERGREEN TREES LESS THAN 4 FEET IN HEIGHT
SHALL BE 4 FEET OR MORE IN HEIGHT.

GENERAL NOTES

1. ALL DECIDUOUS TREES OVER 4 FT. IN HEIGHT AND ALL EVERGREEN TREES OVER 4 FT. IN HEIGHT OR TALLER SHALL BE STAKED AND GUYED WITH 3 STAKES AS SHOWN.
2. MULTIPLE STEMMED DECIDUOUS TREES 4 FT. IN HEIGHT SHALL BE STAKED WITH 3 STAKES IN SUCH A MANNER AS TO STABILIZE 3 MAINSTEMS.
3. THE WOOD STAKES SHALL BE 2"x2"x8'-0" LONG DRESSED HARDWOOD AND DECAY RESISTANT.

5
(L-3) **TRIPLE - GUYING**

DECIDUOUS TREES 2" IN CALIPER OR GREATER
EVERGREEN TREES 4 FEET IN HEIGHT OR GREATER

THE WIRE TIES SHALL BE 1/4 GAUGE GALVANIZED WIRE AND BE PROVIDED WITH A ONE FOOT PIECE OF GREEN RUBBER HOSE PLACED TO PREVENT INJURY TO THE BARK. THESE SHOULD BE A 1" - 3" SWAY IN THE TREE (THE WIRE SHOULD NOT BE PULLED TIGHT) FOR BEST ESTABLISHMENT. OTHER ANCHORING METHODS AND MATERIALS MAY BE APPROVED FOR USE BY THE ENGINEER.

- REMOVAL OF BRACING MATERIALS FROM TREES AND STAKES AND WIRE CAGES FROM ROOT BALLS SHALL COMPLY TO THE CURRENT ROAD & BRIDGE SPECS.

SPECIFICATION
REFERENCE805
244

PLANTING DETAILS

VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT

ROAD AND BRIDGE STANDARDS

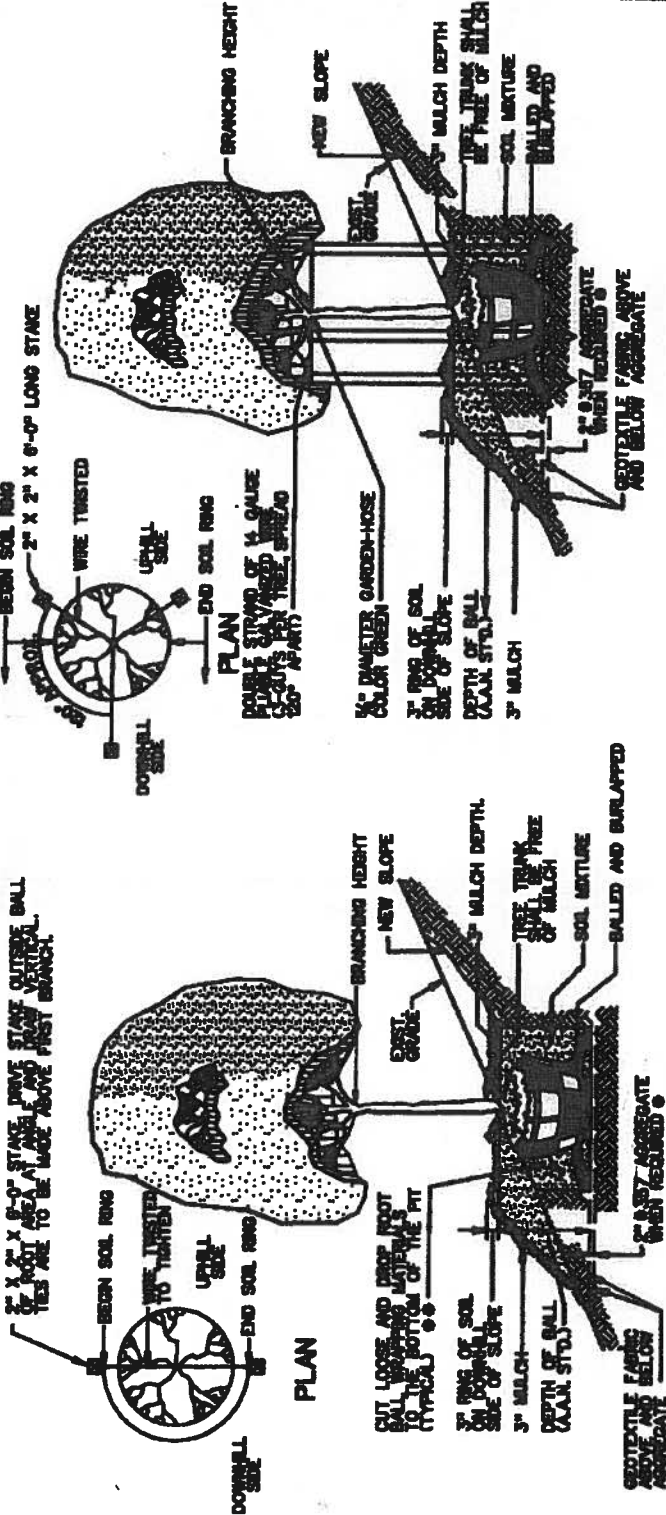
REVISION DATE

SHEET 1 OF 1

1001.05

L-3

PLANTING, STAKING, GUYING



ELEVATION

DOUBLE STAKING & STAKE PLACEMENT

DECIDUOUS TREES LESS THAN 2" IN CALIPER
EVERGREEN TREES LESS THAN 4" IN HEIGHT
AND SHRUBS 4' OR MORE IN HEIGHT

GENERAL NOTES

1. ALL DECIDUOUS TREES 2" IN CALIPER OR MORE AND ALL EVERGREEN TREES OVER 4' IN HEIGHT SHALL BE STAKED OR GUYED AS SHOWN.
2. WITH 2-5 STAKES, DECIDUOUS TREES OVER 4' IN HEIGHT SHALL BE STAKED WITH 3-5 STAKES IN SUCH A MANNER AS TO STABILIZE THE TRUNK.
3. THE WOOD STAKES SHALL BE CONSTRUCTION GRADE ROUND OR SQUARE OF SOUND AND DRY WOOD, BEAT RESISTANT, AND OF THE SIZE INDICATED IN THE DETAILS.
4. THE WIRE LINES SHALL BE 14 GAUGE GALVANIZED WIRE OR OTHER APPROVED MATERIAL AND BE PROVIDED WITH A 1/2" RADIUS OF BEND WHEN PLACED TO PREVENT INJURY TO THE BARK. THERE SHALL BE A 2'-3" SWAY IN THE LINE. THE WIRE SHALL NOT BE ALLOWED TO REST ON THE GROUND OR BE STAKED TO ANY OTHER METHOD AND MATERIALS MAY BE APPROVED FOR USED BY THE ENGINEER.
5. ON 8" OR GREATER TRUNKS, THE FRONT CENTER OF THE PIT SHALL BE ADJUSTED TO INCLUDE A 1/2" CUT THE FULL LENGTH OF THE PIT. THE PIT SHALL BE 1/2" DEEPER THAN SHOWN IN THE DETAILS. SHALL BE COVERED WITH GEOTEXTILE FABRIC PRIOR TO BACK-FILLING WITH SOIL MIXTURE.

ELEVATION

TRIPLE GUYING

DECIDUOUS TREES 2" IN CALIPER OR GREATER
EVERGREEN TREES 4' IN HEIGHT OR GREATER

- FIT DRAINAGE INFORMATION FOR SLOPE
- REMOVAL OF EXISTING MATERIALS FROM TRUNK AND STEM AND LIFTING CABLES FROM ROOT BALLS SHALL BE DONE TO SECTION BOARDS OF THE SLOPE.
- A. PRIOR TO THE PLANTING ON A SLOPE, THE CONTRACTOR SHALL TEST NO MORE THAN 3 FITS FOR PERCOLATION.
- B. PERCOLATION TEST SHALL CONSIST OF FILLING THE PIT WITH APPROXIMATELY 1/2" OF WATER. NO LEAKAGE IS REQUIRED.
- C. PAYMENT FOR APPROPRIATE GEOTEXTILE FABRIC AND ALL MATERIALS AND BRIDGE SPACE ARE WITH THE ROAD AND BRIDGE SPACE.

VDOT

ROAD AND BRIDGE STANDARDS

SHEET 1 OF 1 REVISION DATE

12/01/08

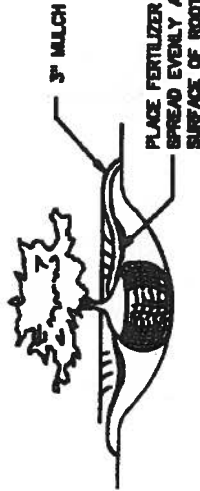
SLOPE PLANTING DETAILS

VIRGINIA DEPARTMENT OF TRANSPORTATION

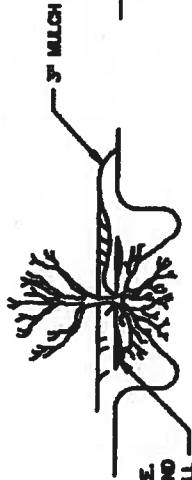
SPECIFICATION REFERENCE

203
245
603

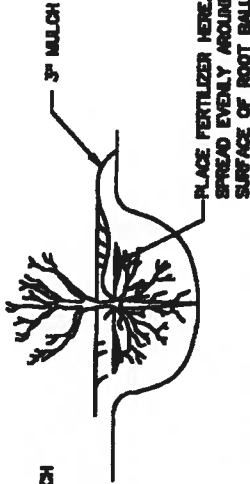
FERTILIZER PLACEMENT



**BALLED & BURLAPPED
& CONTAINER PLANTS**



**BASE ROOT PLANTS
WITHOUT TAPROOT**



**BASE ROOT PLANTS
WITH TAPROOT**

FERTILIZER MATERIALS

FERTILIZER MATERIALS SHALL CONFORM TO THE SECTION 244.02 (a) OF THE VDOT ROAD AND BRIDGE SPECIFICATIONS.

THE FOLLOWING INFORMATION SHALL BE SHOWN ON A TAG ATTACHED TO FERTILIZER BAG:

1. THE NAME AND ADDRESS OF MANUFACTURER
2. NAME OF MATERIAL
3. NUMBER OF NET POUNDS OF READY MIXED MATERIALS IN THE PACKAGE
4. CHEMICAL COMPOSITION AND ANALYSIS
5. GUARANTEED ANALYSIS (VA DEPARTMENT OF AGRICULTURE)

MULCHING MATERIALS

BARK SHALL BE DOUBLE SHREDDED HARDWOOD BARK, DISEASE FREE, BROWN IN COLOR AND SHALL CONFORM TO THE NATIONAL BARK AND SOIL PRODUCER ASSOC. STANDARDS FOR CLASSIFICATION. PARTICLE SIZE, PERCENTAGE WOOD CONTENT, MOISTURE RETENTION AND PH RATING. OTHER MULCH MATERIAL MAY BE USED WITH APPROVAL FROM THE ENGINEER.

FERTILIZER RATES

- 2 OUNCES PER VINE AND GROUND COVER UP TO ONE GALLON CONTAINER.
 - 8 OUNCES PER SHRUB BARE ROOT OR ONE GALLON CONTAINER.
 - 18 OUNCES PER SHRUB, BALLED AND BURLAPPED OR 2 THROUGH FIVE GALLON CONTAINER.
 - 24 OUNCES PER TREE UNDER 2" CALIPER ENCLOSES MULTI-STEMMED AND EVERGREEN TREES UNDER 6'
 - 32 OUNCES PER TREE OVER 2" CALIPER ENCLOSES MULTI-STEMMED AND EVERGREEN TREES OVER 6' IN HEIGHT
- THE FERTILIZER SHALL BE APPLIED AS A SURFACE APPLICATION, SPREAD EVENLY OVER TOP OF THE ROOT BALL AND PLANT PIT SOIL PRIOR TO MULCHING.
- FERTILIZER SHALL NOT BE MIXED WITH THE SOIL MIXTURE.

APPROVED MULCHES

TYPE	DEPTH
DOUBLE SHREDDED HARDWOOD BARK	3"

SPECIFICATION
REFERENCE

805
244

FERTILIZER AND MULCH

VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT

ROAD AND BRIDGE STANDARDS

REVISION DATE

SHEET 1 OF 1

120107

VIRGINIA DEPARTMENT OF TRANSPORTATION

LOCATION AND DESIGN DIVISION

INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: STORMWATER MANAGEMENT EROSION AND SEDIMENT CONTROL PROGRAM	NUMBER: IIM-LD-11.28
SPECIFIC SUBJECT: PROGRAM ADMINISTRATION AND MINIMUM REQUIREMENTS FOR THE DEVELOPMENT AND IMPLEMENTATION OF EROSION AND SEDIMENT CONTROL AND POST CONSTRUCTION STORMWATER MANAGEMENT PLANS	DATE: JULY 22, 2013
	SUPERSEDES: IIM-LD-11.27
APPROVAL: <div style="text-align: right;">B. A. Thrasher, P.E. State Location and Design Engineer Approved July 22, 2013</div>	

Changes are shaded.

CURRENT REVISION

- This memorandum has been revised in accordance with recommendations from the Virginia Department of Conservation and Recreation's annual review. On sheet 7, paragraph 4.2, the reference to a "Tributary Strategy Plan" has been deleted. On sheet 9, paragraph 5.1, "steep slopes" has been added; "silt traps" have been deleted.
- References to the Department of Conservation and Recreation (DCR) have been changed to the Department of Environmental Quality (DEQ).

EFFECTIVE DATE

- This memorandum is effective upon receipt.

BACKGROUND

- Program administration details and instructions on the development of erosion and sediment control plans for Standard, Minimum, No Plan, SAAP, Capital Outlay and State Force Construction/Maintenance Projects are contained in this IIM.

- Instructions pertaining to the design criteria and procedures for incorporating erosion and sediment control features into an erosion and sediment control plan and an example of an erosion and sediment control plan for a "No Plan" project are contained in Appendix 10B-1 and 10C-1 in Chapter 10 of the latest version of the VDOT Drainage Manual.

ACRONYMS

- The following acronyms are used within this document:
 - ACE – Area Construction Engineer
 - CA – Contract Administrator
 - CEP – Concurrent Engineering Process
 - DEQ – Department of Environmental Quality
 - DCR – Department of Conservation and Recreation
 - EPA – Environmental Protection Agency
 - ESC – Erosion and Sediment Control
 - ESCCC – Erosion and Sediment Control Contractor Certification
 - FI – Field Inspection
 - HDA – Hydraulic Design Advisory
 - IIM – Informational and Instructional Memorandum
 - PFI – Preliminary Field Inspection
 - PM – Project Manager
 - RA – Residency Administrator
 - R&B – Road and Bridge
 - RLD – Responsible Land Disturber
 - RLDA – Regulated Land Disturbance Activity
 - SLS – Straight Line Sketch
 - SWM – Stormwater Management
 - SWPPP – Stormwater Pollution Prevention Plan
 - TMDL – Total Maximum Daily Load
 - VDOT – Virginia Department of Transportation
 - VSMP – Virginia Stormwater Management Program
 - VTCA – Virginia Transportation Construction Alliance

1.0 PROGRAM ADMINISTRATION

- 1.1 VDOT receives an annual approval of its ESC Standards and Specifications from DEQ. By its annual approval of VDOT's ESC Standards and Specifications, DEQ authorizes VDOT to administer its ESC Program in accordance with the Approved ESC Standards and Specifications, on all regulated land disturbance activities undertaken by the Department.

- 1.2 VDOT's Approved ESC Standards and Specifications shall apply to all plan design, construction and maintenance activities undertaken by VDOT, either by its internal workforce or contracted to external entities, where such activities are regulated by the Virginia ESC Law and Regulations. During any inspections of VDOT land disturbing activities by **DEQ**, EPA and other such environmental agencies, compliance with the VDOT's Approved ESC Standards and Specifications (and all parts thereof) will be expected. A standard, specification or product not contained or referenced in VDOT's Approved ESC Standards and Specifications can not be used unless it is submitted to and approved by **DEQ** either as a revision to the Approved ESC Standards and Specifications or a project specific variance.
- 1.3 Statewide use of standards, specifications or products not contained in VDOT's **DEQ** Approved ESC Standards and Specifications will require a revision to the Approved ESC Standards and Specifications. Any revisions to the Approved ESC Standards and Specifications shall be reviewed and approved by **DEQ** prior to implementation by VDOT. Such review and approval shall be coordinated by the VDOT State Stormwater Program Administrator in the VDOT Central Office with the **DEQ** Regulatory Programs Manager in the **DEQ** Central Office Stormwater Management Division.
- 1.4 Where determined necessary to meet an individual project need, VDOT may request **DEQ** to grant a project specific variance to the Approved ESC Standards and Specifications.
 - 1.4.1 All requests for project specific variances for those projects being designed in a VDOT District Office shall be coordinated by the District Hydraulics Engineer with the appropriate **DEQ** Regional Office staff. All variance requests shall be accompanied by complete details and documentation, including justification for the requested variance. Copies of any variance requests, approvals and related correspondence are to be sent to the **DEQ** Regulatory Programs Manager in the **DEQ** Central Office Stormwater Management Division and the VDOT State Stormwater Program Administrator in the VDOT Central Office. If the VDOT District Office and the **DEQ** Regional Office can not come to agreement on a specific request, or if additional review is necessary, the assistance of the **DEQ** or VDOT Central Office can be requested.
 - 1.4.2 All requests for project specific variances for those projects being designed in the VDOT Central Office shall be coordinated by the VDOT State Hydraulics Engineer with the **DEQ** Regulatory Programs Manager. All variance requests shall be accompanied by complete details and documentation, including justification for the requested variance. Copies of any variance requests, approvals and related correspondence are to be sent to the VDOT State Stormwater Program Administrator.
 - 1.4.3 All requested variances are to be considered unapproved until written approval from **DEQ** is received.
 - 1.4.4 All approved variances shall be listed in Note 1 in Section II of the SWPPP General Information Sheets in the construction plans (or other such documents) for the land disturbing activity (see latest version of IIM-LD-246).

- 1.4.5 All documentation for and approval of requested variances shall be retained in the appropriate (i.e. design, construction, etc.) files of the proposed activity.
- 1.4.6 The VDOT State Stormwater Programs Administrator shall maintain a file of all requested and approved variances.
- 1.5 Non linear projects, such as those administered by the VDOT's Capital Outlay Program, are encouraged to utilize VDOT's Approved ESC Standards and Specifications in the development of the ESC Plan for such projects. Where deemed impractical to use VDOT's Approved ESC Standards and Specifications and when approved by the VDOT State Stormwater Program Administrator, **DEQ's** ESC Standards and Specifications, as outlined in the Virginia Erosion and Sediment Control Regulations and Handbook, may be utilized in combination with VDOT's Approved ESC Standards and Specifications to develop ESC Plans for non linear projects. Such projects include, but are not limited to, new and/or additions/modifications to Rest Areas, District or Residency Office complexes, Area Maintenance Headquarters/Repair Shops and buildings on the right of way or associated with bridges/piers/tunnels, spreader/tailgate/wash rack sites, holding ponds or containment pads, fuel dispensing facilities, security facilities and drainage improvements to building/parking sites and structures.

2.0 **DEQ** CERTIFICATIONS

- 2.1 The Virginia ESC Law and Regulations require that the ESC Program administration and the ESC Plan design, implementation and inspection activities be conducted by **DEQ** certified personnel for all Regulated Land Disturbance Activities.
- 2.2 VDOT's ESC Program will be administrated by a **DEQ** Certified Program Administrator.
 - 2.2.1 The Program Administrator shall be the person within the Department who has been designated to have overall responsibility for administration of VDOT's ESC Program.
 - 2.2.2 The **DEQ** Program Administrator Certification is acquired by satisfying the **DEQ** eligibility/training requirements and passing the **DEQ** Program Administrator Exam or by possessing a **DEQ** Combined Administrator Certification.
 - 2.2.3 The State Stormwater Program Administrator in the Central Office Location and Design Division is currently designated as VDOT's ESC Program Administrator.
- 2.3 The Virginia ESC Regulations require that each RLDA be overseen by a **DEQ** certified RLD.
 - 2.3.1 The **DEQ** RLD Certification is required for the VDOT person who has general oversight of the construction phase of a specific RLDA.

- 2.3.2 The RLD for a specific RLDA must be identified prior to beginning any land disturbance activity (see note 5 in Section I of the SWPPP General Information Sheets referenced in the latest version of IIM-LD-246).
- 2.3.3 The **DEQ** RLD Certification is acquired by passing the **DEQ** RLD Exam or by possessing a **DEQ** Combined Administrator, Program Administrator, Plan Reviewer or Inspector Certification or by possessing a Professional Engineer, Land Surveyor, Landscape Architect or Architect License pursuant to Chapter 4, Title 54.1, of the Code of Virginia.
- 2.4 The proposed ESC Plan for each RLDA must be reviewed and approved by a **DEQ** Certified ESC Plan Reviewer to ensure that the ESC Plan has been developed in accordance with VDOT's Approved ESC Standards and Specifications or variances authorized thereto.
- 2.4.1 The **DEQ** Plan Reviewer Certification is required for any person that has responsibility for reviewing and approving the proposed erosion and sediment control plan for a specific RLDA.
- 2.4.2 The Certified Plan Reviewer shall be a VDOT employee, or an employee of an engineering consulting firm under contract to VDOT, who has expertise in drainage design and erosion and sediment control design.
- 2.4.3 The **DEQ** Plan Reviewer Certification is acquired by satisfying the **DEQ** eligibility/training requirements and passing the **DEQ** Plan Reviewer Exam or by possessing a **DEQ** Combined Administrator Certification or by possessing a Professional Engineer, Land Surveyor, Landscape Architect or Architect License pursuant to Chapter 4, Title 54.1, of the Code of Virginia.
- 2.5 A **DEQ** ESC Inspector Certification is required for those persons having responsibility for ensuring the proper implementation of, or compliance with, the proposed ESC Plan and VDOT's Approved ESC Standards and Specifications, or variances authorized thereto, throughout the construction phase of the RLDA. The ESC Law and Regulations also require that inspections of ESC facilities be conducted by a **DEQ** certified ESC Inspector.
- 2.5.1 The Certified Inspector shall be a VDOT employee or an employee of an engineering consulting firm under contract to VDOT and who is so identified on the SWPPP Certification form LD-445E (see latest version of IIM-LD-246).
- 2.5.2 The **DEQ** Inspector Certification is acquired by satisfying the **DEQ** eligibility/training requirements and passing the **DEQ** Inspector Certification Exam or by possessing a **DEQ** Combined Administrator Certification.
- 2.6 It shall be the responsibility of the Project Authority to ensure that those staff with the appropriate **DEQ** Certifications (RLD, Plan Reviewer or Inspector) perform the functions required by the ESC Law and Regulations and noted in Sections 2.3 through 2.5 of this document.

- 2.6.1 For the purposes of this document, the Project Authority is defined as that person with overall responsibility of a land disturbing activity or a specific phase of a land disturbing activity.
- 2.6.2 The Project Authority for preconstruction (design) activities is typically the PM, Residency CA, RA or other such person responsible for the preconstruction phase of the land disturbing activity. This person shall ensure that the proposed ESC Plan has been reviewed and approved by a **DEC** Certified Plan Reviewer.
- 2.6.3 The Project Authority for actual land disturbance (construction) activities is typically the ACE, RA or other such person responsible for the construction phase of the land disturbing activity. This person shall ensure that the RLDA has an assigned **DEC** Certified RLD and that the implementation of the ESC Plan, including inspection requirements, is being overseen/conducted by a **DEC** Certified Inspector.

3.0 VDOT TRAINING/CERTIFICATIONS

- 3.1 Where land disturbing activities occurring within VDOT right of way are regulated under the Virginia ESC Law and Regulations, Section 107.16(a) of the 2007 VDOT R&B Specifications requires that all contractors performing such land disturbing activities have a person certified by the VDOT in erosion and sediment control within the project limits. This certification requirement is mandatory for all contractors performing land disturbing activities under contracts managed by VDOT, including PPTA and Design Build agreements. For contractors performing land disturbing activities on VDOT right of way under a Land Use Permit, the certification requirements of Section 107.16(a) shall apply if the area of land disturbance within the VDOT right of way exceeds that noted in Sections 4.3 and 4.4 of this document.

EXCEPTION – Those contractors performing maintenance related land disturbing activities under a hired equipment contract whose work is directly supervised by VDOT personnel.

- 3.1.1 Successful completion of the Department's "Erosion and Sediment Control Contractor Certification" course satisfies the certification requirements of Section 107.16 (a) of the 2007 VDOT R&B Specifications.
- 3.1.2 The ESCCC is a joint training effort between the VDOT and the VTCA. The VDOT develops the course material and the VTCA administers the training, testing and issuance of certifications.
- 3.2 The VDOT "In Stream Maintenance Training" course is required training for all VDOT personnel performing or supervising maintenance activities, where such activities are regulated under the Virginia ESC Law and Regulations.

- 3.2.1 The "In Stream Maintenance Training" course is developed and administered by the VDOT's Central Office Environmental Division.
- 3.2.2 The "In Stream Maintenance Training" course consists of several modules that are targeted toward best management practices for working in and around streams and other environmentally sensitive areas and controlling erosion and sedimentation associated with land disturbance on maintenance activities.
- 3.2.3 The "In Stream Maintenance Training" course is designed to be conducted at the local level (i.e., Residency, Area Maintenance Headquarters, etc.) by the Residency Environmental Specialist or other such person. The modules can be taught individually in short group meetings or several modules can be combined and taught at a more formal training session. A web based training option is available in the VDOT University Virtual Campus.

4.0 POLICY/GENERAL GUIDELINES

- 4.1 Requirements of the Virginia ESC Regulations and the VDOT ESC Standards and Specifications, as approved by the **DEC** and described herein, shall be incorporated into all erosion and sediment control designs and shall be enforced on all Regulated Land Disturbance Activities managed by VDOT.
- 4.2 When requested by **DEC**, and where deemed practical by VDOT, projects located in jurisdictions with more stringent ESC technical criteria than that contained in the Virginia ESC Law and Regulations shall be designed to meet the more stringent criteria. The local criteria may be part of a locally adopted State approved program or may be part of a watershed initiative related to the protection of a water supply, a TMDL implementation plan. It will be the responsibility of the ESC Plan Designer to demonstrate, through appropriate analysis and documentation, that the local requirements are not practical for the project under consideration. Early coordination should occur between the ESC Plan Designer and the local ESC program authority in order to identify any such requirements.
- 4.3 Any maintenance or construction activity disturbing 2,500 square feet (232 m²) or greater within the area of Tidewater, Virginia, as defined in the Virginia Chesapeake Bay Preservation Act, must have a project specific ESC Plan developed and implemented in accordance with the VDOT's Approved ESC Standards and Specifications. Tidewater, Virginia is defined as the Counties of Accomack, Arlington, Caroline, Charles City, Chesterfield, Essex, Fairfax, Gloucester, Hanover, Henrico, Isle of Wight, James City, King George, King and Queen, King William, Lancaster, Matthews, Middlesex, New Kent, Northampton, Northumberland, Prince George, Prince William, Richmond, Spotsylvania, Stafford, Surry, Westmoreland and York and the Cities of Alexandria, Chesapeake, Colonial Heights, Fairfax, Falls

Church, Fredericksburg, Hampton, Hopewell, Newport News, Norfolk, Petersburg, Poquoson, Portsmouth, Richmond, Suffolk, Virginia Beach and Williamsburg.

- 4.4 Any maintenance or construction activity disturbing 10,000 square feet (929 m²) or greater in areas other than those within Tidewater, Virginia (as defined in Section 4.3 of this document) must have a project specific ESC Plan developed and implemented in accordance with VDOT's Approved ESC Standards and Specifications.
- 4.5 The Virginia ESC Law defines land disturbance as any land change which may result in soil erosion from water or wind and the movement of sediments into state waters or onto lands of the Commonwealth, including, but not limited to, clearing, grading, excavating, transporting and filling of land.
- 4.6 The blading/dragging/grading associated with the maintenance of the travel surface of an unpaved roadway is considered a land disturbance.
- 4.7 VDOT shall be responsible for ensuring compliance with its approved ESC Standards and Specifications by private entities (i.e., agents, contractors, subcontractors, consultants) conducting regulated land disturbance activities on projects managed by VDOT, including those constructed under the Public/Private Transportation Act (PPTA), the Design/Build process and the Capital Outlay Program.
- 4.8 When not included in the proposed ESC Plan for the RLDA, the contractor must provide an ESC Plan in accordance with Section 106 of the 2007 VDOT R&B Specifications for borrow pit sites and disposal area sites utilized exclusively to obtain or dispose of project materials. Any such ESC Plan provided by the contractor must comply with VDOT's Approved ESC Standards and Specifications. Where required, the contractor must design, construct and maintain sediment traps and/or basins at these sites. The contractor shall supply supporting calculations for sediment trap and/or basin design and calculations demonstrating compliance with the Virginia ESC Regulation MS-19 for an adequate receiving channel. All information provided by the contractor should be reviewed by the District Hydraulics Engineer or other appropriate VDOT personnel to ensure accuracy, the use of appropriate methodology and compliance with VDOT's Approved ESC Standards and Specifications, Virginia ESC Law and Regulations, and VSMP Construction Permit Conditions (where applicable).

5.0 MINIMUM REQUIREMENTS FOR ALL EROSION AND SEDIMENT CONTROL PLANS

- 5.1 The ESC Plan shall include a plan view depicting (using appropriate plan symbols and notes) locations where specific measures are needed in order to control erosion

and sediment deposition within the RLDA limits. Specific erosion and sediment control measures include, but are not limited to, protective linings for ditches and steep slopes, pipe outlet protection, filter barrier, silt fence, check dams, sediment traps, sediment basins, diversion berms and ditches, etc. The ESC Plan should be based on the existing field conditions at the time of design, the anticipated sequence of construction, and the site conditions expected as the RLDA is brought to final grade.

5.2 Erosion and Sediment Control Plan Information:

General information related to the ESC Plan is to be documented utilizing the notes in Section I, II and III of the SWPPP General Information Sheets (see the latest version of IIM-LD-246). Information required to complete the SWPPP notes will be developed by the ESC Plan Designer with assistance from District Hydraulics or Residency staff as needed.

5.3 Sequence of Construction

The proposed ESC Plan shall be developed in conjunction with the proposed Sequence of Construction Plan and should denote the required erosion and sediment controls for the intended sequence of major construction activities. In planning the sequence of construction, consideration should be given to elimination or minimization of the need for major erosion and sediment control facilities, such as sediment basins, by strategic planning of the construction timing and location of erosion and sediment control measures, grading operations, temporary and permanent channels and drainage facilities. Any changes to the proposed sequence of construction plan that could potentially cause a significant change to the proposed ESC or related Drainage Plan shall be submitted to the ESC Plan Designer/Hydraulics Engineer for evaluation of impacts.

5.4 Contents of ESC Plan

Details of the RLDA'S ESC Plan may be shown on, but is not limited to, the plan, profile, typical section and detail sheets of the construction plan set or other such documents. The ESC Plan shall, at a minimum, contain the following information:

5.4.1 Section I, II and III notes of the SWPPP General Information Sheets (see latest version of IIM-LD-246).

5.4.2 Limits of clearing and grading (plan view and typical section).

5.4.3 Location of temporary and permanent erosion and sediment control and related permanent stormwater management features (plan view).

5.4.4 Construction details for any temporary or permanent erosion and sediment control or related permanent stormwater management features if different from the VDOT R&B Standards and Specifications.

5.4.5 Location of any surface waters, wetland features, or other environmentally sensitive/critical areas within or immediately adjacent to the RLDA area. (Such features located within close proximity of the project, yet outside the limits of the construction plans or other such documents, shall be described in Note 6 in Section I of the SWPPP General Information Sheets (see latest version of IIM-LD-246).

5.4.6 Appropriate existing and proposed topographic features.

6.0 PLAN DEVELOPMENT PROCESS

6.1 Concurrent Engineering Process for Plan Development

The CEP for plan development incorporates the principles of teamwork, flexibility, and milestones. The development, review, and approval of the project specific erosion and sediment control plan is included in the CEP milestones as follows:

6.1.1 Scoping Stage

The ESC Plan Designer/Hydraulics Engineer shall identify any local ESC or related SWM technical criteria or watershed initiatives that may influence the ESC or related post construction SWM design of the project. This should include early coordination with the local ESC/SWM program authority to assess any potential impacts on the project design.

6.1.2 PFI/Public Hearing Stage

The ESC Plan Designer/Hydraulics Engineer shall develop preliminary ESC and associated post construction SWM Plans (see the latest version of IIM-LD-195 for information on the technical criteria and requirements for permanent SWM facilities) and show locations of all major erosion and sediment control, permanent stormwater management, and/or drainage facilities on the plans that may affect the required right of way. Members of the project team shall provide comments, as appropriate, to the ESC Plan Designer/Hydraulics Engineer regarding the preliminary plan, including any pertinent information that might affect the final design of the ESC or post construction SWM Plan.

6.1.3 FI Stage

Prior to the FI, the ESC Plan Designer/Hydraulics Engineer shall develop final ESC and associated post construction SWM plans and show final design locations, sizes, and other plan details as necessary to accurately determine the right-of-way and/or easement requirements, and to determine whether the selected ESC Plan Concept (see Section 6.5 of this document) is appropriate. The ESC and related post construction SWM Plan design shall address any comments or recommendations from the Public Hearing process as accepted/incorporated by the Project Manager (or other such project

authority). This phase of the ESC and related post construction SWM Plan design process provides all the necessary information needed to conduct a thorough Field Inspection. Members of the project team shall provide comments, as appropriate, to the ESC Plan Designer/Hydraulics Engineer regarding the proposed ESC and post construction SWM Plan.

6.1.4 ESC Plan Design Completion

After FI and prior to the Right of Way stage, the ESC Plan Designer/Hydraulics Engineer shall incorporate all changes, deletions, and/or additions into the ESC and related post construction SWM Plan resulting from any FI and/or Quality Control Review comments or plan revisions. The ESC and post construction SWM Plan shall be carefully reviewed for compliance with the approved VDOT ESC and SWM Standards and Specifications and the VSMP Construction Permit (where applicable) including, but not limited to, the types of proposed measures, means of access for maintenance, and required right of way and/or easements.

6.1.5 ESC & SWM Plan Design Certification

Prior to the Pre-Advertisement Conference (or similar project meeting), the ESC Plan Designer/Hydraulics Engineer shall have the ESC and related post construction SWM Plan reviewed by a **DEC** Certified ESC Plan Reviewer. The ESC Plan Reviewer shall verify that the ESC and related post construction SWM Plan for the project is in compliance with the VDOT Approved ESC and SWM Standards and Specifications. Any comments by the Plan Reviewer shall be addressed with the ESC Plan Designer/Hydraulics Engineer. Once all comments have been reconciled, the ESC Plan Reviewer completes, signs and forwards the ESC & SWM Plan Design Certification Form (LD-445C) to the ESC Plan Designer/Hydraulics Engineer. The ESC Plan Designer/Hydraulics Engineer provides the completed LD-445C form to the Project Manager (or other such project authority) for use in the VSMP Construction Permit Application Process (see the latest version of IIM-LD-242), if applicable. A copy of the completed LD-445C form is to be retained with the other documentation for the proposed ESC Plan.

6.2 Plan Development Process for "No Plan" Projects and Special Advertisement and Award Process (SAAP) Projects

- 6.2.1** A "No Plan" project is defined as an assembly of letter size sketches and narratives depicting the project's location, typical cross section, estimated quantities and any other specific details necessary (i.e., ESC and/or post construction SWM plans) for the construction of the project. Any "No Plan" project that disturbs 2,500 square feet (232 m²) or greater in Tidewater, Virginia or 10,000 square feet (929 m²) or greater elsewhere within the State must have a project specific ESC Plan. A project developed under the "No Plan" concept is one that generally requires little or no survey, engineering or hydraulic analysis in order to produce the necessary contract documents. Any required right of way is generally acquired through donations in lieu of the purchase/condemnation process. See Appendix A of the *VDOT Road Design Manual* for additional information on the "No Plan" concept.

6.2.2 "SAAP" Projects are defined as those advertised under the Special Advertisement and Award Process. The "No Plan" concept is generally used to produce the required contract documents. "SAAP" projects generally have one or more of the following characteristics:

- They require little or no preliminary engineering.
- They are standard maintenance repair contracts (e.g., bridge, guardrail or concrete pavement repairs).
- They are standard incidental construction and/or improvement projects of limited scope.
- The work being performed involves a singular function or specialty work (e.g., bridge painting, pavement markings or pipe installation).

Any "SAAP" project that disturbs 2,500 square feet (232 m²) or greater in Tidewater, Virginia or 10,000 square feet (929 m²) or greater elsewhere within the State must have a project specific ESC Plan.

6.2.3 During the early stages of the preparation of the contract assembly for any "SAAP" or "No Plan" Project, the Contract Administrator (CA) (or other such project authority) should conduct a Scoping Meeting to determine what is needed on the project in order to comply with the VDOT Approved ESC and SWM Standards and Specifications. This should include filling out form LD-439 to the extent possible.

The Scoping Meeting should include the CA, the District L&D Engineer and/or Hydraulics Engineer, and the appropriate District Environmental Section personnel in order to accurately determine the project requirements.

6.2.4 The CA, with the assistance of the District Hydraulics Engineer, or other appropriately qualified personnel, shall prepare a preliminary Straight Line Sketch (SLS) in accordance with the instructions on Form LD-438.

6.2.5 Upon completion of the Preliminary SLS, the CA shall coordinate with the appropriate personnel in the District Hydraulics Section and other appropriate District/Residency sections to schedule a Field Review. The following data should be made available to all Field Review participants:

- A completed form LD-439.
- A Vicinity Map – United States Geological Survey (USGS) Topographical Map and County Road Map showing the location and limits of the proposed project.
- A SLS of the project prepared in accordance with the instructions on form LD-438, showing the project limits and the approximate location of proposed drainage items and erosion and sediment control items.

6.2.6 If during the Field Review it is found that such items as permanent stormwater management facilities, drainage improvements, temporary sediment basins or temporary sediment traps are required, the District Hydraulics Section will determine and request the necessary survey data, and provide engineering support in the development of the SLS to ensure consistency with the VDOT Approved ESC and SWM Standards and Specifications.

6.2.7 Upon completion of the design of any required permanent stormwater management facilities, drainage improvements, or sediment trapping facilities, the District Hydraulics Section will provide the CA with final comments, recommendations and plan details.

6.2.8 Final approval of the SLS:

- Upon incorporation of all the required revisions, a **DEC** Certified ESC Plan Reviewer shall make a final review of the ESC and post construction SWM Plan (if applicable). Once any Plan Reviewer comments have been reconciled with the ESC Plan Designer/Hydraulics Engineer, the Plan Reviewer shall complete and sign the LD-445C Erosion and Sediment Control and Stormwater Management Certification form and forward it to the CA for use in the VSMP Construction Permit Application Process (see the latest version of IIM-LD-242), if applicable. A copy of the completed LD-445C form is to be retained with the other documentation for the proposed ESC Plan.
- The CA will incorporate the final SLS into the contract assembly.
- Thereafter, any significant change to the project that may impact the ESC, post construction SWM, or Drainage Plan will require resubmission of the revised SLS to the ESC Plan Designer and/or District Hydraulics Engineer for review and approval prior to implementation.

6.2.9 The final version of the SLS, the SWPPP General Information Sheets (See latest version of IIM-LD-246) and any Construction Notes will serve as the ESC and post construction SWM Plan for the project. During the construction phase of the project, a copy of the ESC and post construction SWM Plan (Record Set) and all other SWPPP documents shall be kept on the project site and in the project file at the appropriate District/Residency Office as documentation that all policies and procedures have been addressed with regards to the post construction SWM, ESC and SWPPP requirements of the project. During construction, any authorized changes to the proposed ESC Plan necessitated by unforeseen conditions or other circumstances shall be documented on the Record Set in accordance with Section 107.16(e) of the 2007 VDOT R&B Specifications.

6.3 Plan Development Process for State Force Construction Projects

- 6.3.1 State Force Construction Projects include land-disturbing activities that are performed with state force equipment and/or hired equipment.
- 6.3.2 Residency personnel are to contact the Residency Environmental Specialist and/or the District Hydraulics Engineer to review any State Force Construction Projects to determine if the proposed work is of a magnitude that may require drainage improvements, an ESC Plan, a post construction SWM Plan, and/or a SWPPP. If it is determined that any of these items are needed, the same procedures outlined in Section 6.2 of this document shall be followed.
- 6.4 Plan Development Process for Minimum Plan and Standard Plan Construction Projects
 - 6.4.1 Minimum Plan projects are those that require a limited amount of survey information in order to perform the necessary engineering studies and to provide the information required to secure the necessary rights of way. The minimum amounts of detail needed to address environmental requirements and to construct the project are provided in a standard plan assembly format. See Appendix A of the *VDOT Road Design Manual* for additional information on the Minimum Plan concept.
 - 6.4.2 Standard Plan Projects are those that require complete survey information in order to perform the necessary detailed engineering studies and to develop a complete and detailed construction plan assembly.
 - 6.4.3 Projects developed under the Minimum and Standard Plan concepts must have an ESC plan and a SWPPP (see the latest version of IIM-LD-246) if they exceed the land disturbance threshold amounts noted in Sections 4.3 and 4.4 of this document. In addition, such projects may also require a post construction SWM Plan (see the latest version of IIM-LD-195 for applicability and technical criteria and requirements). These plan assemblies should be developed consistent with the steps identified under the Concurrent Engineering Plan Development process described in Section 6.3 of this document.
- 6.5 The ESC Plan shall be developed utilizing either a single phase or a multiple phase concept. The decision as to which concept to use in the development of the ESC Plan for each specific RLDA shall be determined by the ESC Plan Designer/Hydraulics Engineer and the Project Manager (or other such project authority) during the initial stages of plan development.
 - 6.5.1 Single Phase ESC Plan Concept
 - 6.5.1.1 The Single Phase ESC Plan concept may be used on minor construction projects where all of the erosion and sediment control measures can be clearly depicted on the construction plan sheet (e.g., rural secondary project, minor urban widening project, bridge and approach project, etc.)

6.5.1.2 The ESC Plan shall address both those items requiring installation prior to the beginning of grubbing operations or the installation of major drainage structures and those items to be installed as grading operations and installation of minor drainage facilities progress. The ESC Plan shall contain or be accompanied by, at a minimum, all those items identified in Section 5.4 of this document (Contents of an ESC Plan).

6.5.1.3 In addition to standard plan symbols, supplemental notes/narratives may be used to clearly define the intent and purpose of the proposed erosion and sediment control measures and to define their sequence of installation. Some standard construction notes and symbols have been developed and are included as a part of the VDOT CADD Cell and Custom Line Style Library and the Geopak Road Plan View Labeler.

6.5.2 Multiple Phase ESC Plan Concept

6.5.2.1 The Multiple Phase ESC Plan concept shall be used on construction projects where additional plan sheet(s) are needed in order to clearly depict the erosion and sediment control measures required at the various stages of construction (e.g., rural multi-lane roadway projects, major urban roadway projects, roadway projects on new locations, roadway projects through environmentally sensitive areas, etc.).

6.5.2.2 In addition to standard plan symbols, supplemental notes/narratives may be used to clearly define the intent and purpose of the proposed erosion and sediment control measures and to define their installation sequencing. Some standard construction notes and symbols have been developed and are included as a part of the VDOT CADD Cell and Custom Line Style Library and the Geopak Road Plan View Labeler.

6.5.2.3 Projects may be developed using the Multiple Phase concept on only those portions of the project that require greater detail and clarity than that provided by the Single Phase concept (e.g., construction in environmentally sensitive areas or major waterway areas, areas where plan clutter reduces the ability to clearly show the erosion and sediment control items, and where grading operations are required prior to installation of major temporary ESC measures or permanent drainage improvements).

6.5.2.4 At a minimum, the multiple phase ESC Plan should be developed in two phases:

- Phase I for those items that need to be installed prior to the beginning of grubbing operations or the installation of major drainage structures.

- Phase II for those items that need to be installed as grading operations and installation of minor drainage facilities progress.

6.5.2.5 Projects with complex grading operations and/or sequence of construction plans may warrant additional ESC Plan Phases to clearly identify all required ESC items.

6.5.2.6 Generally, the Phase I and the Phase II plan details (including associated narratives or notes) should each be depicted on a separate plan sheet following the applicable construction plan sheet (e.g., Construction Plan Sheet 5, Profile Sheet 5A, ESC Phase I Plan Sheet 5B, ESC Phase II Plan Sheet 5C).

6.5.2.7 When found appropriate, the Phase I and Phase II plan details may be depicted on a single plan sheet following the applicable construction plan sheet (e.g., Construction Plan Sheet 5, Profile Sheet 5A, ESC Phase I & II Plan Sheet 5B).

6.5.2.8 In general, when utilizing a separate plan sheet for the Phase I and the Phase II plan details, erosion and sediment control items (including protective linings in permanent ditches and channel relocations) depicted on the Phase I Plan Sheet should not be duplicated on the Phase II Plan Sheet. Temporary erosion and sediment control items depicted on the Phase I & II Plan Sheets should not be duplicated on the Construction Plan Sheet. Permanent drainage improvements identified for completion in Phase I, such as culverts, channels, etc, should also be shown on the Phase II plan.

6.5.2.9 The ESC Phase I Plan Sheet shall, at a minimum, depict the following:

- Existing contours and appropriate existing hydraulic and topographic features as referenced in the Survey File.
- Proposed centerline, edges of pavement and construction limits.
- Permanent drainage culverts, temporary diversion channels and permanent channel relocations (including any protective linings required) involving natural drainage ways that would be constructed or installed prior to the start of grading operations.
- Temporary Sediment Basins (including grading contours, if applicable) that are to be constructed in the initial phases of the grading operations.
- Permanent stormwater management basins (including grading contours, if applicable) that will be utilized as temporary sediment basins and that are to be constructed in the initial phases of the grading operations.
- Diversion dikes, berm ditches and other perimeter ditches (including any required protective linings) that need to be installed prior to the start of grubbing or other earth moving operations.

- Temporary sediment traps, filter barriers, silt fences, rock check dams, turbidity curtains and any other perimeter controls that need to be installed prior to the start of grubbing or other earth moving operations.
- Any necessary construction notes/narratives (to include the need/location for items not typically shown on the plan view such as temporary slope drains, construction entrances, etc.).

6.5.2.10 The Phase II Plan Sheet shall, at a minimum, depict the following:

- Proposed centerline, edges of pavement and construction limits.
- Any permanent drainage culverts and channel relocations involving natural drainage ways installed under the Phase I Plan.
- Temporary sediment basins and permanent stormwater management basins installed under the Phase I Plan.
- All culverts, storm sewer pipe, drop inlets and associated drainage structures that will be installed as grading operations progress.
- All required protective ditch linings (e.g., Standard EC-2 or EC-3, concrete, riprap, etc.), paved flumes and associated structures that will be installed as grading operations progress.
- Temporary sediment traps, filter barriers, silt fences, rock check dams, drop inlet silt traps, and any other erosion and sediment control measures needed to be installed as grading operations progress.
- Any necessary construction notes/narratives (to include the need/location for items not typically shown on the plan view such as temporary slope drains, construction entrances, etc.).

6.5.2.11 The following drainage items from the Phase I and II Plan Sheets shall be depicted on the Construction Plan Sheet:

- Permanent drainage culverts, storm sewer systems, drop inlets and associated structures.
- Permanent channel relocations involving natural waterways.
- Permanent stormwater management facilities.
- Rock checkdams that will be left in place after construction to serve as a permanent stormwater management structure.

7.0 COMPUTATIONS

- 7.1 All computations to support the ESC and related post construction SWM Plan, and the drainage design plan, including the drainage area map, shall be developed in accordance with the instructions contained in the VDOT Drainage Manual, Hydraulic

Design Advisories, related Informational and Instructional Memoranda, and Drainage Design Memoranda, and shall be made part of the project file and the SWPPP for the land disturbance activity.

8.0 FIELD REVISIONS AND EVALUATIONS

- 8.1 The ESC Plan must be fully and effectively implemented throughout the entire construction phase of the project.
- 8.2 During the construction phase of the project, the Project Engineer the Project ESC Inspector, and the contractor shall continuously evaluate the project for areas that may require the deletion/addition/modification of the proposed erosion and sediment control measures/plan in order for the project to remain in compliance with the approved VDOT ESC Standards and Specifications, the Virginia ESC Law and Regulations, and the VSMP Construction Permit conditions (where applicable). Changes in the proposed ESC Plan may be needed due to unforeseen site conditions, contractor scheduling, changes in the proposed sequence of construction or other factors unknown at the time of the development of the proposed ESC Plan.
 - 8.2.1 Minor changes to the proposed ESC Plan (e.g., deletion/addition/modification to non-engineered items such as filter barrier, silt fence, check dams, inlet protection, etc.) may be approved/authorized by the VDOT **DEC** Certified Inspector and/or the designated RLD for the activity.
 - 8.2.2 When changes to the proposed ESC Plan require detailed hydrologic/hydraulic engineering analysis/calculations (e.g., deletion/addition/modification to engineered items such as sediment traps, sediment basins, etc.), the Project Engineer and/or the Project ESC Inspector shall coordinate a site inspection with the District Hydraulics Engineer and/or the ESC Plan Designer/Hydraulics Engineer. The site inspection should be used to assemble detailed notes, sketches, and photographs to formally document the need for ESC Plan changes. The ESC Plan Designer and/or Hydraulics Engineer will provide the appropriate engineering analysis to document the required changes and to ensure the ESC Plan's continued compliance with the approved VDOT ESC Standards and Specifications, Virginia ESC Law and Regulations, and VSMP Construction Permit conditions (where applicable).
 - 8.2.3 Any authorized changes to the proposed ESC Plan must be noted on a designated plan set (Record Set) which shall be retained on the project site and made available upon request (see Section 107.16(e) of the 2007 VDOT R&B Specifications).

- 8.3 During the construction phase of the project, the Project Engineer and/or the Project ESC Inspector will periodically, upon request, provide the ESC Plan Designer and/or Hydraulics Engineer with a detailed evaluation report that notes the success or failure of the proposed erosion and sediment control measures depicted in the construction plans (or other such documents) and/or the implementation of different measures as a result of new technologies/products. The VDOT Stormwater Program Administrator is to be provided a copy of all such reports.
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9.0 MAINTENANCE

- 9.1 Maintenance of the erosion and sediment control items must be continually provided during the duration of the land disturbance activity.
- 9.2 The inspection and maintenance of all temporary and permanent erosion and sediment controls shall be conducted in accordance with Sections 107.16 and 303.03 of the 2007 VDOT R&B Specifications.
- 9.3 Accumulated sediment shall, at a minimum, be removed from erosion and sediment control facilities in accordance with Section 303.03 of the 2007 VDOT R&B Specifications.
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10.0 STANDARD FORMS

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|----------|---|
| LD-438 | Guidelines for Development of Erosion and Sediment Control and Stormwater Management Plans for Projects with Straight Line Sketches |
| LD-439 | Drainage Information Sheet |
| LD- 445C | Erosion and Sediment Control and Stormwater Management Plan Certification Form |

For the current version of these forms, see the VDOT site at
<http://vdotforms.vdot.virginia.gov/> .

VIRGINIA DEPARTMENT OF TRANSPORTATION

LOCATION AND DESIGN DIVISION

INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: POST-DEVELOPMENT STORMWATER MANAGEMENT	NUMBER: IIM-LD-195.8
SPECIFIC SUBJECT: MINIMUM REQUIREMENTS FOR THE ENGINEERING, PLAN PREPARATION AND IMPLEMENTATION OF POST-DEVELOPMENT STORMWATER MANAGEMENT PLANS	DATE: JULY 15, 2014
	SUPERSEDES: IIM-LD-195.7
APPROVAL: <div style="text-align: right;">B. A. Thrasher, P.E. State Location and Design Engineer Approved July 15, 2014</div>	

CURRENT REVISION

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- Changes have been made throughout this IIM to reflect changes in the Virginia Stormwater Management Program Law and Regulations. Stormwater Program Advisories SWPA 12-01 thru 12-04 have been incorporated into this IIM.
 - Shading has been omitted due to the number of changes in this memorandum.
 - This IIM addresses the technical criteria contained in Part IIC of the VSMP Regulations which includes, for linear projects, the Performance/Technology Based criteria for water quality and MS19 for erosion and flood control in the downstream receiving channel. The technical criteria contained in Part IIB of the VSMP Regulations, which includes the Run-Off Reduction Method for water quality and Energy Balance Equation for erosion and flood control in the downstream receiving channel, will be addressed in a future guidance document.
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EFFECTIVE DATE

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- Unless identified otherwise within this IIM, the information contained in this IIM is effective upon receipt.

ACRONYMS

- BMP – Best Management Practice
 - BSD – Better Site Design
 - CBPA – Chesapeake Bay Preservation Area
 - DCR – (The) Department of Conservation and Recreation
 - DEQ – (The) Department of Environmental Quality
 - ESC – Erosion and Sediment Control
 - EPA – (The) Environmental Protection Agency
 - FEMA – Federal Emergency Management Agency
 - HUC - Hydrologic Unit Code
 - IIM – Instructional and Informational Memorandum
 - LID – Low Impact Development
 - MS – Minimum Standard
 - MS4 – Municipal Separate Storm Sewer System
 - PAC – Pre-Advertisement Conference
 - R&B – Road and Bridge
 - RFP – Request for Proposal
 - RW – Right-of-Way
 - SWM – Stormwater Management
 - SWCB – Soil and Water Conservation Board
 - SYIP – Six Year Improvement Program
 - TMDL – Total Maximum Daily Load
 - SWPPP – Stormwater Pollution Prevention Plan
 - VAC – Virginia Administrative Code
 - VDOT – (The) Virginia Department of Transportation
 - VPDES – Virginia Pollutant Discharge Elimination System
 - VSMP – Virginia Stormwater Management Program
 - WQV – Water Quality Volume
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DEFINITIONS

- Adequate Channel – A channel that meets the technical criteria contained in Section 5.2 and 5.3 of this IIM.
- Average Land Cover Condition – A measure (in percent) of the average amount of impervious area within a watershed. For regulatory purposes, this value is assumed to be 16% statewide.
- Channel – A natural or manmade waterway (includes culverts and storm sewer systems).
- Discharge Point – The location at which stormwater and/or a pollutant leaves the project area.
- Department – The Virginia Department of Transportation.
- HUC6 - A watershed unit established in the most recent version of Virginia's 6th Order National Watershed Boundary Dataset.

- Impervious Surface or Cover - A surface composed of any material that significantly impedes or prevents natural infiltration of water into soil. Impervious surfaces include, but are not limited to, roofs, buildings, streets, parking areas, and any concrete, asphalt, or compacted gravel surface.
- Impervious Area - The area (square feet or acres) of the site composed of an impervious surface.
- Land-Disturbing Activity or Land Disturbance - A manmade change to the land surface that potentially changes its runoff characteristics including any associated clearing, grading or excavation.
- Linear Development Projects - Those land-disturbing activities linear in nature such as, but not limited to, highway construction/maintenance projects/activities, construction/maintenance of stormwater channels and stream restoration projects.
- MS4 General Permit - General Permit For Discharges Of Stormwater From Small Municipal Separate Storm Sewer Systems.
- Non-Linear Projects - Those land-disturbing activities not considered linear in nature such as, but not limited to, parking lots, rest areas and District/Residency/Area Headquarter complexes.
- Offsite - Areas located outside of the VDOT right of way, easement or property boundary.
- Onsite - Areas located inside of VDOT right of way, easement or property boundary.
- Outfall - The location where concentrated stormwater leaves the project area.
- Pre-development - Those conditions that exist prior to commencement of the proposed land-disturbing activity/project.
- Pre-development Impervious Area - The amount of impervious area within the site prior to commencement of the proposed land-disturbing activity/project.
- Pre-development Percent Impervious - The amount of pre-development impervious area within the site divided by the total area of the site times 100.
- Post-development - Those conditions that will, or are expected to, exist after completion of the proposed land-disturbing activity/project.
- Post-development Impervious Area - The amount of impervious area within the site that will or is expected to exist after completion of the proposed land-disturbing activity/project.
- Post-development Percent Impervious - The amount of post-development impervious area within the site divided by the total area of the site times 100.
- Receiving Channel - The drainage facility that receives the stormwater run-off from the proposed land-disturbing activity.
- Regulated Land Disturbance Activities - Those activities that disturb one (1) acre or greater except in those areas designated as a Chesapeake Bay Preservation Area in which case the land disturbance threshold is 2500 square feet or greater (unless the activity is specifically exempted by the VSMP Law and/or Regulations).
- Roadway Section - The traveled way and associated shoulders, ditches, sidewalks, multi-use/shared use paths, back (cut) slopes and fore (fill) slopes
- Site - The area of proposed land disturbance (e.g., the construction limits) plus any R/W acquired in support of the proposed land disturbance activity/project. Any support areas within existing or proposed VDOT R/W associated with the proposed land disturbance activity/project and identified in the pre-construction SWPPP for the proposed land disturbance activity/project shall also be considered a part of the site. Permanent easements and/or other property acquired through the R/W acquisition

process in conjunction with the proposed land disturbance activity/project may be considered a part of the site and utilized in the determination of the post-development water quality requirements provided such property will remain under the ownership/control of the VDOT and providing such property is so identified/designated on the proposed land disturbance activity/project plans and is legally encumbered for the purpose of stormwater management.

- Traveled Way – That portion of the roadway section, exclusive of shoulders, designated for vehicular use.
- Watershed – The surface area, measured in a horizontal plane, draining to a specific point in a channel, stream, river or other such watercourse. Also referred to as "Drainage Area" or "Drainage Basin".

REFERENCES

The following editions apply when referenced in this IIM:

- Virginia SWM Handbook – First Edition (1999) Volume I and II.
 - Virginia ESC Handbook – Third Edition (1992).
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1.0 PROGRAM BACKGROUND

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- 1.1 Acts of the General Assembly, the SWCB and DCR in 2011 and 2012 have resulted in the issuance of revised/update Virginia Stormwater Management Program Law and Regulations and Virginia Erosion and Sediment Control Law and Regulations. The general application of the VSMP Law and Regulations to VDOT operations is addressed in this IIM. The general application of the ESC Law and Regulations to VDOT operations is addressed in the current version of IIM-LD-11.
- 1.2 Effective July 1, 2013, the DCR Stormwater Program was transferred to DEQ. This included the regulatory areas of ESC, post-development SWM, construction permitting, MS4 permitting and Chesapeake Bay preservation. The sections of the Virginia Administrative Code (VAC) referenced herein reflect new numbering as a result of the program transfer.
- 1.3 Further information regarding the various law and regulations may be obtained from DEQ at: <http://www.deq.state.va.us/Programs/Water/StormwaterManagement.aspx>.
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2.0 PROGRAM OBJECTIVE

2.1 Post-development Stormwater Management

To inhibit the deterioration of the aquatic environment by instituting a post-development SWM program that maintains both the water quantity and quality post-development runoff characteristics, as nearly as practicable, equal to or better than pre-development runoff characteristics.

2.2 Erosion and Sediment Control

To effectively control soil erosion, sediment deposition, and post-development runoff in order to protect downstream properties from erosion and flooding, and to minimize onsite soil erosion and transportation of sediment off the project site.

3.0 PROGRAM ADMINISTRATION

- 3.1 VDOT requests an annual approval of its ESC and SWM Standards and Specifications from DEQ. By its annual approval of VDOT's ESC and SWM Standards and Specifications, DEQ authorizes VDOT to administer its ESC and SWM Program in accordance with the approved ESC and SWM Standards and Specifications on all regulated land disturbance activities performed by or for VDOT (see Section 21.0 of this IIM for further information on VDOT's Approved ESC and SWM Standards and Specifications).
- 3.2 VDOT's Approved ESC and SWM Standards and Specifications shall apply to all plan design, construction and maintenance activities administered by VDOT and performed either by its internal workforce or contracted to external entities, where such activities are regulated by the Virginia ESC and VSMP Law and Regulations. During any inspections of VDOT land-disturbing activities by DEQ, EPA and other such regulatory agencies, compliance with the VDOT's Approved ESC and SWM Standards and Specifications (and all parts thereof) will be expected.
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4.0 POLICY/GENERAL GUIDELINES

- 4.1 The VSMP Regulations are applicable to all land-disturbing activities where one acre or greater (2,500 square feet or greater in a designated CBPA) of land is disturbed, except routine maintenance operations that are performed to maintain the original line and grade, hydraulic capacity or original construction of the project (see Section 2.5 of the current IIM-LD-242 for additional information on the exemption for routine maintenance activities).
- 4.2 The VSMP Regulations are applicable to all regulated land-disturbing activities, both construction and maintenance, administered by VDOT and performed either by its internal workforce or contracted to external entities, including those developed/constructed under the Public/Private Transportation Act (PPTA), the Design/Build (DB) process and the Capital Outlay Program.
- 4.3 For the purposes of compliance with the VSMP Regulations, the following land-disturbing activities are not considered VDOT projects:

1. Roadway projects occurring on non-VDOT R/W, such as subdivision streets, industrial access roads, locality funded/administered projects, etc., which are designed and constructed by other parties and which are eligible for acceptance into the state roadway system for operations and/or maintenance by VDOT after completion of construction.
The water quality/quantity requirements for the portions of these types of projects that will be operated and/or maintained by VDOT shall comply (at a minimum) with the requirements in Part II of the VSMP Regulations (9VAC25-870-62 et. seq.).
2. Land-disturbing activities occurring within the existing R/W of VDOT owned and/or operated roadway facilities that are a part of an offsite development and which are allowed by agreement and/or the issuance of a VDOT Land Use Permit and which are designed and constructed by other parties.
Such land-disturbing activities shall be considered a part of overall offsite development plan (i.e., common plan of development) and any SWM requirements for areas inside of VDOT R/W shall be accounted for in the SWM plan for the offsite development.
The water quality/quantity requirements for the portions of these types of projects that will be operated and/or maintained by VDOT shall comply (at a minimum) with the requirements in Part II of the VSMP Regulations (9VAC25-870-62 et. seq.).
The plans for the offsite development shall document how and where the SWM requirements for the land-disturbing activities occurring on areas that will be operated and/or maintained by VDOT are being accomplished. This information is to be retained in the appropriate file(s) in the applicable VDOT District or Residency Office, until such time it is no longer valid.
3. Projects involving roadways that are owned and/or operated by VDOT and which include land-disturbing activities occurring inside and/or outside of existing R/W and which are funded by VDOT transportation revenue but whose construction contracts are administered by Federal Agencies, other State Agencies or localities (County, City or Town) and which will be turned over to VDOT for operations and/or maintenance after completion of construction.
The water quality/quantity requirements for the portions of these types of projects that will be operated and/or maintained by VDOT shall comply (at a minimum) with the requirements in Part II of the VSMP Regulations (9VAC25-870-62 et. seq.).
- 4.3.1 The design of BMPs to be installed by others on any VDOT R/W, and/or which will be turned over to VDOT for operation and maintenance after construction is completed, shall be subject to the review and approval by VDOT. This process should occur prior to the issuance of a Land Use Permit (where one is required). The construction of BMPs installed by others on any VDOT R/W, and/or which will be turned over to VDOT for operation and maintenance, shall be subject to the review and approval by VDOT prior to the release of the Land Use Permit surety (where applicable) or prior to VDOT's acceptance of the facility for operation and

maintenance. Design and construction information for any BMPs accepted by VDOT for operation and maintenance shall be forwarded to the District Infrastructure Manager and the District Hydraulics Engineer in order to process for inclusion in the L&D and Maintenance Divisions' BMP Databases. The appropriate section of the LD-445D form is to be used for reporting the BMP information.

- 4.4 Prior to the issuance of a VDOT Land Use Permit for land-disturbing activities occurring inside the R/W of VDOT owned and/or operated roadway facilities or prior to the acceptance of a roadway facility into the state roadway system for VDOT operations and/or maintenance, those activities identified in Section 4.3 of this IIM, and which occur within a designated MS4 area or within a watershed with an approved TMDL plan, shall be reviewed by the appropriate VDOT personnel (typically Central Office or District Location and Design Hydraulics staff) for compliance with the conditions of the VDOT's MS4 Permit and/or the approved TMDL plan and the requirements of the VDOT Implementation Plan for its MS4 Permit conditions. Those activities found not to comply with the conditions of VDOT's MS4 Permit, or an approved TMDL plan, or the VDOT MS4 Implementation Plan requirements, shall not be issued a Land Use Permit, nor be accepted into the state system of roadways, until such compliance is demonstrated to the satisfaction of VDOT.
- 4.5 The potential post-development impact of any changes to the land surface should be based on the ultimate post-development condition of the site considering a mature vegetative cover where applicable. Impacts should not be based on the temporary surface changes that occur during construction activities. The temporary surface changes occurring during construction activities are addressed by compliance with the Virginia ESC Regulations.
- 4.6 Milling and/or overlaying or other such rehabilitation of an existing impervious surface is not considered a land disturbance activity in determining compliance with the VSMP Regulations, but any associated shoulder or ditch grading would be considered in the calculation of the total land disturbance quantity for the proposed activity (see Section 4.1 of this IIM for the exemption for routine maintenance operations).
 - 4.6.1 Where a project contains the milling and/or overlaying or other such rehabilitation of an existing impervious surface in conjunction with other improvements (e.g., adding additional lanes to a roadway facility), the milling and/or overlaying or other such rehabilitation of the existing impervious surface can be considered as routine maintenance and not included as a part of the construction "site" for the purposes of defining compliance with the VSMP Regulations provided that:
 - 1. The milling and/or overlaying or other such rehabilitation of the existing impervious surface could be accomplished as a distinct and separate operation, and
 - 2. Any rehabilitation of the existing impervious surface maintains existing horizontal and vertical alignment, and
 - 3. The milling and/or overlaying or other such rehabilitation of the existing impervious surface is, for the most part, continuous throughout the project limits.

- **Example 1 - Adding one lane to the outside of the south bound lanes of a 2 mile section of Route 81 and milling and overlaying the existing two south bound lanes within the project limits.** In this case, since the milling and overlaying of the existing pavement is consistent throughout the project limits, and since it could have been done independently of the construction of the additional lane, it would be considered routine maintenance and not include as a part of the construction "site" for the purposes of defining compliance with the VSMP Regulations.
 - **Example 2 – Widening a two mile section of an existing two lane roadway to add another travel lane on each side of the existing pavement with the existing pavement being removed and replaced in some locations (due to minor changes in vertical alignment) throughout the project limits and milled and overlaid in other locations.** Since the milling and overlaying is sporadic and not continuous throughout the project limits, its area would not be considered routine maintenance and would need to be included in the construction "site" area for the purposes of defining compliance with the VSMP Regulations.
- 4.7** When requested by a locality's VSMP Authority, VDOT projects located in jurisdictions that have adopted more stringent SWM technical criteria than that required by the VSMP Regulations (as identified in this IIM) shall be designed, to the largest extent practicable, to meet the locality's more stringent criteria provided such requests are received prior to the completion of the project's plans for use in the public participation phase of a project (or other such phase where no public participation process is required). The local SWM criteria may be part of a locally adopted DEQ approved SWM program or may be part of a watershed initiative related to the protection of a water supply or a TMDL implementation plan. If it is found that the more stringent local SWM requirements are not practicable for the VDOT project, it will be the responsibility of the SWM Plan Designer to provide documentation to the locality's VSMP Authority to demonstrate such. Early coordination should occur between the SWM Plan Designer and the local VSMP Authority, in order to identify any such potential requirements/requests.

5.0 TECHNICAL CRITERIA

- 5.1** Part II of the VSMP Regulations (9VAC25-870-40 et. seq.) provides technical criteria to address stream channel erosion, flooding and water quality.
- 5.1.1** Part IIB (9VAC25-870-62 et. seq.) contains the "new" technical criteria that include the Runoff Reduction methodology (for determining compliance with water quality requirements) and the Energy Balance Equation (for determining compliance with stream channel flooding and erosion requirements). Part IIB technical criteria are applicable to non-grandfathered projects (see Section 19.1 of this IIM for additional information on grandfathered projects).

5.1.2 Part IIC (9VAC25-870-93 et. seq.) contains the "old" technical criteria that include the Performance/Technology-Based methodology (for determining compliance with water quality requirements) and MS19 criteria (for determining compliance with stream channel flooding and erosion requirements). Part IIC technical criteria are applicable to grandfathered projects (see Section 19.1 of this IIM for additional information on grandfathered projects).

5.1.3 The requirements for compliance with the Part IIC technical requirements are addressed in this IIM. The requirements for compliance with the Part IIB technical requirements will be addressed in a future guidance document.

5.2 Stream Channel Erosion (Part IIC)

5.2.1 Properties and receiving waterways downstream of any land-disturbing activity shall be protected from erosion and damage due to changes in stormwater flows and hydrologic characteristics, including but not limited to, changes in runoff volume, velocity, frequency, duration, and peak flow rate.

5.2.2 Requirements for stream channel erosion control shall be governed by the Virginia ESC Regulation MS19 for an adequate receiving channel for stormwater discharges.

5.2.3 Receiving channels shall be reviewed for adequacy based upon the following criteria:

1. Natural channels shall be analyzed by the use of a post-development peak discharge from a 2-year storm to verify that stormwater will not cause erosion of the channel bed and banks, and
2. All previously constructed man-made channels shall be analyzed by the use of a post-development peak discharge from a 2-year storm to verify that the stormwater will not cause erosion of the channel bed or banks.

5.2.4 When utilizing an existing culvert or storm sewer pipe as the outfall for stormwater runoff from the project site, the receiving channel at the outlet end of the existing culvert or storm sewer pipe shall be analyzed for adequacy in accordance with Section 5.2.3 based on the type of receiving channel (natural or man-made).

5.2.5 If existing natural or previously constructed man-made receiving channels are not adequate, then one of the following measures must be implemented:

1. Improve the receiving channel to a condition where the post-development peak runoff rate from a 2-year storm will not cause erosion to the channel bed or banks or to the point where the drainage area within the channel complies with the requirements of Section 5.2.9 of this IIM, or

2. Develop a site design that will not cause the pre-development peak runoff rate from a 2-year storm to increase (i.e., post development 2 year peak discharge is equal to or less than pre-development 2 year peak discharge) when runoff discharges into a natural channel or will not cause the pre-development peak runoff rate from a 10- year storm to increase (i.e., post development 10-year peak discharge is equal to or less than pre-development 10-year peak discharge) when runoff discharges into a man-made channel, or
 3. Provide a combination of channel improvements, stormwater detention or other measures to prevent downstream erosion.
- 5.2.6 Where determined necessary by the SWM Plan Designer or requested by DEQ, water quantity control for the 1-year storm may be required if there are existing or anticipated erosion concerns downstream of the project site. Such determination or request shall be made prior to the public participation phase of the project (or other such phase when no public participation process is required). Control of the 1-year storm requires detaining the volume of runoff from the entire drainage area and releasing that volume over a 24-hour period. See the Virginia SWM Handbook, Volume I, Page 1-23 and Volume II, Pages 5-38 thru 5-41 for additional information.
- 5.2.7 Pre-development conditions for both offsite and onsite areas shall be those that exist at the time when the final receiving channel analysis is performed. All land cover shall be assumed to be in "good" condition regardless of actual conditions existing at the time the analysis is performed.
- 5.2.8 Post-development conditions for offsite areas shall be determined the same as in Section 5.2.7 of this IIM. Post-development conditions for the on-site areas shall be determined based on the proposed project plans and any known future plans of development within the project site.
- 5.2.9 One Percent (1%) Rule - If it can be demonstrated that the total drainage area to the point of analysis within the receiving channel is 100 times greater than the contributing drainage area from within the project site, the receiving channel may be considered adequate, with respect to the stability (erosion) requirements, without further analysis.
- 5.3 Flooding (Part IIC)
- 5.3.1 Properties and receiving waterways downstream of any land-disturbing activity shall be protected from localized flooding due to changes in stormwater flows and hydrologic characteristics including, but not limited to, changes in runoff volume, velocity, frequency, duration, and peak flow rate.
- 5.3.2 For non-linear projects, the 10-year post-development peak rate of runoff from the site shall not exceed the 10-year pre-development peak rate of runoff.

5.3.3 For linear projects, requirements for downstream flooding control shall be governed by the Virginia ESC Regulation MS19 for adequate receiving channel for stormwater discharges.

5.3.3.1 Receiving channels shall be reviewed for adequacy based upon the following criteria:

1. Natural channels shall be analyzed by the use of a post-development peak discharge rate from 2-year storm to verify that stormwater will not overtop the channel banks, and
2. All previously constructed man-made channels shall be analyzed by the use of a post-development peak discharge rate from a 10-year storm to verify that the stormwater will not overtop the channel banks, and
3. Existing culvert and storm sewer systems, utilized as stormwater outfalls for the development site, shall be analyzed by the use of a post-development peak discharge rate from a 10-year frequency storm to verify that the stormwater will be contained within the pipe or storm sewer system.

5.3.3.2 When utilizing an existing culvert or storm sewer pipe as the outfall for stormwater runoff from the project site, the receiving channel at the outlet end of the existing culvert or storm sewer pipe shall be analyzed for adequacy in accordance with Section 5.3.3.1 based on the type of receiving channel (natural or man-made).

5.3.3.3 If existing natural or previously constructed man-made receiving channels or existing culvert or storm sewer pipe systems are not adequate, then one of the following measures must be implemented:

1. Improve the channel to a condition where the post-development peak runoff rate from a 10-year storm will not overtop the channel banks or to the point where the drainage area within the channel complies with the requirements of Section 5.3.3.4 of this IIM, or
2. Improve the culvert or storm sewer system to a condition where the post-development peak runoff rate from a 10-year storm is contained within the appurtenances, or
3. Develop a site design that will not cause the pre-development peak run-off rate from a 2-year storm to increase (i.e., post development 2-year peak discharge is equal to or less than pre-development 2-year peak discharge) when runoff from the site discharges into a natural channel or will not cause the pre-development peak runoff rate from a 10-year storm to increase (i.e., post development 10-year peak discharge is equal to or less than pre-development 10-year peak discharge) when runoff from the site discharges into a man-made channel or a culvert/storm sewer system, or

4. Provide a combination of channel/culvert/storm sewer system improvements, stormwater detention or other measures in order to prevent downstream flooding.

5.3.3.4 One Percent (1%) Rule - If it can be demonstrated that the total drainage area to the point of analysis within the receiving channel is 100 times greater than the contributing drainage area from within the project site, the receiving channel may be considered adequate, with respect to the flooding requirements, without further analysis.

5.3.3.5 Pre-development conditions for both the offsite and onsite areas shall be those that exist at the time when the final receiving channel analysis is performed. All land cover shall be assumed to be in good condition regardless of actual conditions existing at the time the analysis is performed.

5.3.3.6 Post-development conditions for offsite areas shall be determined the same as in Section 5.3.3.5 of this IIM. Post-development conditions for the on-site areas shall be determined based on the proposed project plans and any known future plans of development within the project site.

5.4 Water Quality Control (Part IIC)

5.4.1 Unless otherwise exempt, a water quality control plan that provides compliance with the VSMP Regulations Part IIC technical criteria shall be developed for each grandfathered VDOT land-disturbing activity exceeding the land disturbance thresholds noted in Section 4.1 of this IIM (see Section 19.1 of this IIM for additional information on grandfathered projects).

5.4.2 Compliance with the water quality criteria may be achieved by applying the performance-based criteria (recommended) or the technology-based criteria methodology. Discussion and application of each of these methodologies, as they relate to VDOT land-disturbing activities, is found in Sections 5.4.5 and 5.4.6 of this IIM. Additional discussion and application of these methodologies can be found in Volumes I and II of the Virginia SWM Handbook.

5.4.3 Evaluation of water quality requirements may be performed considering the site area at each individual stormwater discharge (outfall) point from the proposed land disturbing-activity/project or may be performed considering the site area for the entire limits of the proposed land-disturbing activity/project.

5.4.4 Where the proposed land-disturbing activity/project drains to more than one HUC6, the required pollutant load reductions shall be applied independently within each HUC6 unless reductions are proposed to be achieved under a project specific or a comprehensive SWM plan developed in accordance with Section 9VAC25-870-92 of the VSMP Regulations.

5.4.5 Performance-Based Criteria

5.4.5.1 The calculated post-development pollutant load from the site shall be compared to the calculated pre-development pollutant load from the site based upon the average land cover condition or the existing site condition as related to the site's percent impervious.

5.4.5.2 The site's percent impervious shall be determined as follows:

- For pre-development conditions - The amount of pre-development impervious area within the site divided by the total area of the site times 100.
- For post-development conditions - The amount of post-development impervious area within the site divided by the total area of the site times 100.

5.4.5.3 A BMP shall be located, designed, and maintained to achieve the target pollutant removal efficiencies specified in Table 1 for the purposes of reducing the post-development pollutant load from the site to the required level based upon the following four applicable land development situations for which the performance-based criteria apply:

1. Situation 1 consists of land-disturbing activities where the pre-development percent impervious cover of the site is less than or equal to the average land cover condition (16%) and the proposed improvements will create a total post-development percent impervious cover of the site which is less than the average land cover condition (16%).
 - Water Quality Requirement: No reduction in the post-development pollutant discharge from the site is required.
2. Situation 2 consists of land-disturbing activities where the pre-development percent impervious cover of the site is less than or equal to the average land cover condition (16%) and the proposed improvements will create a total post-development percent impervious cover of the site which is greater than the average land cover condition (16%).
 - Water Quality Requirement: The post-development pollutant discharge from the site shall not exceed the pre-development pollutant discharge from the site based on the average land cover condition (16%).
3. Situation 3 consists of land-disturbing activities where the pre-development percent impervious cover of the site is greater than the average land cover condition (16%).

- **Water Quality Requirement:** The post-development pollutant discharge from the site shall not exceed (a) the pre-development pollutant discharge from the site less 10% or (b) the pollutant discharge based on the average land cover condition (16%), whichever is greater.
4. Situation 4 consists of land-disturbing activities where the pre-development impervious cover of the site is served by an existing BMP that addresses water quality.
- **Water Quality Requirement:** The post-development pollutant discharge from the site shall not exceed the pre-development pollutant discharge from the site based on the existing percent impervious cover of the area being served by the existing BMP. The existing BMP shall be shown to have been designed and constructed in accordance with proper design standards and specifications, and to be in proper functioning condition.

5.4.6 Technology-Based Criteria

- The stormwater runoff from the impervious cover of the land-disturbing activity shall be treated by an appropriate BMP as specified in Table 1 based on the applicable post-development percent impervious cover of the site.
- When the applicable percent impervious cover of the site is less than the statewide "average land cover condition" of 16%, no water quality BMPs are required. (Exception - Where a locality has established a lower "average land cover condition" than the statewide average, the provisions of Section 4.7 of this IIM shall govern.)

5.4.6.1 The applicable post-development percent impervious cover of the site shall be as follows:

- For linear development projects:
 - "Old" criteria - The net increase in impervious area of the site (total post-development impervious area of the site minus the total pre-development impervious area of the site) divided by the total post-development area of the site times 100.
 - "New" criteria – See Section 5.4.5.2 of this IIM.
- See Section 19.3 of this IIM for applicability of "old" and "new" criteria to VDOT projects.

- For Non- Linear Projects – See Section 5.4.5.2 of this IIM.

5.4.6.2 The water quality volume for any required BMP shall be based on the total post-development impervious area draining to the BMP from within the R/W of the proposed project/activity and from within any VDOT R/W adjacent to the proposed project/activity (see Section 19.4 of this IIM for applicability of this requirement to current VDOT projects).

TABLE 1 BMP SELECTION TABLE		
Water Quality BMP	Target Phosphorus Removal Efficiency	Applicable Percent Impervious Cover of Site
Vegetated filter strip	10%	16-21%
Grassed swale	15%	
Constructed wetlands	30%	22-37%
Extended detention (2xWQV)	35%	
Retention basin I (3xWQV)	40%	
Bioretention basin	50%	
Bioretention filter	50%	38-66%
Extended detention-enhanced	50%	
Retention basin II (4xWQV)	50%	
Infiltration (1xWQV)	50%	
Sand filter	65%	
Infiltratration (2xWQV)	65%	67-100%
Retention basin III (4xWQV with aquatic bench)	65%	
Manufactured BMP Systems	20%	
Hydrodynamic Structures *		
Manufactured BMP Systems	50%	
Filtering Structures *		
Filtterra™ Bioretention Filter System **	74%	

* See the Virginia SWM Handbook for approved systems. Other systems meeting the definition of a hydrodynamic or filtering structure must be approved by the DEQ prior to use.

** See Technical Bulletin No.6 in the Virginia SWM Handbook.

5.4.7 Alternative BMPs

5.4.7.1 BMPs included on the Virginia SWM BMP Clearing House website <http://vwrrc.vt.edu/swc/> may be used with the Performance-Based water quality criteria. Unless otherwise approved by DEQ, the maximum removal efficiency allowed for the BMP will be that shown for phosphorus removal by treatment and any removal efficiency associated with phosphorus removal by runoff reduction will not be allowed.

5.4.7.2 Other alternative BMPs not included in Table 1 of this IIM or the Virginia SWM BMP Clearing House website may be allowed at the discretion and approval of DEQ.

5.4.7.3 Approval to use alternative BMPs is to be coordinated between the VDOT District or Central Office SWM Plan Designer and the DEQ Regional Stormwater Program Manager. The VDOT State Stormwater Management Program Administrator and the DEQ Central Office Director of the Office of Water Permits shall be copied on any correspondence related to a request for approval of the use of any alternative BMPs.

5.4.8 Use of LID and BSD practices are encouraged to the maximum extent practicable in order to reduce the stormwater runoff impacts of the proposed development. LID practices include, but are not limited to, the preservation/protection of riparian buffers, wetlands, steep slopes, mature trees, flood plains, woodlands and highly permeable soils. BSD practices include, but are not limited to, reduction of impervious cover, conservation of natural areas and the more effective use of pervious areas to treat stormwater runoff.

5.4.9 When the 1-year storm is detained for 24 hours (in accordance with Section 5.2.6 of this IIM) there will be no need to provide additional or separate storage for the WQV if it can be demonstrated that the WQV will be detained for approximately 24 hours.

5.4.10 Off-site Water Quality Compliance Options

5.4.10.1 Where the water quality requirements for the land development activity cannot be satisfied onsite, offsite options may be used to achieve compliance with the requirements of the VSMP Regulations.

5.4.10.2 Offsite compliance options allowed for use in meeting required phosphorus load reductions include one or more of the following:

1. Offsite controls utilized in accordance with a comprehensive SWM plan adopted pursuant to Section 4VAC25-870-69 of the VSMP regulations for the local watershed within which a project is located (e.g., a regional SWM facility).
2. A locality pollutant loading pro rata share program established pursuant to § 15.2-2243 of the Code of Virginia or similar local funding mechanism (e.g., a stream restoration fund).

3. The Nonpoint Nutrient Offset Program established pursuant to § 62.1-44.15:35 of the Code of Virginia (i.e., the purchase of phosphorus credits from a Nutrient Credit Bank).
4. Any other offsite option approved by DEQ.
5. When VDOT has additional properties located within the same HUC6 or upstream HUC6 of the land-disturbing activity or within the same watershed as determined by DEQ, SWM facilities located on those properties may be utilized to meet the required phosphorus load reductions from the land-disturbing activity.

5.4.10.3 VDOT may utilize offsite options identified in Section 5.4.10.2 of this IIM if the project meets any one of the following conditions:

1. The activity will disturb less than five acres of land (100% offsite compliance allowed).
2. The activity's post-developed phosphorus load reduction requirement is less than 10 pounds per year (100% offsite compliance allowed).
3. At least 75% of the required phosphorus load reductions can be achieved onsite (up to 25% offsite compliance allowed).
4. If at least 75% of the activity's required phosphorus load reductions cannot be achieved onsite, then the required phosphorus load reductions may be achieved, in whole or in part, through the use of offsite compliance options (up to 100% offsite compliance may be allowed) provided VDOT can demonstrate to the satisfaction of the DEQ that:
 - (1) Alternative site designs have been considered that may accommodate onsite BMPs, and
 - (2) Onsite BMPs have been considered in alternative site designs to the maximum extent practicable, and
 - (3) Appropriate onsite BMPs will be implemented, and
 - (4) Full compliance with post-development nonpoint nutrient runoff compliance requirements cannot practicably be met onsite,

5.4.10.4 Offsite options shall not be allowed:

1. Unless the selected offsite option achieves the necessary phosphorus load reductions prior to the commencement of the construction of the proposed project. Where the offsite option will be constructed as a part of the proposed VDOT project, the offsite option must be completed and functional prior to the completion of the VDOT project, or
2. In violation of local water quality-based limitations at the point of discharge that are consistent with the determinations made pursuant to a TMDL Implementation Plan, contained in a MS4 Program Plan approved by DEQ or as otherwise may be established or approved by DEQ.

- 5.4.11 The following information is taken from Part IIC of the VSMP Regulations and/or the Virginia SWM Handbook.
- 5.4.11.1 The selected BMP shall be located, designed, and maintained to perform at the target pollutant removal efficiency specified in Table 1 of this IIM. Design standards and specifications for the non-proprietary BMPs in Table 1 that meet the required target pollutant removal efficiency are available in the Virginia SWM Handbook.
- 5.4.11.2 Extended Detention Basins and Extended Detention Basins Enhanced require a WQV based on 1 inch of runoff from the greater of either the post-development impervious area of the site or the post-development impervious area within VDOT R/W draining to the BMP.
- 5.4.11.3 Extended Detention Basins and Extended Detention Basins Enhanced require a 30-hr drawdown time for the required WQV. The calculation procedure for the drawdown time and orifice sizing can be found in the Virginia SWM Handbook Volume II, Pages 5-33 through 5-38.
- 5.4.11.4 In order to facilitate maintenance activities, sediment forebays are to be incorporated into the design of Extended Detention Basins and Extended Detention Basins Enhanced. The volume of the forebay is to be 0.1 inch – 0.25 inches times the impervious area treated by the facility or 10% of the required detention volume. Additional information can be found in the Virginia SWM Handbook Volume I, Pages 3.04-1 through 5.
- 5.4.11.5 Where the overflow (emergency) spillway is incorporated as a part of the dam/embankment, it shall be stabilized utilizing rip rap, concrete or other non-erodible material.
- 5.4.11.6 Suggested details for the Extended Detention Basin can be found in the Virginia SWM Handbook Volume I, Pages 3.07-4 and 5. The riprap lined low flow channel through the basin is not recommended due to maintenance considerations.
- 5.4.11.7 Suggested details for the Extended Detention Basin Enhanced can be found in the Virginia SWM Handbook Volume I, Pages 3.07-6 and 7. The geometric shape of the facility may need to be more symmetrical than that shown in order to facilitate construction of the basin to the dimensions needed.
- 5.4.11.8 Non-structural practices including, but not limited to, minimization of impervious areas and curbing requirements, open space acquisition, floodplain management, and protection of wetlands may be utilized as appropriate in order to at least partially satisfy water quality requirements. Approval to use such non-structural measures is to be secured in advance from DEQ and is to be coordinated between the VDOT State Stormwater Management Program Administrator and the DEQ Central Office Director of the Office of Water Permits.

6.0 OTHER DESIGN CRITERIA / CONSIDERATIONS

- 6.1 The analysis to demonstrate compliance with the requirements of Section 5.2 and 5.3 of this IIM (MS19 of the Virginia ESC Regulations) shall be performed in accordance with the procedures noted in the DEQ Technical Bulletin No. 1 (Stream Channel Erosion Control Policy Guidance).
- 6.2 Increased volumes of sheet flow due to the proposed development that may potentially cause erosion and sedimentation on adjacent property shall be diverted to a stable outfall, an adequate channel, pipe or storm sewer system or to an appropriate SWM facility.
- 6.3 All onsite channels (including culverts and storm sewer systems) must be designed/verified to be adequate in accordance with Sections 5.2 and 5.3 of this IIM (MS19 of the Virginia ESC Regulations).
- 6.4 Impounding structures (dams) that are not covered by the Virginia Dam Safety Regulations shall be designed in accordance with Section 12.0 of this IIM and reviewed for floodplain impacts during the passage of the 100-year storm event.
- 6.5 Outflows from SWM facilities shall be discharged into an adequate receiving channel as defined in Section 5.2 and 5.3 of this IIM (MS19 of the Virginia ESC Regulations).
- 6.6 Existing swales being utilized as natural or man-made outfall conveyances for pre-development runoff will be considered as channels and, if the swale satisfactorily meets the criteria contained in Section 5.2 and 5.3 of this IIM (MS19 of the Virginia ESC Regulations) for the post-development runoff, it will be considered an adequate receiving channel.
- 6.7 Construction of SWM impoundment structures within a FEMA designated 100-year flood plain shall be avoided whenever possible. When this is unavoidable, a thorough review shall be made to ensure that the SWM facility will operate effectively for its intended purpose during the passage of the 10-year flood event on the flood plain. All SWM facility construction within a designated 100-year flood plain shall be in compliance with all applicable regulations under the FEMA's National Flood Insurance Program. The SWM facility shall be reviewed for any potential impacts to the 100-year flood event characteristics of the floodplain and designed for structural stability during the passage of the 100-year flood event on the flood plain.
- 6.8 Construction of SWM facilities within a sinkhole is prohibited. If SWM facilities are required along the periphery of a sinkhole, the design of such facilities shall comply with the guidelines in the latest IIM-LD-228 (Sinkholes) and the DEQ's Technical Bulletin No. 2 (Hydrologic Modeling and Design in Karst) and applicable sections of the Virginia SWM Handbook.

- 6.9 Design of any SWM facilities with permanent water features (proposed or potential) located within five (5) miles of a public use or military airport is to be reviewed and coordinated in accordance with Section A-6 of the VDOT Road Design Manual.
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7.0 VDOT PARTICIPATION IN REGIONAL FACILITIES

- 7.1 There are many cases where it is more feasible to develop one major SWM facility to control a large watershed area rather than a number of small individual facilities controlling small drainage areas within the large watershed. The concept of regional SWM facilities is endorsed by VDOT provided that certain requirements are met.
- 7.1.1 Development and/or use of regional SWM facilities must be a joint undertaking by VDOT and the local governing body. The site must be part of a master SWM Plan developed and/or approved by the local VSMP Authority and/or DEQ and any agreements related to the VDOT use of these facilities must be consummated between VDOT and the local governing body. VDOT may enter into an agreement with a private individual or corporation provided the local governing body has a DEQ approved SWM program that complies with the VSMP Regulations and the proper agreements for maintenance and liability of the regional facility have been executed between the local governing body and the private individual or corporation and any such agreements are referenced in the agreement between VDOT and the private individual or corporation.
- 7.1.2 When VDOT agrees to the use an existing or future VDOT roadway embankment as an impounding structure for a regional facility, the roadway embankment must be designed or retrofitted appropriately for such use. The VDOT RW line will normally be set at the inlet face of the main drainage structure. The local government would be responsible for the maintenance and liabilities outside of the VDOT RW area and VDOT would accept the same responsibilities inside the VDOT RW area.
- 7.1.3 The design of regional SWM facilities must address any mitigation needed to meet the water quality and quantity requirements of any known future VDOT projects within the contributing watershed. Regional SWM facilities located upstream of a proposed VDOT roadway shall provide sufficient mitigation for any water quality and quantity impacts of runoff from the proposed roadway project which may not pass through the proposed facility.
- 7.2 Any questions or concerns related to the the use of an off-site regional SWM facility to satisfy the VDOT post-development SWM requirements should be discussed between the SWM Plan Designer and the appropriate DEQ regional office prior to entering into any agreements with either private or public entities.

8.0 MULTI-USE SWM BASINS

- 8.1** SWM basins may function as both quantity control and quality control facilities. Some basins may only be needed for quality control.
- 8.2** SWM basins may be utilized as temporary sediment basins during the construction phase of the project, and if so, the design of the SWM basin will need to address this dual function. The design that is needed for a permanent SWM basin may need to be altered to provide additional temporary sediment storage volume that is in excess of the required WQV. For design purposes, the two volumes (WQV and temporary sediment storage volume) should not be added together, but rather the larger of the two should govern the basin's design.
 - 8.2.1** The additional volume needed for temporary sediment storage may be provided by excavating the bottom of the basin lower than that required for the WQV. The basin's permanent outlet control structure can be temporarily altered to serve as the control structure for the temporary sediment basin (see Standard SWM-DR of VDOT's R&B Standards and the Virginia ESC Handbook). When the project is nearing completion, and the basin is no longer needed for temporary sediment control, the basin can be converted to satisfy the permanent SWM basin requirements by regrading (excavating and/or filling) and removing any temporary control structure appurtenances.

9.0 PLAN PREPARATION, IMPLEMENTATION AND CERTIFICATIONS

- 9.1** Complete (C) and Minimum (M) plan projects shall show SWM measures in the plan assembly as directed in the latest version of IIM-LD-11, the VDOT Drainage Manual and the VDOT Road Design Manual.
- 9.2** No-plan (N) and other types of projects (including maintenance activities) that have an abbreviated plan assembly must conform to the requirements of the VSMP Regulations and VPDES General Construction Permit where the land disturbance value exceeds the applicable land disturbance thresholds for such. For the definition of these types of projects, and the procedures for addressing the SWM plan details for such projects, see the latest version of IIM-LD-11, the VDOT Drainage Manual and the VDOT Road Design Manual.
- 9.3** The plan design details for BMPs shall be appropriately sealed and signed by a person registered in the Commonwealth of Virginia as a professional architect, engineer, land surveyor or landscape architect.

- 9.4 The review and approval of SWM plan designs shall be performed by a person certified through DEQ's SWM Plan Reviewer certification program. The form LD-445C shall be used to certify the plan review and approval process.
- 9.5 The inspection of SWM BMPs during their construction/installation phase shall be performed by a person certified through DEQ's SWM Inspector certification program. Inspection forms specific to the BMP(s) being constructed/installed shall be used to document the inspection process.
- 9.5 The certification that the BMP(s) were constructed in accordance with their plan details and that the BMP(s) have been made functional shall be performed by a person registered in the Commonwealth of Virginia as a professional architect, engineer, land surveyor or landscape architect. The form LD-445D shall be used to document this certification process.

10.0 FOUNDATION DATA FOR SWM BASINS

- 10.1 Foundation data (a soil boring) for the base of the dam should be requested for all SWM basins in order to determine if the native material will support the dam and prevent ponded water from seeping under the dam. An additional boring near the center of the basin should also be requested if:
1. Excavation from the basin may, potentially, be used to construct the dam, or
 2. There is potential for rock to be encountered in the area of excavation, or
 3. A high water table is suspected that may alter the performance of the SWM basin.
- 10.2 For large basins, more than one boring for the dam and one boring for the area of the basin may be needed. The number and locations of the borings are to be determined by the VDOT SWM Plan Designer/Hydraulics Engineer and/or the VDOT District Materials Engineer.
- 10.3 The foundation data for the SWM basin should be requested by the VDOT SWM Plan Designer/Hydraulics Engineer at the same time that the request for culvert foundation data is initiated.

11.0 RIGHT OF WAY/PERMANENT EASEMENTS

- 11.1 Permanent SWM facilities may be placed in fee R/W or in permanent easements.

- 11.1.1 It is recommended that all permanent SWM features (dams, risers, storage area etc.) be placed within fee R/W initially. Outfall ditches and similar features may initially be placed in permanent easements.
 - 11.1.2 The final decision on R/W versus permanent easement should be made prior to the R/W (or similar) phase of the project development process based on information obtained at the Field Inspection, Design Public Hearing and/or other such plan review milestones.
 - 11.2 VDOT will generally be amenable to the desires of the affected landowners regarding the fee R/W/permanent easement issue.
 - 11.3 The multiple use of property for SWM facilities and other features, such as utilities, is permissible. The decision on such use must be made on a case-by-case basis.
 - 11.4 Permanent easements and/or other properties acquired through the R/W acquisition process, and which are considered a part of the "site" in determining the post-development SWM requirements for the project, are to remain under the ownership/control of VDOT for the life of the project and such property is to be identified/designated on the plans and legally encumbered for the purpose of SWM.
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12.0 DESIGN DETAILS FOR SWM BASINS

- 12.1 The following details are to be incorporated into the design of VDOT SWM basins in order to be in compliance with the VSMP Regulations and the Virginia SWM Handbook. These details address concerns with seepage through the dam and along the culvert due to the ponding of water in the basins for durations greater than that associated with typical culvert installations.
 - 12.1.1 The foundation material under the dam and the material used for the embankment of the dam shall be an AASHTO Type A-4 or finer and/or meet the approval of the VDOT Materials Division. If the native material is not adequate, the foundation of the dam is to be excavated and backfilled with a minimum of 4 feet, or the amount recommended by the VDOT Materials Division. The backfill and embankment material must meet the soil classification requirements identified previously in this section or the design of the dam may incorporate a trench lined with a membrane (such as bentonite penetrated fabric or an HDPE or LDPE liner). Such designs shall be reviewed and approved by the VDOT Materials Division before use.
 - 12.1.2 The pipe culvert under or through the dam is to be reinforced concrete pipe with rubber gaskets. The pipe and gaskets are to comply with the following VDOT Road and Bridge Specifications:
 - Pipe - Section 232 (AASHTO M170)
 - Gasket - Section 212 (ASTM C443)

- 12.1.3 A concrete cradle is to be used under the pipe through the dam in order to prevent seepage. The concrete cradle is to begin at the riser or inlet end of the pipe and extend the full length of the pipe (see Standard SWM-DR of VDOT's R&B Standards).
- 12.1.4 If the height of the dam is greater than 15', or if the basin includes a permanent water pool, the design of the dam is to include a homogenous embankment with seepage controls or zoned embankment, or similar design in accordance with the Virginia SWM Handbook and recommendations from the VDOT Materials Division.
- 12.1.5 The top width of the dam is to be 10' minimum in order to facilitate both construction and maintenance operations.
- 12.1.6 The side slopes of the basin should be no steeper than 3:1 to facilitate mowing and maintenance inspections/operations.
- 12.1.7 The longitudinal slope along the bottom of the basin should be no greater than 2%, nor less than 0.5%.
- 12.1.8 The depth of the basin from the lowest bottom elevation to the primary outflow point (top of riser or invert of orifice or weir) should be no more than 3 feet in order to reduce the hazard potential. If the depth needs to be more than 3 feet, fencing (or other means to limit access) of the basin site should be considered.
- 12.1.9 The primary control structure (riser or weir) should be designed to operate in weir flow conditions for the full range of design flows. Where this is not possible or feasible, and the control structure will operate in orifice flow conditions at some point within the design flow range, an anti-vortex device, consistent with the design recommendations in the Virginia SWM Handbook, shall be utilized.
- 12.1.10 The length-to-width ratio (L:W) of the basin should be about 3:1, with the widest part of the basin at the outlet end. If the ratio is less than about 2:1, and if there is concern that the velocity of flow through the basin will be high, consideration should be given to using baffles within the basin, to reduce velocity and increase flow time through the basin.

13.0 PERIMETER CONTROLS

All SWM basins should be reviewed for the needs of fencing, barricades and no trespassing signs in accordance with the following guidelines.

13.1 Fencing

- 13.1.1 Fencing of SWM basins is normally not required and should not be considered for most basins due to:

1. Insignificant Hazard – For detention basins (no permanent water pool), significant ponding of water in the basin should only occur with very heavy rainfall events and the maximum ponded depth should typically be no more than about 3 feet. Ponds and lakes are almost never fenced, even though they may be located in subdivisions and have deep, permanent water pools.
2. Limits Maintenance Operations – Fencing could hinder the performance of both routine and long term maintenance operations. Fencing could become damaged during major maintenance operations and have to be repaired or replaced.

13.1.2 Fencing of SWM basins may be needed and should be considered when:

1. The basin is deep with a maximum ponded depth greater than about 3' and/or has steep internal side slopes with 2 or more sides steeper than 3:1, or
2. The basin is in close proximity to schools, playgrounds or similar areas where children may be expected to frequent, or
3. It is recommended by the VDOT Field Inspection Review Team (or other such plan reviewing group), the VDOT Residency Administrator or the City/County (where the City/County will assume maintenance responsibility).

13.1.3 Where fencing is proposed, access gate(s) of sufficient size to accommodate maintenance equipment are to be provided. Appropriate security mechanisms for the gates are to be provided to prevent/deter unauthorized entry.

13.2 Barricades - For non-fenced basins, a chain barricade (see Standard CR-1 of VDOT's R&B Standards) or gate may be needed across the vehicular entrance to prohibit non-authorized access if there is a concern with illegal dumping or other undesirable activities at the site.

13.3 Signs - "No Trespassing" signs shall be considered for use on all basins, whether fenced or unfenced, and should be recommended, as needed, by the VDOT Field Inspection Review Team or other such plan reviewing group.

14.0 MAINTENANCE

Requirements for maintenance of SWM facilities, the schedule for inspection and maintenance operations, and the identification of persons responsible for the maintenance will be addressed in the VDOT Maintenance Division's BMP Inspection Manual.

15.0 REPORTING

- 15.1 The VSMP MS4 and Construction Permits require the VDOT to report information to the DEQ such as the location, type, acres treated and the affected receiving waters of all SWM facilities (BMPs) installed.
- 15.1.1.1 A database resides on the VDOT Central Office Location & Design Division's internal web site to record the required BMP data for all VDOT owned and/or operated facilities.
- 15.2.1 It shall be the responsibility of the Central Office VSMP Construction Permit Coordinator to ensure that the required information is logged into the database for all post-development BMPs that are installed on VDOT maintained and/or operated roadways.
- 15.2.2 BMP information is to be logged into the data base when the VSMP Permit Termination Notice Form (LD-445D) is submitted with the required BMP information (see the latest version of IIM-LD-242 and IIM-LD-246).

16.0 PLAN DETAILS

- 16.1 Stormwater Management Drainage Structure – R&B Standard SWM-1
- To be used at all applicable locations where a riser type of control structure is desired.
 - At locations where a riser type structure is desired, but a Standard SWM-1 structure will not satisfy site specific characteristics, a special design structure is to be utilized with appropriate details developed and included in the construction documents.
- 16.2 Stormwater Management Dam
- To be used at locations where a wall-type control structure is desired (includes modifications to standard endwalls). Normally used where shallow depths of ponding are desired/required.
 - Appropriate details are to be developed and included in the construction documents for individual locations to fit site specific conditions.
- 16.3 Stormwater Management Details – Road and Bridge Standard "SWM-DR"

- Includes details for debris rack, trash rack, concrete cradle, water quality orifice and modifications for use of SWM facility as a temporary sediment basin.
- Specify at each SWM facility location requiring any of the noted items.
- The location and the size of the water quality orifice or any other required openings in the control structure shall be specified in the description/details for the control structure for each SWM facility.

16.4 Access

- A means of access for inspection and maintenance personnel and equipment shall be provided at each SWM facility location. The Standard PE-1 details shown in VDOT's Road and Bridge Standards should be used for vehicular entrances.
- A turnaround area is to be provided at or near the terminus of each vehicular entrance.
- An appropriate all weather surface material shall be provided for each vehicular entrance.
- See Section 13.0 of this IIM for requirements for access control.

17.0 METHOD OF MEASUREMENT – BASIS OF PAYMENT

17.1 Stormwater Management Drainage Structure – Road and Bridge Standard SWM-1 and other similar types of control structures.

- Basis of payment to be linear feet (LF) measured from invert of structure to top of concrete. Price bid includes cost of trash rack, debris rack and holder, temporary dewatering device and temporary metal plates.

17.2 Stormwater Management Dam

- Basis of payment to be cubic yards (CY) of Concrete Class A3 Miscellaneous and pounds (LBS) of Reinforcing Steel.

17.3 Concrete Cradle

- Basis of payment to be cubic yards (CY) of Concrete Class A3 Miscellaneous.

17.4 Excavation for SWM facilities will be measured and paid for as cubic yards (CY) of Stormwater Management Basin Excavation.

- 17.5 Fill material needed for dams or berms will be measured and paid for as cubic yards of Regular Excavation, Borrow Excavation or Embankment, as appropriate.
 - 17.6 The Grading Diagram and/or the Grading Summary is to reflect how the cubic yards of Stormwater Management Basin Excavation and cubic yards of Embankment or Borrow, if needed, are to be distributed.
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18.0 STORMWATER MANAGEMENT SUMMARY

- 18.1 All drainage items related to the construction of SWM facilities shall be summarized, by location, in the Drainage Summary for the project.
 - 18.2 All incidental items related to the construction of SWM facilities shall be summarized, by location, in the Incidental Summary for the project.
 - 18.3 Stormwater Management Excavation and Borrow or Embankment, if needed, are to be included in the totals on the Grading Diagram and/or Summary.
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19.0 SPECIAL CONSIDERATIONS

19.1 GRANDFATHERING

- 19.1.1 For those land disturbance activities regulated under of the VSMP Regulations, Part II of the regulations (9VAC25-870-40 et. seq) contains both the "new" technical criteria (Part IIB) and the "old" technical criteria (Part IIC) for water quality and stream channel erosion and flood protection (water quantity) requirements (see Section 5.0 of this IIM for information on the old and new technical criteria).
- 19.1.2 Section 9VAC 25-870-48 in Part II of the VSMP Regulations provides provisions for locality, state and federal projects to be grandfathered under the "old" technical criteria provided certain conditions are met. For the purposes of grandfathering, projects are defined as activities (construction or maintenance) with defined limits and designated PE, RW and/or Construction accounts. Location studies, coordinator studies and other such studies and lump fund accounts are not considered projects and are not eligible for consideration under the grandfathering provisions.
- 19.1.3 For a VDOT project/activity to be grandfathered it must fit into one of the following two categories:
 - 1. Project specific bonds must have been issued prior to July 1, 2012. Projects/activities meeting this requirement may be grandfathered indefinitely and can use the "old" technical criteria (VSMP Regulations - Part IIC - 9VAC25-870-93 et. seq.) to satisfy VSMP compliance requirements for water quantity and quality.

2. Funding (PE, RW or Construction) must have been allocated to the project/activity prior to July 1, 2012 (i.e., allocation in SYIP in FY13 or prior) and construction activity on the project must physically begin prior to July 1, 2019 (beginning the installation of erosion and sediment perimeter controls will be considered beginning the construction activity).

Projects/activities meeting these requirements may be grandfathered and can use the "old" technical criteria (VSMP Regulations- Part IIC - 9VAC25-870-93 et. seq.) to satisfy VSMP compliance requirements for water quantity and quality.

Note: Grandfathered projects may use the "new" technical criteria (VSMP Regulations- Part IIB - 9VAC25-870-62 et. seq.). However, in doing so, the design details and efficiency of the BMPs must be in accordance with the information on DEQ's BMP Clearing House Website.

- 19.1.4 For Design/Bid/Build (D/B/B) projects, the beginning of construction activity (as defined in Section 19.1.3 of this IIM) typically occurs within five to six months after advertisement; therefore, those D/B/B projects with an advertisement date of January 1, 2019 or after should not be considered a candidate for grandfathering.
- 19.1.5 For Design/Build (D/B) projects, beginning of construction activity (as defined in Section 19.1.3 of this IIM) typically occurs within 18 months following issuance on a Request for Proposal (RFP); therefore, those D/B projects with an RFP issuance date of January 1, 2018 or after should not be considered a candidate for grandfathering.
- 19.1.6 The construction schedule for projects/activities being considered for grandfathering and the use of the "old" technical criteria (VSMP Regulations – Part IIC - 9VAC25-870-93 et. seq.) should be carefully evaluated to make certain that the beginning of construction (as defined Section 19.1.3 of this IIM) can/will occur prior to July 1, 2019, as there will be no exceptions granted by DEQ for this requirement.
- 19.1.7 If a project/activity is grandfathered and the post-development SWM plan for the project/ activity is based on the "old" technical criteria (VSMP Regulations- Part IIC - 9VAC25-870-93 et. seq.) because it is anticipated that the beginning of construction (as defined Section 19.1.3 of this IIM) will be prior to July 1, 2019 but for some reason the schedule "slips" and construction will not begin by that date, the post-development SWM plan for the project/activity must be revised to incorporate any additional BMPs or offsite drainage system improvements to satisfy the "new" technical criteria (VSMP Regulations - Part IIB - 9VAC 25-870-62 et. seq.) requirements for both water quality and water quantity. Additional BMPs or offsite drainage system improvements necessary to satisfy the requirements of the "new" technical criteria may require the project/activity to have to revisit the public participation and/or the environmental review process.

19.1.8 The status of a project/activity with regards to the grandfathering provision shall be noted using the appropriate note(s) in Section IV of the SWPPP General Information Sheets. A list of all projects/activities within each District Office designated to be grandfathered shall be maintained by each respective District L&D Engineer and shall be available upon request by the State L&D Engineer, the Assistant State L&D Engineers, the State PMO Director or the State Stormwater Management Program Administrator. The "Grandfathered Project List" shall include the following information for each project:

- County or City
- Project Number
- UPC Number
- Type of Project (D/B/B, D/B, etc.)
- Brief Description of Project
- Potential or actual Construction Advertisement (D/B/B) or RFP issuance (D/B) date

19.1.9 Upon the publication of an updated SYIP, each District L&D Engineer shall have all projects/activities on their "Grandfathered Project List" reviewed to verify the validity of the grandfathered status of each project based on the most current date of the anticipated beginning of construction (as defined in Section 19.1.3 of this IIM) and/or advertisement or RFP issuance date. The "Grandfathered Project List" and the appropriate notes in SWPPP General Information Sheets shall be updated/revised to reflect any changes to the grandfathered status of a project/activity.

19.2 LINEAR PROJECT OUTFALLS

19.2.1 The exemption in the VSMP Law for "less than one acre of land disturbance per outfall" for linear projects was eliminated on July 1, 2012. As a result, all land disturbing activities where the total land disturbance is one acre or greater (2,500 square feet or greater in a designated CBPA) requires compliance with the water quality criteria in the VSMP Regulations and requires VSMP Construction Permit coverage, if applicable (see Section 4.1 of this IIM for the exemption for routine maintenance activities).

19.2.2 Land-disturbing activities previously qualifying for the "less than one acre of land disturbance per outfall" exemption typically were those activities where the total amount of land disturbance was small or where the total amount of land disturbance was distributed among multiple outfalls and where there was minimal impact anticipated to downstream receiving waters. Because of this, the following guidance has been agreed to by VDOT and DEQ for VDOT regulated linear development projects/activities where less than one acre of land disturbance will occur per outfall or watershed and where there will be insignificant increases in peak flow rates as a result of the proposed activity and where there are no existing or anticipated flooding or erosion problems downstream of the discharge point(s):

1. Water quality requirements shall be achieved within the proposed land-disturbing activity/project limits provided such can be accomplished without the acquisition of additional RW or easement.
2. Any water quality requirements not achieved within the land-disturbing activity/project limits may be achieved offsite in accordance with Section 5.4.10 of this IIM provided such can be accomplished without the acquisition of additional RW or easement.
3. For any applicable land-disturbing activity/project where the total water quality requirements (pollutant load reductions) cannot be achieved utilizing the provisions of 1 and 2 of this Section, the activity/project may be granted an exception by DEQ, in accordance with the provisions of Section 9VAC 25-870-57 of the VSMP Regulations and Section 20.0 of this IIM for that portion of the water quality requirements determined to be unachievable.

19.3 DETERMINATION OF PERCENT IMPERVIOUS AND WATER QUALITY REQUIREMENTS

19.3.1 Effective October 1, 2012, all proposed VDOT regulated land-disturbing activities/projects that had not begun the construction advertisement stage (e.g., PAC for Design/Bid/Build (D/B/B) projects or Request for Proposal (RFP) for Design/Build (D/B) projects) were required to have their post-development SWM plan evaluated or re-evaluated using the total post-development impervious area of the site (new criteria), in lieu of the post-development net increase in impervious area of the site (old criteria), to determine the activity/project's percent impervious and corresponding water quality requirements.

19.3.2 If using the new criteria results in an increase in the water quality requirements for the proposed land-disturbing activity/project from that determined using the old criteria, the additional water quality requirements shall be incorporated into the post-development SWM plan for the proposed land-disturbing activity/project based on the following:

1. Category 1 activities are those proposed land-disturbing activities/projects that had not completed the public hearing/willingness notice stage of plan development as of October 1, 2012. These activities/projects are required to fully incorporate any additional water quality requirements into their proposed post-development SWM plan.
2. Category 2 activities are those proposed land-disturbing activities/projects that had completed the public hearing/willingness notice stage of plan development but had not begun the construction advertisement stage as of October 1, 2012. These activities/projects are required to incorporate any additional water quality requirements into their proposed post-development SWM plan to the maximum extent practicable without impacting (increasing) the existing or proposed RW footprint and without impacting (delaying) the construction schedule.

19.3.3 For Category 2 land-disturbing activities/projects, any revisions to the proposed post-development SWM plan to address additional water quality requirements should be reasonable and practicable and be applied in a logical and common sense approach. Any additions or modifications to the proposed post-development SWM plan should utilize standard BMPs typically associated with the specific type of project (i.e., rural or urban). For example, proposing to install a large number of manufactured BMPs on a rural secondary roadway project may, theoretically, satisfy the water quality requirement "numbers" but, in reality, may be neither reasonable nor practical.

19.3.4 The following steps are to be followed in the evaluation or re-evaluation process for Category 2 land-disturbing activities/projects:

1. Determine the additional water quality requirements in accordance with the procedures and guidance in this IIM, then
2. Explore all reasonable BMP alternatives to achieve any additional water quality requirements within the existing or proposed R/W footprint for the proposed land-disturbing activity/project or within adjacent/other VDOT R/W, or through the use of an offsite option (see Section 5.4.10 of this IIM), then
3. Determine/select which BMP alternatives can be feasibly incorporated into the activity/project's proposed post-development SWM plan without impacting (delaying) the construction schedule, then
4. Incorporate the selected water quality BMPs into the project's proposed post-development SWM plan, then
5. After completing steps 1 through 4, any activities/projects not able to achieve 100% of the required pollutant load reduction shall have their activity/project files and SWPPP documented with the following information:
 - The total water quality requirements for the activity/project based on the new criteria (as defined in this section)
 - The additional water quality requirements for the activity/project based on the difference between the old and new criteria (as defined in this section)
 - The BMP alternatives investigated
 - The BMP alternatives selected
 - The reasons why certain BMPs were selected or not selected
 - The amount/percent of the total water quality requirements achieved and/or not achieved.

19.4 BMP WATER QUALITY VOLUME

19.4.1 The effective date for implementing the criteria contained in Section 5.4.6.2 of this IIM regarding water quality volume of the BMP was November 12, 2010. The extent of the implementation of this criteria was to be based on the type of project and the project development status (stage) as of the implementation date in accordance with the following:

1. Design/Bid/Build Projects

- Full implementation for projects that had not been advertised for a Public Hearing/Willingness or progressed beyond a similar phase (where no Public Hearing/Willingness is required).
- Full implementation for projects that had been advertised for a Public Hearing/Willingness or progressed beyond a similar phase (where no Public Hearing/Willingness is required) but which had to repeat that process because of reasons other than changes related to Section 5.4.6.2 of this IIM.
- Implementation to the extent practicable within the identified RW requirements except where the project construction schedule would have been compromised in doing so for projects that had been advertised for a Public Hearing/Willingness or progressed beyond a similar phase (where no Public Hearing/Willingness is required) but which had not progressed to the PAC or similar phase (based on the normal time schedule for such).
- Projects that were at the PAC or similar phase as of the implementation date were exempt from any type of implementation.

2. PPTA Projects

- Full implementation for projects that had not been advertised for a Public Hearing/Willingness and where a contract had not been executed with the selected Concessionaire.
- Full implementation for projects where a contract had not been executed with the selected Concessionaire and the project had been advertised for a Public Hearing/Willingness but which had to repeat that process because of reasons other than changes related to Section 5.4.6.2 of this IIM.
- Implementation to the extent practicable within the identified RW requirements except where the project construction schedule would have been compromised in doing so for projects that had been advertised for a Public Hearing/Willingness but where a contract with the selected Concessionaire had not been executed.
- Projects where a contract had been executed with the selected Concessionaire were exempt from any type of implementation.

3. Design Build Projects

- Full Implementation for projects that had not been advertised for a Public Hearing/Willingness and where an RFP had not been advertised.

- Full Implementation for projects where an RFP has not been advertised and the project has been advertised for a Public Hearing/Willingness but which had to repeat that process because of reasons other than changes related to Section 5.4.6.2 of this IIM.
- Implementation to the extent practicable within the identified R/W requirements except where the project construction schedule would have been compromised in doing so for projects that had been advertised for a Public Hearing/Willingness but where an RFP had not been advertised.
- Projects where an RFP had been advertised were exempt from any type of implementation.

19.4.2 There may have been projects that did not exactly fit into any one of the categories identified in Sections 19.4.1. In those situations, a project by project decision on implementation of the water quality volume requirements contained in Section 5.4.6.2 of this IIM was to have been made. The State Hydraulics Engineer or the respective District Hydraulics Engineer should have been consulted for assistance, as needed. The expectation was that VDOT would implement the revised water quality volume requirements contained in Section 5.4.6.2 of this IIM on all current projects as of the implementation date where it was reasonable and feasible to do so.

20.0 EXCEPTION PROCESS

20.1 For those land-disturbing activities where it is determined that water quality requirements cannot be totally achieved utilizing onsite BMPs and/or offsite options (see Section 5.4.10 of this IIM), an exception for the pounds of phosphorus removal (load reduction) unachievable may be granted by DEQ provided that VDOT submits a written request to DEQ requesting the exception. Form LD-445G is to be used for this purpose. The request shall include documentation of the need for the exception. The documentation shall describe all means and methods evaluated for meeting the water quality requirements and the reasons why specific methods were determined not feasible. The documentation must also state that the exception being requested is the minimum necessary to afford relief.

20.2 Economic hardship alone is not sufficient reason to request an exception.

20.3 Any approved exception is to be documented in the SWPPP for the project/activity. The appropriate SWPPP General Information Sheet notes are to include the date the exception was approved, by whom it was approved and the amount of the exception (pounds of phosphorus).

20.3.1 Information regarding any approved exception (i.e., date approved, by whom approved and for what amount) is to be noted and included with other registration information when applying for coverage for the proposed land-disturbing activity/project under the VPDES General Construction Permit.

21.0 ANNUAL STANDARDS AND SPECIFICATIONS

- 21.1** VDOT submits annually its standards and specifications for ESC and SWM (the Annual ESC and SWM Standards and Specifications) to DEQ for review and approval. Upon DEQ approval, VDOT is authorized to design, construct, inspect and maintain its roadways and facilities in accordance with the Approved ESC and SWM Standards and Specifications. The annual approval covers the calendar year (January 1 to December 31). DEQ reserves the right to randomly review VDOT design plans and construction activities to ensure compliance with the Approved ESC and SWM Standards and Specifications.
- 21.2** VDOT's Approved ESC and SWM Standards and Specifications is a compilation of all VDOT documents related to the design, construction, inspection and maintenance of ESC measures and post-development BMPs including, but not limited to, all or a portion of the following:
- R&B Standards
 - R&B Specifications, Supplemental Specifications and Special Provisions
 - IIMs
 - Drainage Manual
 - BMP Design Manual of Practice
 - Road Design Manual
 - BMP Inspection Manual
- 21.3** VDOT's Annual ESC and SWM Standards and Specifications are housed in an on-line electronic data base which includes both current and previously approved ESC and SWM Standards and Specifications. The data base is dynamic and items within the data base may be added to, deleted or revised at any time to reflect changes or updates to VDOT's ESC and SWM Program. VDOT will notify DEQ, in writing, when changes are made to the content of the data base. DEQ will have 30 calendar days to provide any written comments they might have regarding the change. If VDOT does not receive any written comments from DEQ within the 30 calendar days after notification, the change shall be deemed approved and may be used on VDOT projects/land-disturbing activities as appropriate.
- 21.4** VDOT's Approved ESC and SWM Standards and Specifications are for use in the design, construction and maintenance of VDOT projects/land-disturbing activities only. Approval to use any portions of VDOT's Approved ESC and SWM Standards and Specifications on non-VDOT projects/land-disturbing activities (see Section 4.3 of this IIM) must be secured from DEQ by the project authority.

VIRGINIA DEPARTMENT OF TRANSPORTATION

LOCATION AND DESIGN DIVISION

INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: VIRGINIA STORMWATER MANAGEMENT PROGRAM	NUMBER: IIM-LD-242.5
SPECIFIC SUBJECT: VIRGINIA POLLUTANT DISCHARGE ELIMINATION SYSTEM GENERAL PERMIT FOR DISCHARGES OF STORMWATER FROM CONSTRUCTION ACTIVITIES	DATE: OCTOBER 15, 2014
	SUPERSEDES: IIM-LD-242.4
APPROVAL: B. A. Thrasher, P.E. State Location and Design Engineer Approved October 15, 2014	

CURRENT REVISION

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- Revisions have been made throughout this memorandum to update and clarify the requirements contained in the VPDES General Permit for Discharges of Stormwater from Construction Activities and the procedures for obtaining permit coverage.
 - Shading has been omitted due to the number of changes.
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EFFECTIVE DATE

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- The provisions in Section 4.0 of this memorandum are effective for all projects developed/constructed under the provisions of VDOT 2007 Road and Bridge Supplemental Specification SS1D016-0913 et seq.
 - All other sections of this memorandum are effective upon receipt.
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ACRONYMS

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- BMP – Best Management Practice
 - DCR – (The) Virginia Department of Conservation and Recreation
 - DEQ – (The) Virginia Department of Environmental Quality

- ESC – Erosion and Sediment Control
- ESCCC – Erosion and Sediment Control Contractor Certification
- IIM – Instructional and Informational Memorandum
- IAT – Interagency Transfer
- L&D – Location and Design
- PAC – Pre Advertisement Conference
- RLD – Responsible Land Disturber
- RLDA – Regulated Land Disturbance Activity
- SWCB – State Water Control Board
- SWM – Stormwater Management
- SWPPP – Stormwater Pollution Prevention Plan
- VDOT – (The) Virginia Department of Transportation
- VPDES – Virginia Pollutant Discharge Elimination System
- VSMP – Virginia Stormwater Management Program
- VSWCB – Virginia Soil and Water Conservation Board

1.0 BACKGROUND

- 1.1 Acts of the General Assembly have resulted in the enactment of the Stormwater Management Law (Section 62.1-44.15:24 et seq. of the Code of Virginia) and the issuance of the Virginia Stormwater Management Program Regulations (9 VAC 25-870-10 et seq.) for discharges of stormwater from Regulated Land Disturbing Activities. The law empowers the SWCB to regulate, permit, and control stormwater runoff in the Commonwealth and authorizes the SWCB to delegate such powers to DEQ.
- 1.2 Effective July 1, 2013, the Stormwater Program, including the VPDES General Permit for Discharges of Stormwater from Construction Activities was transferred from DCR to DEQ. The sections of the Code of Virginia and the Virginia Administrative Code (VAC) referenced herein reflect new numbering as a result of the program transfer.
- 1.3 Authorization to discharge stormwater from construction activities under the VSMP Regulations and the Virginia Stormwater Management Act is permitted through DEQ's VPDES General Permit for Discharges of Stormwater from Construction Activities VAR10 (hereafter referred to as the VPDES Construction Permit). This IIM addresses the conditions and requirements within the permit that is effective July 1, 2014 to June 30, 2019. Except for emergency related activities, coverage under the VPDES Construction Permit must be obtained prior to beginning any land disturbance on regulated activities.

2.0 APPLICATION

- 2.1** The VPDES Construction Permit is applicable for all RLDAs undertaken by or for VDOT including projects developed under the PPTA and Design Build process, Capital Outlay projects and non-routine maintenance activities, including those performed by state forces or hired equipment. For the purposes of this IIM, the RLDA is defined as the proposed construction or maintenance related land disturbing project or activity that generates the need for acquiring coverage under the VPDES Construction Permit.
- 2.2** In accordance with the instructions contained in this document, VDOT shall apply for and secure coverage under the VPDES Construction Permit for all applicable land disturbing activities over which it has contractual control or which are done by state forces. This includes any support facilities located within VDOT right of way or easement.
- 2.3** It shall be the responsibility of those conducting land disturbing activities on VDOT right of way or easement under agreement and/or a land use permit to secure coverage under the VPDES Construction Permit for their activities (if applicable). This includes, but is not limited to, those land disturbing activities conducted on VDOT right of way or easement by municipalities under the First Cities Program, the Locally Administered Project Program and the Transportation Enhancement Program.
- 2.4** Except for land disturbing activities associated with routine maintenance operations, coverage under the VPDES Construction Permit is required for all land disturbing activities that equal or exceed one acre in size.
 - 2.4.1** For construction and maintenance related projects/activities that include non-contiguous land disturbing activities, when such land disturbing activities are one mile or more in distance apart, as measured between the closest outer limits of each adjacent land disturbing project/activity and as measured along the most direct public travelway, they shall be considered separate and individual land disturbing activities for the applicability of the VPDES Construction Permit coverage and requirements.
 - 2.4.2** Each individual construction contract containing land disturbances requiring VPDES Construction Permit coverage shall have only one VPDES General Permit number unless the provisions of section 2.4.1 of this IIM apply.
 - 2.4.4** Applying the provisions of section 2.4.1 and 2.4.2 of this IIM could result in one of the following situations:
 - 1.** A UPC/project number having more than one VPDES General Permit number. When this occurs, care should be taken to make sure each individual permitted site included under one UPC/project number has a distinct designation that is clearly identifiable in the construction plans or other such documents and the permit registration packet. Where general SWPPP information is the same, it will not be necessary to duplicate such information in SWPPP General Information Sheet notes in the construction plans or other such documents for each individual site.

However, where site specific information is required in the SWPPP General Information Sheet notes (e.g., project location, land disturbance values, receiving waters, etc.), such information is to be identified for each individual permitted site.

2. One VPDES General Permit number applying to multiple UPC/project numbers. Where multiple UPC/project numbers are to be covered under one permit application, the LD-445 and other applicable forms should list all the UPC/project numbers. The cost of the permit can be allocated to just one of the UPC/project numbers or can be divided among all of the UPC/project numbers, whichever the Project Authority deems most appropriate.
- 2.5 Routine maintenance activities are exempt from the VSMP Regulations and VPDES Construction Permit coverage regardless of the amount of land disturbance.
- 2.5.1 This exemption is only for those maintenance activities considered routine and only applies to the VSMP Regulations and VPDES Construction Permit Program. It does not apply to the ESC Program, other applicable SWPPP components or other policies related to upstream and downstream channel and flood impacts. An ESC Plan (including downstream channel adequacy analysis, as appropriate) and other applicable SWPPP components are required for any land disturbing activity that equals or exceeds 10,000 square feet (2,500 square feet in the area defined as Tidewater, Virginia in the Chesapeake Bay Preservation Act) regardless of any exemption under the VSMP Regulations and VPDES Construction Permit Program (see current version of IIM-LD-11 and 246 for more information on ESC Plan and SWPPP requirements).
- 2.5.2 Routine maintenance is defined as those activities performed to maintain the original line and grade, hydraulic capacity, or original construction of the facility. Such activities include, but are not limited to, ditch cleaning operations, shoulder grading operations, pipe replacement or rehabilitation operations, pavement milling and/or overlays, bridge deck replacement, and the normal operational procedures for maintaining the travel surface of unpaved/gravel roadways (i.e., dragging, blading, grading, etc.). When classifying a land disturbance activity as a routine maintenance, consideration should be given to the fact that changes to the size, shape, slope and material of a drainage feature (i.e., ditch, culvert, etc.) may alter the conveyance of flow, but may still maintain the original hydraulic capacity of the facility, since for certain flood events, that may include conveyance of flow over the roadway section.
- 2.5.3 The paving of an existing road with a compacted or otherwise impervious surface (e.g., gravel) and re-establishment of original ditches and shoulders is considered routine maintenance for the purposes of determining the applicability of the VSMP Regulations and VPDES Construction Permit coverage provided all of the following conditions are met:
1. The proposed paved area will approximate the existing compacted or otherwise impervious area.

2. There will be no changes to the existing horizontal or vertical alignment.
 3. Roadside ditch work will only be performed as necessary to re-establish original line, grade or hydraulic capacity, provide positive drainage or address safety concerns.
 4. Drainage pipe work will only be performed as necessary to extend existing structures, replace structurally deficient structures or address safety concerns.
- 2.5.4 Facilities that support the routine maintenance activity (e.g., disposal areas for surplus dirt or borrow pits) are not considered a part of the routine maintenance operation and, therefore, are not covered under the routine maintenance activity exemption. If the support facility does not otherwise have coverage under the VPDES Construction Permit, it must be evaluated for the applicability of VPDES Construction Permit and where found necessary, VPDES Construction Permit coverage must be obtained (either by VDOT or the site owner) prior to any land disturbance activities occurring at the site.
- 2.5.5 For any maintenance activity being classified as routine, the activity files shall be documented regarding the original and proposed line, grade, hydraulic capacity and construction of the facility. Documentation of original conditions can be in the form of old plans, photographs or other such documents depicting the original line and grade, hydraulic capacity, or original construction of the facility. Written and signed statements from those that know the history of the facility can also serve as documentation of the original conditions.
- 2.5.6 Where there is any question as to the application of the routine maintenance definition to a land disturbing activity, the appropriate District Hydraulics Engineer should be consulted.

3.0 LAND DEVELOPMENT AREA AND LAND DISTURBANCE AREA

- 3.1 The application for coverage under the VPDES Construction Permit requires the reporting of both the area of land development and the area of land disturbance.
- 3.1.1 The area of land development is the total VDOT owned/controlled area within the project limits identified in the construction plans or other such documents for the RLDA. The land development area would, typically, include areas such as the right of way and temporary and permanent easements, including that for any areas for support facilities identified and included as a part of the construction plans or other such documents and the registration information for VPDES Construction Permit coverage for the RLDA.

- 3.1.2 The area of land disturbance is the total area within the land development area that will be disturbed by the proposed activities. Land disturbance, for the purposes of applicability of the VSMP Regulations and the VPDES Construction Permit, is defined as any manmade change to the land surface that potentially changes its runoff characteristics including any clearing, grading or excavation associated with the proposed activity. Typically, the land disturbance area would be the area encompassed by the limits of the construction activity (i.e., the construction limits) for the RLDA plus any additional areas for support facilities if such areas are identified and included as a part of the construction plans or other such documents and the registration information for VPDES Construction Permit coverage for the RLDA.
- 3.1.3 Once VPDES Construction Permit coverage has been received, changes to the identified area of land disturbance within the identified area of land development can be made without having to re-permit the project/activity provided the additional land disturbance area, when combined with the originally reported area, does not change the VPDES Construction Permit fee previously paid to DEQ. If the additional land disturbance area does change the VPDES Construction Permit fee previously paid to DEQ, another application for permit coverage must be processed. The existing permit coverage must be terminated once new permit coverage is received.
- 3.1.4 A change in the identified land development area of the project/activity after receipt of VPDES Construction Permit coverage will require the processing of another application for permit coverage. The existing permit coverage must be terminated once the new permit coverage is received.
- 3.1.5 Because of the potential of having to submit the project/activity for new VPDES Construction Permit coverage and having to terminate the existing VPDES Construction Permit coverage when changes occur to the land development and land disturbance area, it is recommended that a liberal determination be applied when defining the area of land development and the area of land disturbance for the purposes of VPDES Construction Permit coverage.
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4.0 SUPPORT FACILITIES FOR THE RLDA

4.1 ONSITE

- 4.1.1 Onsite support facilities are defined as those facilities such as staging areas, equipment and material storage areas, unsuitable and surplus material disposal areas, borrow areas, etc., which are located within the project limits and within the designated land development area (VDOT right of way or easement) for the RLDA.
- 4.1.2 Onsite support facilities are to be covered under the VPDES Construction Permit for the RLDA. The SWPPP for the onsite support facilities shall include, but is not limited to, the ESC Plan, the Pollution Prevention Plan and the post construction SWM Plan (if applicable) and shall become a component of the SWPPP for the RLDA.

- 4.1.3 In most instances, the identification of the locations of the onsite support facilities is the responsibility of the contractor or other such person performing/managing the land disturbing activity and the exact location and size of such areas within the limits of the RLDA are unknown until after the award of the contract for the RLDA and/or after the VPDES Construction Permit registration process for the RLDA has been completed.
- 4.1.4 For all onsite support facilities requiring coverage under the VPDES Construction Permit which were not identified in the construction plans or other such documents or the registration information submitted for VPDES Construction Permit coverage for the RLDA, the contractor shall develop a SWPPP, which shall include but is not limited to the ESC Plan, the Pollution Prevention Plan and the post construction SWM Plan, for such areas in accordance with the VDOT R&B Standards and Specifications, the instructions in the current version of IIM-LD 11, 195 and 246 and VDOT's Approved ESC and SWM Standards and Specifications (see Section 21.0 in the latest version of IIM-LD-195 for additional information on VDOT's Approved ESC and SWM Standards and Specifications). The contractor shall have the ESC Plan and post construction SWM Plan for the onsite support facilities reviewed and approved by a person appropriately certified through DEQ's SWM and/or ESC Plan Reviewer certification program. The form LD-445C shall be used to certify the plan review and approval process. The SWPPP, including the LD-445C form, for the onsite support facilities shall be submitted to the VDOT RLD for the RLDA for review and approval.
- 4.1.5 The SWPPP for the RLDA will require modification for the inclusion of the SWPPP for the onsite support facilities once such areas are identified and plans are reviewed and approved by the RLD for the RLDA (see Section 107.16(e) of the 2007 R&B Specifications (as amended) and the current version of IIM-LD-11 and 246 for additional information for modifying the SWPPP, including the approved ESC Plan and post construction SWM Plan).
- 4.1.6 The impact of any additional land disturbance area associated with any onsite support facilities identified in Section 4.1.4 of this IIM shall be evaluated with regards to changes in the permitting conditions noted in Section 3.1.3 and 3.1.4 of this IIM.
- 4.2 OFFSITE
- 4.2.1 Offsite support facilities are defined as those facilities such as staging areas, equipment and material storage areas, unsuitable and surplus material disposal areas, borrow areas, etc., which are located outside the project limits/land development area of the RLDA.
- 4.2.2 Offsite support facilities may be located within or outside of VDOT right of way or easement.
- 4.2.3 Offsite support facilities located within VDOT Right of way or easement

- 4.2.3.1 Offsite support facilities located within VDOT right of way or easement may be identified and included in the construction plans or other such documents and the VPDES Construction Permit registration information for the RLDA. More typically, the identification of the location of such areas is the responsibility of the contractor or other such person performing or managing the land disturbing activity and such areas are not included in the registration information submitted to DEQ to acquire VPDES Construction Permit coverage for the RLDA.
- 4.2.3.2 Those offsite support facilities not included in the construction plans or other such documents and the VPDES Construction Permit registration information for the RLDA will not be included under the VPDES Construction Permit coverage for the RLDA. Instead, such offsite support facilities exceeding the land disturbance thresholds identified in Section 2.4 of this IIM shall be required to obtain individual coverage under the VPDES Construction Permit.
 - 4.2.3.2.1 Where multiple areas are being utilized for offsite support facilities, the land disturbance value for all the offsite support facilities located within VDOT right of way or easement for an individual RLDA shall be considered in total for the applicability of the VPDES Construction Permit coverage and requirements unless such activities meet the conditions of Section 2.4.1 of this IIM.
 - 4.2.3.3 For all offsite support facilities located within VDOT right of way or easement requiring individual coverage under the VPDES Construction Permit, the contractor shall develop the necessary plans and documents for applying for VPDES Construction Permit coverage and VDOT shall secure the permit coverage.
 - 4.2.3.3.1 The contractor shall develop a SWPPP, which shall include but is not limited to the ESC Plan, the Pollution Prevention Plan and the post construction SWM Plan, for such areas in accordance with the VDOT R&B Standards and Specifications, the instructions in the current version of IIM-LD 11, 195 and 246 and VDOT's Approved ESC and SWM Standards and Specifications. The contractor shall have the ESC Plan and post construction SWM Plan for the offsite support facilities reviewed and approved by a person appropriately certified through DEQ's SWM and/or ESC Plan Reviewer certification program. The form LD-445C shall be used to certify the plan review and approval process. The SWPPP, including the LD-445C form, for the offsite support facilities shall be submitted to the VDOT RLD for the RLDA for review and approval
 - 4.2.3.3.2 The contractor shall complete, and submit to the VDOT RLD, the VPDES Construction Permit Registration Information form LD-445 and the ESC & SWM Plan Certification form LD-445C for use in applying for coverage for the offsite support facilities under the VPDES Construction Permit. The RLD for the RLDA is to be listed on the LD-445 form as the RLD for the offsite support facility.

- 4.2.3.3.3 The VDOT RLD for the RLDA shall review the permit application forms for accuracy and completeness. Forms with incomplete or inaccurate information will be returned to the contractor for corrective action and resubmission.
- 4.2.3.3.4 Once the VDOT RLD receives a complete and accurate LD-445 and LD-445C form the contractor, the VDOT RLD shall complete the VPDES Construction Permit Registration Fee form LD-445B and then forward all documents to the appropriate District VPDES Construction Permit Coordinator for processing and obtaining VPDES Construction Permit coverage for the offsite support facilities. The process and time schedule for VDOT to request VSMP Construction Permit coverage from the DEQ is outlined in Section 6.0 of this IIM.
- 4.2.3.4 Once issued by DEQ, the VPDES Construction Permit coverage letter with the permit registration number will be transmitted to the VDOT RLD in accordance with the procedures noted in Section 6.7 and 6.9 of this IIM. The RLD shall provide the contractor a copy of the VPDES Construction Permit coverage letter and the notice to proceed in the offsite support facility area(s). No land disturbance activity can occur at the offsite support facility area(s) until the VPDES Construction Permit coverage for such has been secured and the VDOT RLD has provided the notice to proceed. Depending upon the submission date, it could take a maximum of 90 days from the time the contractor submits complete and accurate registration information to the VDOT RLD to the time the contractor receives the authority to proceed from the VDOT RLD. The VDOT RLD shall also complete and provide the contractor a copy of the VPDES Construction Permit Contact Information form LD-445A. The contact person for the offsite support facility area shall be the same as for the RLDA.
- 4.2.3.5 The contractor shall post a copy the VPDES Construction Permit coverage letter with the permit registration number and the LD-445A form at each applicable offsite support facility area in accordance with the instructions contained in the SWPPP General Information Sheets and Section 7.3 of this IIM.
- 4.2.3.6 Once all activity at the offsite support facility area has been completed and the site stabilized in accordance with the VDOT R&B Specifications and Section 8.1.1 of this IIM, the contractor shall complete and submit the VPDES Construction Permit Termination Notice form LD-445D to the designated VDOT RLD for processing in accordance with Section 8.0 et seq. of this IIM.
- 4.2.3.7 For offsite support facilities not requiring coverage under the VPDES Construction permit but disturbing 10,000 square feet or greater (2,500 square feet or greater in the Tidewater area – see the current version of IIM-LD-11 for the definition of Tidewater area), the contractor shall develop and have approved a SWPPP (which shall include but is not limited to an ESC Plan, a Pollution Prevention Plan and, when applicable, a post construction SWM Plan) in accordance with Section 4.2.3.3.1 of this IIM.
- 4.2.4 Offsite support facilities located outside of VDOT right of way or easement.

- 4.2.4.1 For all offsite support facilities located outside VDOT right of way or easement, it shall be the responsibility of the contractor to develop all necessary plans and documents and secure any necessary VPDES Construction Permit coverage directly from the VSMP Authority for the area in which the support facility is located.
- 4.2.4.2 Plans and documents for any offsite support facility shall be developed in accordance with the requirements of the VSMP Authority for the area in which the support facility is located.
- 4.2.4.3 Application for coverage under the VPDES Construction Permit shall be completed in accordance with the requirements of the VSMP Authority for the area in which the support facility is located.
- 4.2.4.4 The contractor shall be responsible for the installation of temporary erosion and sediment control measures and the permanent stabilization of all disturbed areas at borrow and soil disposal sites associated with the RLDA regardless of the need for VPDES Construction Permit coverage at those sites. The installation of temporary erosion and sediment control measures and the permanent stabilization of all disturbed areas at such sites shall be accomplished in accordance with the requirements of the VSMP or ESC Authority for the area in which the support facility is located or the ESC Law and Regulations, whichever is more stringent.

5.0 RESPONSIBLE PARTIES

5.1 VDOT Project Authority

Responsible for initiating the VPDES Construction Permit Registration application process. This includes, but is not limited to, the following:

- Completing, or coordinating the completion of, all of the information on the VPDES Construction Permit Registration Information form LD-445 and the VPDES Construction Permit Fee Registration form LD-445B.
- Attaching the completed ESC & SWM Plan Certification form LD-445C to the permit application assembly and sending the completed assembly for each RLDA to the District or Central Office (as applicable) VPDES Construction Permit Coordinator.
- Processing the VPDES Construction Permit registration assembly for the offsite support facilities within VDOT right of way or easement and submitting completed assemblies to the District or Central Office (as applicable) VPDES Construction Permit Coordinator.

- 5.1.1 For the purposes of this IIM, the Project Authority for the RLDA prior to award of the construction contract or the commencement of the land disturbing activity is assumed to be that VDOT person with responsibility for oversight of the preliminary engineering aspects of the RLDA such as the Project Manager, the Residency Contract Administrator, or other such person that manages/oversees the pre-construction activities of the proposed land disturbing activity.

- 5.1.2 For the purposes of this IIM, once the construction contract has been awarded or the land disturbing activity has begun, the Project Authority for the RLDA is assumed to be the designated VDOT RLD.

5.2 ESC Plan Designer/Hydraulic Engineer

Responsible for preparing the ESC and post construction SWM Plan for the RLDA in accordance with VDOT's Approved ESC and SWM Standards and Specifications. This includes, but is not limited to, the following:

- Developing and ensuring that all applicable information is included on the SWPPP General Information Sheets (see the current version of IIM-LD-246).
- Assisting the Project Authority in completing the VPDES Construction Permit Registration Information form LD-445.
- Completing and submitting the Erosion and Sediment Control and Stormwater Management Plan Certification form LD-445C to the Project Authority.

5.3 VDOT District VPDES Construction Permit Coordinator

Responsible for coordinating the VPDES Construction Permit Registration application process for the District. This includes, but is not limited to, the following:

- Collecting all of the completed VPDES Construction Permit Registration application assemblies (i.e., forms LD-445, LD-445B and LD445C) and uploading them to the InsideVDOT VPDES Construction Permit web site.
- Collecting and uploading the completed Stormwater Pollution Prevention Plan Certification forms LD-445E and the VPDES Construction Permit Termination Notice forms LD-445D to the InsideVDOT VPDES Construction Permit web site.
- Attaching a copy of the VPDES Construction Permit Registration Information form LD-445 to the applicable VPDES Construction Permit coverage letter received from the Central Office VPDES Construction Permit Coordinator and forwarding both to the RLD for each specific RLDA or offsite support facility area located within VDOT right of way or easement.

- 5.3.1 The District VPDES Construction Permit Coordinator is the District Drainage Engineer or his/her designee.

5.4 VDOT Responsible Land Disturber (RLD)

Responsible for ensuring the implementation of the SWPPP (including the ESC, Pollution Prevention and post construction SWM Plan) for the RLDA and any onsite and offsite support facilities located within VDOT right of way or easement. This includes, but is not limited to, the following:

- Coordinating the review and approval for the SWPPP for any onsite or offsite support facilities within VDOT right of way or easement not identified in the construction plans or other such documents for the RLDA.

- Coordinating the submission of information for offsite support facilities located within VDOT right of way or easement that require VPDES Construction Permit coverage.
- Completing, signing, and forwarding, to the appropriate District VPDES Construction Permit Coordinator, the SWPPP Certification form LD-445E, certifying that all information noted on the SWPPP General Information Sheets contained in the construction plan set (or other such documents) required to be supplied by the contractor (including that for onsite support facilities) will be received and approved and included with the other SWPPP documents for the proposed RLDA prior to any land disturbance activities occurring in those areas identified by such information.
- Completing and forwarding, to the appropriate District VPDES Construction Permit Coordinator, the VPDES Construction Permit Termination Notice form LD-445D certifying that final stabilization has been achieved on all portions of the RLDA site and/or offsite support facilities within VDOT right of way or easement and (where applicable) that all permanent (post construction) SWM BMPs have been constructed in accordance with their plan design details and that the BMPs have been made operational.
- Coordinating with the appropriate VDOT District Maintenance Infrastructure Manager to obtain a Maintenance ID number for each permanent (post construction) SWM BMP and reporting such number, along with other applicable information, on the BMP information portion of the VPDES Construction Permit Termination Notice form LD-445D.

5.4.1 The RLD is the VDOT person so identified on the SWPPP General Information Sheets and satisfies the requirements of DEQ's RLD Certification Program. The certification that the BMP(s) were constructed in accordance with their plan details and that the BMP(s) have been made functional shall be performed by a person registered in the Commonwealth of Virginia as a Professional Architect, Engineer, Land Surveyor or Landscape Architect.

5.5 VDOT Central Office VPDES Construction Permit Coordinator

Responsible for compiling all VPDES Construction Permit Registration assemblies statewide and applying to DEQ for coverage under the VPDES Construction Permit for the RLDAs or offsite support facilities within VDOT right of way or easement. This includes, but is not limited, to the following:

- Submitting the VPDES Construction Permit Registration and Termination information (spread sheet) and registration fees (in the form of an IAT) to DEQ.
- Forwarding the VPDES Construction Permit coverage letters (including permit number) received from the DEQ to the District VPDES Construction Permit Coordinator.
- Providing specific project information to the Central Office L&D Administrative Section for processing the project charges and the IAT for DEQ.

- Maintaining an online database documenting pertinent information on the RLDA's and offsite support facilities within VDOT right of way or easement submitted for VPDES Construction Permit coverage.
- Inputting permanent SWM BMP data submitted with the VPDES Construction Permit Termination Notice form LD-445D into the L&D BMP Design Database.

5.5.1 The Central Office VPDES Construction Permit Coordinator is a designated person in the Central Office Location and Design Division.

6.0 VPDES CONSTRUCTION PERMIT REGISTRATION PROCEDURE

6.1 Except for emergency related work, coverage under the VPDES Construction Permit must be obtained prior to any land disturbance occurring on any proposed project/activity or offsite support facilities within VDOT right of way or easement that exceed the land disturbance threshold amount noted in Section 2.4 of this IIM. Once VDOT submits a complete and accurate registration statement (including applicable permit fee) to DEQ, DEQ must issue or deny VPDES Construction Permit coverage within 30 calendar days. The registration statement will be considered submitted once the appropriate registration information and permit fee (in the form of the IAT documentation) have been sent to DEQ by the VDOT Central Office VPDES Construction Permit Coordinator.

6.1.1 Land disturbing activities requiring VPDES Construction Permit coverage which are conducted in response to a public emergency to avoid imminent endangerment to human health or environment may commence without VPDES Construction Permit coverage provided that both of the following conditions are met:

1. DEQ is advised of the activity within seven calendar days of commencing the land disturbance activity.
2. VPDES Construction Permit coverage (if applicable) is applied for within 30 calendar days of commencing the land disturbance activity.

See Section 6.13 of this IIM for additional information related to the permitting process for emergency work.

6.2 On or before the initiation of the PAC process for a RLDA (or other appropriate stage for those activities that do not go through a formal PAC process), the VDOT Project Authority shall complete, or have the appropriate person complete, the applicable sections of the VPDES Construction Permit Registration Information form LD-445 and the VPDES Construction Permit Fee Registration form LD-445B, attach the ESC and SWM Plan Certification form LD-445C and send this assembly to the appropriate VDOT District VPDES Construction Permit Coordinator prior to the 21st day of each month.

- 6.2.1 For Capital Outlay projects, the VDOT Project Authority shall submit the completed permit registration assembly directly to the VDOT Central Office VPDES Construction Permit Coordinator.
- 6.2.2 For Public/Private Transportation Act (PPTA) and Design Build (DB) projects, the VDOT Project Authority shall submit the completed permit registration assembly to either the VDOT District VPDES Construction Permit Coordinator (where the project is being managed in the VDOT District Office) or the VDOT Central Office VPDES Construction Permit Coordinator (where the project is being managed in the VDOT Central Office).
- 6.3 The VDOT District VPDES Construction Permit Coordinator shall review all permit registration assemblies received for completeness and then upload all assemblies found complete to the InsideVDOT VPDES Construction Permit web site on or before the last day of each month. The VDOT District VPDES Construction Permit Coordinator will return all incomplete assemblies to the VDOT Project Authority for completion and resubmission.
- 6.4 The VDOT Central Office VPDES Construction Permit Coordinator shall:
- Compile all VPDES Construction Permit registration information from registration assemblies and enter appropriate data into the VPDES database.
 - Create the VDOT VPDES Construction Permit Registration Report.
 - Determine the total fee to be paid to the DEQ for registering the RLDA's or offsite support facilities for coverage under the VPDES Construction Permit using the VPDES Construction Permit Fee Summary Report.
 - Complete and get authorized an IAT for the fee to be paid to DEQ.
 - Complete the DEQ Registration Statement for Construction Permit coverage.
 - Complete the cover letter for submitting information to DEQ.
 - Submit all VPDES Construction Permit registration information to VDOT management for review and signature.
- 6.5 Once VDOT management reviews and signs the DEQ submittal package, the VDOT Central Office VPDES Construction Permit Coordinator shall submit the information to DEQ for processing. Based on the various reviews and approvals required, it could take up to 15 business days for the Central Office VPDES Construction Permit Coordinator to compile and submit the VPDES Construction Permit registration information to DEQ. To facilitate the VPDES Construction Permitting process, the submissions to DEQ will only occur only once-a-month.
- 6.6 Within 30 calendar days after DEQ receives the VPDES Construction Permit submittal package, DEQ will issue or deny permit coverage for each RLDA or offsite support facility area. For those RLDA's or offsite support facility areas approved for coverage, DEQ will issue a permit coverage letter to the VDOT Central Office VPDES Construction Permit Coordinator with a project specific permit registration number. Where DEQ denies coverage for any RLDA or offsite support facility area, the registration information will be returned to VDOT for revision (as appropriate) and re-submittal.

- 6.7 The VDOT Central Office VPDES Construction Permit Coordinator will forward the RLDA or offsite support facility area permit coverage letters to the appropriate VDOT District VPDES Construction Permit Coordinator or the VDOT Capital Outlay, PPTA or Design Build Project Authority.
- 6.8 Because of the many steps involved in the VPDES Construction Permit coverage process, a minimum of 90 calendar days should be allotted from the time complete registration information is submitted to the District (or Central Office) VPDES Construction Permit Coordinator to the time the permit coverage letter is forwarded to the District VPDES Construction Permit Coordinator or the VDOT Capital Outlay, PPTA or Design Build Project Authority.
- 6.9 The VDOT District VPDES Construction Permit Coordinator or Capital Outlay/PPTA/Design Build Project Authority shall attach a copy of the VPDES Construction Permit Registration Information form LD-445 to each applicable RLDA or offsite support facility area VPDES Construction Permit coverage letter received and distribute both to the appropriate VDOT RLD.
- 6.10 The VDOT Central Office VPDES Construction Permit Coordinator shall submit copies of the LD-445B forms to the VDOT Central Office Location and Design Administrative Section in order to debit the appropriate permit registration fee from each specific RLDA.
- 6.11 The VDOT Central Office VPDES Construction Permit Coordinator shall maintain an online database documenting the registered RLDAs and offsite support facilities within VDOT right of way or easement and shall retain, on file, copies of the VPDES Construction Permit Registration Application information for a period of not less than 3 years after completion of the RLDA or offsite support facilities within VDOT right of way or easement and the termination of the VPDES Construction Permit coverage.
- 6.12 The VPDES Construction Permit Registration Application for any RLDA or offsite support facility area located within VDOT right of way or easement missing any of the submission cutoff dates (i.e., to VDOT District or Central Office VPDES Construction Permit Coordinator) will be carried forward to the next month's submission to DEQ.
- 6.13 The following procedures shall be followed for land disturbing activities related to emergency operations that may require coverage under the VPDES Construction Permit.
 - 6.13.1 The Project Authority shall complete the Notification of Emergency Related Land Disturbing Activities form LD-445F and submit such to DEQ by mail or fax (with copies to the VDOT District and Central Office VPDES Construction Permit Coordinators) no later than seven calendar days after commencement of the land disturbing activities associated with the emergency operations.
 - 6.13.2 Once a determination is made as to the actual land disturbance area associated with the emergency operations, those operations exceeding the land disturbance thresholds identified in Section 2.4 of this IIM shall follow the procedures in Section 6.0 et seq. of this IIM for obtaining VPDES Construction Permit coverage except for the following:

- a. The application for VPDES Construction Permit coverage for the emergency operations shall be submitted to the District VPDES Construction Permit Coordinator no later than 14 calendar days following commencement the land disturbing activities associated with the emergency operations.
- b. The application for VPDES Construction Permit coverage for the emergency operations shall be submitted by the District VPDES Construction Permit Coordinator to the Central Office VPDES Construction Permit Coordinator no later than 21 calendar days following commencement the land disturbing activities associated with the emergency operations.
- c. The application for VPDES Construction Permit coverage for the emergency operations shall be submitted by the Central Office VPDES Construction Permit Coordinator to the DEQ no later than 30 calendar days following commencement of land disturbing activities associated with the emergency operations.

7.0 CONDITIONS OF COVERAGE UNDER THE VPDES CONSTRUCTION PERMIT

- 7.1 The SWPPP (see the current version of IIM-LD-246), along with a copy of the VPDES General Construction Permit, the VPDES Construction Permit Registration Information form LD-445 and the VPDES Construction Permit coverage letter showing the permit registration number, must be retained on the site of the RLDA or the offsite support facility area within VDOT right of way or easement from the commencement of any land disturbance activity to the date of permit coverage termination. Where no facilities are available at the activity site to maintain these documents, they are to be kept by or with the designated VDOT RLD at a location convenient to the activity site where they would be readily available for review upon request during normal business hours. Where the SWPPP documents are not stored at the site of the RLDA or the offsite support facility area within VDOT right of way or easement, a copy of such documents, except for the ESC and SWM engineering calculations and documentation, shall be in the possession of those with day to day operational control over the implementation of the SWPPP (e.g., the VDOT RLD, VDOT ESC Inspector, the contractor's ESCCC person, etc.) whenever they are on site.
- 7.2 The VPDES Construction Permit requires that the SWPPP be made available for review upon the request of DEQ, the EPA, local government officials or the operator of a municipal separate storm sewer system (MS4) receiving discharge from the RLDA or any of the RLDA's support facilities covered under the VPDES Construction Permit for the RLDA.
- 7.3 The VPDES Construction Permit requires that a copy of the permit coverage letter and the name and contact information for the VDOT person responsible for the land disturbing activity and the SWPPP be posted at a publicly accessible location at the activity site. The LD-445A form is to be used to identify the name and contact information for the VDOT responsible person (typically the designated RLD for the activity). A copy of the VPDES Construction Permit coverage letter and the LD-445A form are to be posted outside the project's construction office along with other Federal and State mandated information.

Where there is no construction office (e.g., a maintenance activity or an offsite support facility), a copy of the VPDES Construction Permit coverage letter and the LD-445A form are to be maintained with the other SWPPP documents for the land disturbing activity.

- 7.4 The VPDES Construction Permit requires that the SWPPP be made available for review by the public upon request. Such reviews shall be at a time and publicly accessible location convenient to the VDOT and shall be scheduled during normal business hours and no less than once a month (i.e., at least once a month).
- 7.5 Any modifications to the approved SWPPP must be implemented in accordance with Section 107.16(e) (as amended) of the VDOT R&B Specifications, the VDOT's Approved ESC and SWM Standards and Specifications, and the procedures outlined in the current version of IIM-LD-11 and IIM-LD-246.

8.0 PROCEDURE FOR TERMINATING COVERAGE UNDER VPDES CONSTRUCTION PERMIT

- 8.1 Upon completion of land disturbance activities at the RLDA or offsite support facility area within VDOT right of way or easement (i.e., all areas are stabilized and all permanent SWM BMPs are operational), the VDOT RLD shall coordinate with the appropriate District Maintenance Infrastructure Manager to secure a VDOT Maintenance ID Number for each BMP listed in the Permanent BMP Table A in Section VI of the SWPPP General Information Sheets for the land disturbing activity. The VDOT RLD shall complete and sign the VPDES Construction Permit Termination Notice form LD-445D. The LD-445D form (including all permanent BMP information) is to be submitted to the appropriate VDOT District VPDES Construction Permit Coordinator prior to the 21st day of the month. A copy of the LD-445D form (including all permanent BMP information) is to be sent to the VDOT District Maintenance Engineer and the Central Office Maintenance Division Administrator.
 - 8.1.1 Since VDOT has the responsibility to maintain all of the properties it owns or operates (e.g., roadway rights of way and easements, facility properties, etc.) and since such responsibilities include maintaining land surfaces to prevent/control erosion, for the purposes of VPDES Construction Permit termination for the VDOT RLDAs or offsite support areas located within VDOT right of way or easement, the area is considered stable when all land disturbing activities have been completed and all disturbed areas not covered with a non-erodible surface have been limed, fertilized, seeded and mulched in accordance with an approved nutrient management plan.
- 8.2 The VDOT District VPDES Construction Permit Coordinator shall upload all LD-445D forms (including the permanent BMP information) received to the InsideVDOT VPDES Construction Permit web site on or before the last day of each month.
- 8.3 The VDOT Central Office VPDES Construction Permit Coordinator shall compile all VPDES Construction Permit termination information and enter the appropriate data into the VPDES database.

The VDOT Central Office VPDES Construction Permit Coordinator shall generate a VPDES Construction Permit Termination Report from the VPDES data base. The permanent BMP information is to be added to the VPDES Construction Permit Termination Report and all information is to be sent to DEQ along with the monthly VPDES Construction Permit Registration Report.

- 8.4 The VDOT Central Office VPDES Construction Permit Coordinator shall retain a copy of the permit termination information on file for a period of not less than 3 years after the termination date. The VDOT Central Office VPDES Construction Permit Coordinator shall also enter the permanent BMP information into the L&D BMP Design Data Base.

9.0 FORMS

LD-445	VPDES Construction Permit Registration Information
LD-445A	VPDES Construction Permit Contact Information
LD-445B	VPDES Construction Permit Fee Registration
LD-445C	ESC and SWM Plan Certification
LD-445D	VPDES Construction Permit Termination Notice
LD-445E	Stormwater Pollution Prevention Plan (SWPPP) Certification
LD-445F	Notification of Emergency Related Land Disturbing Activities

L&D forms are available through the VDOT website and can be downloaded at the following link: <http://vdotforms.vdot.virginia.gov/>

VIRGINIA DEPARTMENT OF TRANSPORTATION

LOCATION AND DESIGN DIVISION

INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: STORMWATER POLLUTION PREVENTION PLAN	NUMBER: IIM-LD-246.3
SPECIFIC SUBJECT: STORMWATER POLLUTION PREVENTION PLAN DOCUMENTS AND COMPONENTS	DATE: AUGUST 26, 2013
	SUPERSEDES: IIM-LD-246.2
APPROVAL: <div style="text-align: right;">B. A. Thrasher, P.E. State Location and Design Engineer Approved August 26, 2013</div>	

CURRENT REVISION

- Changes have been made throughout this IIM to reflect new requirements in the Virginia Stormwater Management Program Regulations and to clarify requirements in the General Permit for Discharges of Stormwater from Construction Activities (the VSMP Construction Permit).
- Shading has been omitted due to the number of changes.

EFFECTIVE DATE

- These instructions are effective upon receipt.
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ACRONYMS

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- BMP – Best Management Practice
 - DEQ – Department of Environmental Quality
 - ESC – Erosion and Sediment Control
 - ESCCC – Erosion and Sediment Control Contractor Certification
 - IIM – Instructional and Informational Memorandum
 - LD – Location and Design

- RLD – Responsible Land Disturber
 - RLDA – Regulated Land Disturbance Activity
 - R&B – Road and Bridge
 - SWM – Stormwater Management
 - SWPPP – Stormwater Pollution Prevention Plan
 - VDOT – Virginia Department of Transportation
 - VSMP – Virginia Stormwater Management Program
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1.0 BACKGROUND

- 1.1 Section 107.16 (e) of the 2007 VDOT R&B Specifications requires all land disturbance activities that disturb 10,000 square feet or greater (2500 square feet or greater in the area defined as Tidewater, Virginia in the Chesapeake Bay Preservation Act) (see the latest version of IIM-LD-11) to have a SWPPP.
 - 1.2 The VSMP General Permit for the Discharge of Stormwater from Construction Activities (hereafter referred to as the VSMP Construction Permit) also requires a SWPPP for activities covered under that permit. While a SWPPP is an important component of the VSMP Construction Permit, it is only one of the many requirements that must be addressed in order to be in full compliance with the conditions of the permit. Those persons who oversee or perform activities covered by the VSMP Construction Permit must review and understand all of the conditions and requirements contained within that permit.
 - 1.3 Effective July 1, 2013, the DCR Stormwater Program, including the Construction Permit Program, was transferred to the DEQ. The sections of the Virginia Administrative Code (VAC) referenced herein reflect new numbering as a result of the program transfer.
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2.0 SWPPP APPLICABILITY AND REQUIREMENTS

- 2.1.1 A SWPPP identifies potential sources of pollutants which may reasonably be expected to affect the stormwater discharges from the RLDA, and any support areas included in the VSMP Construction Permit coverage for the RLDA, and describes and ensures the implementation of practices to minimize pollutants in such discharges. For the purposes of this IIM, the RLDA is defined as the proposed construction or maintenance related land disturbing project or activity that generates the need for acquiring coverage under the VSMP Construction Permit and/or requires an ESC Plan.
- 2.1.2 The required contents of a SWPPP for those land disturbance activities requiring coverage under the VSMP Construction Permit are found in Section II, D of the General Permit section of the VSMP Regulations (9VAC25-880-70).

- 2.3 Except for the items dealing with the post construction stormwater management requirements, the majority of the items that must be addressed in the SWPPP for land disturbance activities requiring VSMP Construction Permit coverage must also be addressed for those land disturbance activities that do not require VSMP Construction Permit coverage but do require an ESC Plan in accordance with the requirements of the Virginia ESC Law and Regulations.
- 2.4 When the land disturbing activity requires coverage under the VSMP Construction Permit, the SWPPP must also include a copy of the VSMP Construction Permit, the VSMP Construction Permit Registration Information form LD-445, the VSMP Construction Permit Contact Information form LD-445A, the SWPPP Certification form LD-445E and the VSMP Construction Permit coverage letter received from DEQ showing a project specific permit number.
- 2.5 The SWPPP for the RLDA is to include any on site support facilities used exclusively for the RLDA (e.g., borrow and disposal sites, the contractor's storage and fueling areas, etc.) (see the current version of IIM-LD-242 for guidance related to SWPPP information for support facilities).
- 2.6 For those RLDAs requiring coverage under the VSMP Construction Permit, Section II B.1. of the General Permit section of the VSMP Regulations (9VAC25-880-70) requires the SWPPP to be signed by a person so identified in Section III K.2 of that same document. For a State Agency, that person is the principal executive officer or his designee. For VDOT projects, that authority has been delegated to the RLD for each specific RLDA.
- 2.7 Many of the items required in the SWPPP are inherently contained in the construction plans (or other such documents) by means of the erosion and sediment control plans and the post construction stormwater management plans and in other VDOT documents such as the R&B Standards and Specifications, which can be incorporated into the SWPPP by reference.

3.0 FORM LD-445E

- 3.1 For those land disturbing activities requiring coverage under the VSMP Construction Permit, the Construction Permit requires that the SWPPP for any support facilities be included in the permit coverage for the RLDA be developed and included with the SWPPP for the RLDA prior to issuance of permit coverage.
- 3.2 On most VDOT land disturbing activities, it is the responsibility of the contractor or other such person performing the land disturbance activity to identify the location of the support facilities and provide the SWPPP for such to the project engineer/RLD for review and approval (see the current version of IIM-LD-246 for further discussion on support facilities).

- 3.3 Since the VSMP Construction Permit coverage for VDOT RLDA is normally obtained prior to the identification of the support areas, a mechanism is required whereby the project files can be documented, and DEQ can be assured, that all of the information for the support facilities, as well as other required information not available at the time the VSMP Construction Permit coverage for the RLDA is applied for, has been, or will be, included in the SWPPP for the RLDA. The mechanism to be used for this purpose will be SWPPP Certification form LD-445E.
- 3.3.1 Form LD-445E is also to be used to identify the VDOT person responsible for the inspection of the erosion and sediment control facilities.
- 3.3.2 The DEQ has approved the signature of the RLD on the LD-445E form as meeting the SWPPP signatory requirements contained in Section II B.1. of the General Permit section of the VSMP Regulations (9VAC25-880-70).
- 3.3.3 Form LD-445E is to be completed by the VDOT RLD for all land disturbing activities requiring VSMP Construction Permit Coverage and/or an ESC Plan/SWPPP.
- 3.3.4 A copy of completed form LD-445E is to be retained with the other SWPPP documents for the RLDA.
- 3.3.5 For those land disturbing activities requiring coverage under the VSMP Construction Permit, the VDOT RLD is to send the completed LD-445E form to the District VSMP Construction Permit Coordinator for inclusion with other VSMP Construction Permit data that is submitted monthly to the Central Office VSMP Construction Permit Coordinator.
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4.0 SWPPP GENERAL INFORMATION SHEETS

- 4.1 In order to provide a clear understanding of what is required in a SWPPP and to provide a reference as to where those items are located within the contract/construction documents, a set of SWPPP General Information Sheets has been developed. The SWPPP General Information Sheets provide a summary of the information required in Section II D. of the General Permit section of the VSMP Regulations (9VAC25-880-70) and, where not included on the General Information Sheets, provide a reference to where that information can be found within the contract/construction documents for the RLDA (e.g., the construction plans or other such documents, the VDOT R&B Standards and/or Specifications, contractor supplied documents, etc.).
- 4.2 The SWPPP General Information Sheets incorporate many of the notes previously included in the ESC General Notes as well as those necessary to identify and describe the post construction stormwater management plan for the RLDA (if applicable).

- 4.3 The SWPPP General Information Sheets are to be included in the construction plan set (or other such documents) for all land disturbance activities requiring VSMP Construction Permit coverage and/or an erosion and sediment control plan. Completion and inclusion of the SWPPP General Information Sheets in the contract documents satisfies one of the many requirements contained in the VSMP Construction Permit. Those persons who oversee or perform activities covered by the VSMP Construction Permit must review and understand all of the conditions and requirements contained within that permit.
- 4.4 The SWPPP General Information Sheets are updated from time to time to clarify and/or include additional requirements as a result of changes to the VSMP Regulation, the VSMP Construction Permit or VDOT's Approved ESC and SWM Standards and Specifications. Prior to finalization of the construction plans or other such documents for a proposed land disturbance activity, the Project Manager or other such project authority is to verify that the most recent SWPPP General Information Sheets are included.
- 4.5 The SWPPP General Information Sheets have been developed in two formats as follows:
 - 4.5.1 Available in the CADD sheet 2000 cell library (referenced as SWPPP1, SWPPP2 & SWPPP3) for use with those land disturbance activities that have a formal set of construction plans (i.e., those developed under a Minimum (M) Plan or Complete (C) Plan Process).
 - 4.5.2 Available in Falcon under the Engineering Services' eng-scr directory (No Plan sub-directory) as an 8.5" X 11" letter size word document for use with those land disturbance activities developed under a No Plan (N) Process or for non-routine maintenance activities.
- 4.6 The SWPPP General Information Sheets are to be completed by the ESC Plan Designer, the Hydraulic Engineer or other such person who has the responsibility for developing the ESC and post construction SWM Plan (if applicable) for the RLDA.
- 4.7 Information required by those notes on the SWPPP General Information Sheets designated with an asterisk is to be developed/provided by the contractor. Information required by those notes on the SWPPP General Information Sheets designated with a double asterisk is to be provided/completed by the VDOT RLD.
- 4.8 All information/notes in Sections I through VI of the SWPPP General Information Sheets are applicable to land disturbance activities requiring coverage under the VSMP Construction Permit.
- 4.9 For land disturbance activities requiring an ESC Plan but exempt from the VSMP Regulations or the need for coverage under the VSMP Construction Permit, the information noted on the SWPPP General Information Sheets in Section IV and Section VI, is, typically, not applicable. Those sections, as well as any other notes/information in other sections of the SWPPP General

Information Sheets not applicable to a specific land disturbance activity should be deleted, struck through or noted as "NA" (i.e., not applicable to the land disturbance activity).

- 4.10 Section V of the SWPPP General Information Sheets requires a location map that clearly identifies the project location and all surface waters, such as rivers, streams, lakes, ponds, etc. (including names where applicable), within a one mile radius of the project site. Instructions for placing a location map in Section V can be found at the web addresses noted on the SWPPP General Information Sheets. Those unable to access the noted sites should contact the District or Central Office Hydraulics Section, as appropriate, for assistance. Other methods that produce the desired map may be used in lieu of those noted.
- 4.11 The permanent BMP information (when applicable) in Section VI is to be completed by the Hydraulic Engineer (or other such person developing the post construction SWM Plan) and is to be based on the pre-construction design. This information is to be updated when any changes to the post construction SWM Plan are authorized during the construction phase of the activity. Such changes are to be made as a formal revision to the plans. When submitting a request for termination of the VSMP Construction Permit coverage, the RLD is to use the information in the Permanent BMP table(s) in completing the BMP information section on form LD-445D.
- 4.12 Some of the notes on the General Information Sheets require project specific user input. Some examples of the information required are as follows:
- 4.12.1 Section I General
- 4.12.1.1 Note 1 - Activity Description (Examples)
- This roadway construction project consists of adding two additional parallel lanes to an existing two lane rural roadway facility.
 - This roadway construction project consists of improving an existing urban roadway intersection by adding left turn and right turn lanes.
 - This roadway construction project consists of replacement of an existing bridge with a new bridge and improvements to the existing roadway approaches.
 - This roadway construction project consists of widening an existing urban street and adding additional turn lanes.
 - This roadway maintenance project consists of re-grading and enlarging the roadside ditches and replacing drainage pipes along an existing rural roadway.
 - This roadway maintenance project consists of re-grading the roadside ditches and replacing deteriorated drainage pipes along an existing rural roadway in order to reestablish original grade and/or hydraulic capacity.

4.12.1.2 Note 6 - Critical Areas (Example)

- There is one farm pond located 1500' north of Station 29+00 Route 602 and an existing perennial stream located 1000' east of and parallel to Route 55 between Stations 204+00 and 212+00.

4.12.2 Section II Erosion and Sediment Control

4.12.2.1 Note 1 - Variances (Example)

- A variance to decrease the height of silt fence to 26" approved by letter from the Department of Environmental Quality's Piedmont Regional Office dated July 15, 2013.

5.0 SWPPP DOCUMENTS

5.1 For VDOT RLDA's, the required documents for a SWPPP shall include, but are not limited to, the following:

1. The construction plans/documents.
2. The SWPPP General Information Sheets (with all notes completed with appropriate information).
3. The ESC Plan.
4. The post construction SWM Plan (if applicable).
5. The VDOT R&B Standards and Specifications, Supplemental Specifications, Special Provisions and Special Provision Copied Notes.
6. A copy of the VSMP General Permit For Discharges Of Stormwater From Construction Activities (the Construction Permit) (when applicable).
7. A copy of the VSMP Construction Permit coverage letter received from DEQ (when applicable).
8. A copy of the VSMP Construction Permit Registration Information form LD-445, (when applicable).
9. A copy of the SWPPP Certification form LD-445E.
10. Documents required to be developed/provided by the contractor for erosion and sediment control and stormwater pollution prevention associated with any support facilities to be included in the VSMP Construction Permit coverage for the RLDA.
11. All ESC inspection reports.
12. All ESC and SWM design computations and supporting data.
13. A Record Set of Plans (see Section 6.2 of this IIM for more information)

5.2 All documents related to the SWPPP for a RLDA (except for the ESC and SWM design computations and supporting data) shall be maintained at the activity site and shall be readily available for use by those with SWPPP implementation responsibilities. All documents related to the SWPPP for a RLDA shall be

readily available for review by others upon request during normal working business hours. SWPPP related information not included in the construction plans/documents, the VDOT R&B Standards, Specifications, Supplemental Specifications, Special Provisions or Special Provision Copied Notes and the ESC and SWM design computation files is to be kept in a designated separate paper and/or electronic file. Where no facilities are available at the activity site to maintain the SWPPP documents, they are to be kept at a location convenient to the activity site where they will be readily available for use by those with SWPPP implementation responsibilities and would be available for review by others upon request during normal business working hours. Where the SWPPP documents are not stored on site, a copy of such documents, except for the ESC and SWM engineering calculations and documentation, shall be in the possession of those with day to day operational control over the implementation of the SWPPP (e.g. the VDOT RDL, the VDOT ESC Inspector, the contractor's ESCCC person, etc.) whenever they are on site.

6.0 SWPPP COMPONENTS

- 6.1 The following list outlines the major components of a SWPPP, the person(s) responsible for ensuring that the component is addressed in the SWPPP for a RLDA and how that component is addressed in the construction plans or other such documents for a VDOT land disturbing activity.
- 6.1.1 A copy of the VSMP Construction Permit registration statement and coverage letter (when applicable).
 - The RLD ensures that a copy of the VSMP Construction Permit Registration Information form LD-445, a copy of the SWPPP Certification form LD-445E and the VSMP Construction Permit coverage letter received from DEQ is maintained in the SWPPP file for the RLDA.
 - 6.1.2 A copy the VSMP Construction Permit (when applicable).
 - The RLD ensures that a copy is maintained in the SWPPP file for the RLDA. A copy of the VSMP Construction Permit can be obtained at: http://www.virginiadot.org/business/resources/LocDes/VSMP_Construction_Permit_VAR10.pdf
 - 6.1.3 A narrative description of the nature of the construction activity, including the function of the project.
 - The ESC Plan Designer incorporates project specific information into the appropriate note(s) on the SWPPP General Information Sheets for the RLDA.
 - 6.1.4 The intended sequence and timing of activities that disturb soils at the site (e.g., grubbing, excavation, grading, utilities and infrastructure installation).
 - The Contractor or other such person develops/provides project specific information. The RLD ensures that the information is maintained in the SWPPP file for the RLDA.

- 6.1.5 A record of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated.
- The Contractor or other such person develops/provides project specific information. The RLD ensures that the information is maintained in the SWPPP file for the RLDA.
- 6.1.6 Estimates of the total area expected to be disturbed by excavation, grading, or other construction activities.
- The ESC Plan Designer obtains the information and incorporates it into the appropriate note on the SWPPP General Information Sheets for the RLDA.
- 6.1.7 A description of any other potential pollutant sources, such as vehicle fueling, storage of fertilizers or chemicals, sanitary waste facilities, etc.
- The Contractor or other such person develops/provides project specific information. The RLD ensures that the information is maintained in the SWPPP file for the RLDA.
- 6.1.8 Identification of the nearest receiving waters at or near the construction site that will receive discharges from disturbed areas of the RLDA.
- The ESC Plan Designer determines the information and incorporates it into the appropriate note on the SWPPP General Information Sheets for the RLDA.
- 6.1.9 The location and description of any discharge associated with industrial activity other than construction at the site. This includes stormwater discharges from dedicated asphalt plants and dedicated concrete plants that are covered by the VSMP Construction Permit for the RLDA.
- This information is covered by a standard note on the SWPPP General Information Sheets.
- 6.1.10 A legible general location map (e.g., USGS quadrangle map, a portion of a city or county map, or other map) with sufficient detail to identify the location of the construction activity and surface waters within one mile of the construction activity.
- The ESC Plan Designer or the Hydraulic Engineer develops and incorporates the location map into Section V of the SWPPP General Information Sheets for the RLDA.
- 6.1.11 A legible site map/plan identifying the following items:
- 6.1.11.1 Directions of stormwater flow and approximate slopes anticipated after major grading activities.
- The ESC Plan Designer ensures that the appropriate information (e.g., grading contours, typical sections, profiles and/or cross sections) is included in the construction plans or other such documents for the RLDA.
- 6.1.11.2 Areas of soil disturbance and areas of the site which will not be disturbed.
- The ESC Plan Designer ensures that the appropriate information (e.g., plan view construction limits and/or typical sections/cross sections) is included in the construction plans or other such documents for the RLDA.

- 6.1.11.3 Locations of major structural and nonstructural control measures identified in the SWPPP, including those that will be permanent after construction activities have been completed.
 - The ESC Plan Designer ensures that the appropriate information is included in the construction plans or other such documents for the RLDA.
- 6.1.11.4 Locations where stabilization practices are expected to occur.
 - The ESC Plan Designer ensures that the appropriate information (e.g., plan view construction limits and/or typical sections/cross sections) is included in the construction plans or other such documents for the RLDA.
- 6.1.11.5 Locations of surface waters.
 - The ESC Plan Designer ensures that the appropriate information is included in the construction plans or other such documents for the RLDA.
- 6.1.11.6 Locations where concentrated stormwater discharges from the construction site.
 - The ESC Plan Designer ensures that the appropriate information is included in the construction plans or other such documents for the RLDA.
- 6.1.11.7 Locations of any support areas (e.g., material, waste, borrow or equipment storage areas) that are to be included in the permit coverage and the SWPPP for the RLDA.
 - The Contractor or other such person provides project specific information. The designated RLD ensures that the information is maintained in the SWPPP file for the RLDA.
- 6.1.11.8 Locations of other potential pollutant sources, such as vehicle fueling, storage of chemicals, concrete wash-out areas, sanitary waste facilities, including those temporarily placed on the construction site, etc.
 - The Contractor or other such person provides project specific information. The designated RLD ensures that the information is maintained in the SWPPP file for the RLDA.
- 6.1.11.9 Areas where final stabilization has been accomplished.
 - The Contractor or other such person provides project specific information. The designated RLD ensures that the information is maintained in the SWPPP file for the RLDA.
- 6.1.12 The SWPPP shall include a description of all control measures that will be implemented as part of the construction activity to minimize pollutants in stormwater discharges. For each major construction activity identified, the SWPPP shall clearly describe appropriate control measures, the general sequencing during the construction process in which the control measures will be implemented, and which operator (i.e., contractor) is responsible for implementation of the control measure.

- The ESC Plan Designer/Hydraulics Engineer develops the ESC Plan and the SWPPP for inclusion in the construction plans/documents for the RLDA. The Contractor or other such person develops/provides proposed revisions to the ESC Plan and the SWPPP as necessary to meet differing field conditions or construction sequencing. The VDOT ESC Inspector reviews and the VDOT RLD approves any changes to the ESC Plan and the SWPPP. The RLD ensures that all required information is maintained in the SWPPP file and/or documented on the Record Set of Plans (see Section 6.2 of this IIM for additional information) for the RLDA in accordance with Section 107.16(e) of the 2007 Road and Bridge Specifications.
- 6.1.13 The SWPPP shall include a description of all erosion and sediment control measures (including supporting calculations) that will be installed during the construction process to control any potential pollutants in stormwater discharges from the construction site.
- The ESC Plan Designer develops the ESC Plan and required calculations for the RLDA. The ESC Plan is incorporated into the construction plans/documents for the RLDA. The ESC calculations are maintained in the project hydraulic files and the location of such files is documented by the ESC Plan Designer in the appropriate note on the SWPPP General Information Sheets for the RLDA.
- 6.1.14 The SWPPP shall describe measures to prevent the discharge of solid materials, including building materials, garbage, and debris to state waters, except as authorized by a Clean Water Act § 404 permit.
- This information is covered by a standard note on the SWPPP General Information Sheets.
- 6.1.15 The SWPPP shall describe control measures used to comply with applicable state or local waste disposal, sanitary sewer or septic system regulations.
- This information is covered by a standard note on the SWPPP General Information Sheets.
- 6.1.16 The SWPPP shall include a description of construction and waste materials expected to be stored on site, with updates as appropriate. The SWPPP shall also include a description of controls, including storage practices, to minimize exposure of the materials to stormwater and for spill prevention and response.
- The Contractor or other such person develops/provides project specific information. The designated RLD reviews and approves the information and ensures that copies of such are maintained in the SWPPP file for the RLDA.
- 6.1.17 The SWPPP shall include a description of, and all necessary calculations supporting, all post-construction stormwater management facilities (BMPs) that will be installed prior to the completion of the construction process to control pollutants in stormwater discharges after construction operations have been completed.
- The Hydraulic Engineer develops the post construction SWM Plan and required calculations. The post construction SWM Plan is incorporated into the construction plans/documents. The post construction SWM

calculations are maintained in the project hydraulic files and the location of such files is documented by the Hydraulic Engineer in the appropriate note on the SWPPP General Information Sheets for the RLDA.

- 6.1.18 The SWPPP shall include a description of pollutant sources from any applicable support areas and a description of the control measures that will be implemented at those sites to minimize pollutant discharges.
 - The Contractor or other such person develops/provides project specific information. The designated RLD reviews and approves the information and ensures that copies of such are maintained in the SWPPP file for the RLDA.
- 6.1.19 The name and phone number of qualified personnel conducting the ESC inspections shall be included in the SWPPP.
 - The VDOT RLD provides the appropriate information on SWPPP Certification form LD-445E and ensures a copy is maintained in the SWPPP file for the RLDA.
- 6.1.20 A report summarizing the scope of the ESC inspections, names and qualifications of personnel making the inspections, the dates of the inspections, major observations relating to the implementation of the SWPPP, and any corrective actions taken.
 - The Contractor's Erosion and Sediment Control Contractor Certified (ESCCC) person conducts initial inspections and completes the Construction Runoff Control Inspection Form C-107. The VDOT Certified ESC Inspector verifies inspection information on Form C-107 and the RLD ensures that all of the C-107 forms are maintained in the SWPPP file for the RLD.
- 6.1.21 Where the RLDA discharges to a surface water with an approved (as of the effective date of the VSMP Construction Permit) Total Maximum Daily Load (TMDL), the pollutant identified in any Waste Load Allocation (WLA) assigned to a construction activity must be identified in the SWPPP. The SWPPP shall include strategies and control measures to ensure consistency with the assumptions and requirements of any TMDL WLA that applies to the operator's discharge.
 - The TMDL and WLA information is included on the VSMP Construction Permit Registration Information form LD-445, a copy of which is to be maintained with other SWPPP documents for the RLDA. The ESC Plan Designer/Hydraulics Engineer ensures that the ESC and post construction SWM Plans consider the requirements of any applicable TMDL WLA.
- 6.2 Information contained in the SWPPP shall be updated as necessary by the RLD or his designee to reflect changes required due to differing field conditions and/or construction sequencing. Such changes as well as other information requiring documentation as construction activities are initiated or completed is to be maintained on or with a Record Set of Plans (the Record Plan Set).
 - 6.2.1 The Record Set of Plans is a paper or electronic copy of the construction plans that is used to document/record the following information:
 - Approved changes/modifications to the proposed ESC Plan.

- Approved changes/modifications to other components of the SWPPP.
- Required SWPPP information such as:
 - Dates of beginning and end of major grading operations.
 - Dates of initiation and completion of temporary/permanent stabilization practices.
 - Locations of material, waste, borrow or equipment storage areas included in the project's VSMP Construction Permit coverage.
 - Locations of other potential pollutant sources, such as vehicle fueling, storage of chemicals, concrete wash-out areas, sanitary waste facilities, etc., placed on the construction site.
 - Areas where final stabilization has been accomplished.

6.2.2 The Record Plan Set shall be kept current and shall reflect up to date conditions of the RLDA.

6.2.3 The Record Plan Set must be maintained at the project site and be available for review upon request (see Section 5.2 of this IIM for exceptions).

7.0 FORMS

7.1 LD-445	VSMP Construction Permit Registration Information
7.2 LD-445D	VSMP Construction Permit Termination Notice
7.3 LD-445E	Stormwater Pollution Prevention Plan (SWPPP) Certification
7.4 C-107	Construction Runoff Control Inspection Form