CONTRACT DOCUMENTS
and
TECHNICAL SPECIFICATIONS

for

CITYWIDE INTERSECTION SAFETY IMPROVEMENT PROJECT
HSIP – GROUP 1

July 2013

VDOT Project: U000-122-S55

UPC #	PHASE JOB #	FEDERAL AID #
102524	P101	HSIP-5A03 (537)
	M501	HSIP-5A03 (616)

City of Norfolk

Department of Public Works

7th Floor, City Hall Building
Norfolk, Virginia 23510
(757) 664-4631

CITY OF NORFOLK
LOCALLY ADMINISTERED
FEDERALLY FUNDED PROJECTS

NORFOLK CITYWIDE INTERSECTION SAFETY IMPROVEMENTS
GROUP ONE
PROJECT BID DOCUMENTS AND SPECIFICATIONS

STATE PROJECT NO. U000-122-S55, P101, M501
UPC NO. 102524
PE FEDERAL AID NO. HSIP 5A03(537)
CN FEDERAL AID NO. HSIP-5A03(616)
SITE PLAN NO. 13-0015

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Posted: August 2, 2013

CITY OF NORFOLK
DEPARTMENT OF PUBLIC WORKS
INVITATION FOR BIDS

PROJECT: **CITYWIDE INTERSECTION SAFETY IMPROVEMENT PROJECT HSIP – GROUP 1**
UPC 102524
VDOT Project U000-122-S55
PHASE P101, HSIP-5A03 (537)
PHASE M501, HSIP-5A03 (616)

Owner: City of Norfolk
Department of Public Works
Room 700, 7th floor, City Hall Building
810 Union Street, Norfolk, VA 23510
Contact: Pankaj Gupte, P.E.
Tel: (757) 664-7300 / Fax: (757) 664-7311

AE: Kimley-Horn and Associates
4500 Main Street, Room 500
Virginia Beach, Virginia 23462
Contact: Daniel Markham, P.E.
Tel: (757) 213-8604

****

Sealed bids are to be received in Public Works Department, Attn: Contracts Office, Room 700, 7th floor, City Hall Building, 810 Union Street, Norfolk, VA 23510 until **2:00 p.m., Tuesday, August 27, 2013,** for the above titled Project.

The Work under this project consists of implementing safety improvements at various intersections citywide to include, but not limited to, pavement markings, ADA upgrades, LED bulbs, traffic signal conversions, and access management. Locations include Chesapeake Blvd./Johnstons Rd., Monticello Ave/27th St., Church St./27th St., Granby St./27th St., and St. Pauls Blvd./Market St.

Funding for the project includes both Federal and State funds therefore specific requirements must be adhered to as well as conformance to the Davis-Bacon Act and VDOT requirements. In order to be considered for award, all prospective contractors, joint-ventures, and subcontractors shall be pre-qualified with the Virginia Department of Transportation in accordance with Section 102.01 of VDOT's 2007 Road and Bridge Specifications. Information regarding VDOT prequalification can be found at www.virginiadot.org/business/const/prequal.asp.

Bidding Documents are available from the Department of Public Works in accordance with the Instructions to Bidders upon non-refundable payment of **$5.00 per CD set** in the form of a check made payable to Treasurer, City of Norfolk. Cash payments will not be accepted. A copy of the Bidding Documents will be on file and open to inspection at The Builders and Contractors Exchange, Inc., Norfolk, VA (757-858-0680), The Builders and Contractors Exchange, Inc., Richmond, VA (804-353-2788), McGraw-Hill Construction-Dodge, Richmond, VA (804-343-2034), Reed Construction Data, Norcross, GA (800-641-4653), Valley Construction News, Richmond, VA (804-674-0118), and Hispanic Contractors Association-Carolinas, Columbia, SC (877-227-1680 ext. 8054).

A Bid Bond, certified check, or cashier's check made payable to the Treasurer, City of Norfolk, for 5% of total bid must accompany each bid. State Contractor registration class and number is required on the outside of the envelope. The City reserves the right to cancel the bid opening or to reject any or all bids in whole or part, when it is in the best interest of the City. The right to waive informalities and to determine responsiveness of any bid and

responsibility of all bidders is reserved to the City. Withdrawal of bids will be in accordance with Section 33.1-42.1 of the Norfolk City Code and Section 11-54 of The Code of Virginia, 1950 (as amended).

John M. Keifer
Director

The Virginian Pilot – August 4, 2013
DemandStar – August 4, 2013

INSTRUCTIONS TO BIDDERS

1. AUTHORIZATION TO TRANSACT BUSINESS IN THE COMMONWEALTH

(a) Bidder or offeror organized or authorized to transact business in the Commonwealth pursuant to Title 13.1 or Title 50 to include in its bid or proposal the identification number issued to it by the State Corporation Commission.

(b) Any bidder or offeror 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 why6 the bidder or offeror is not required to be so authorized.

2. SUBMISSION OF BIDS

(a) Make all bids on "Bid Form" and seal in opaque envelope. The name of project, the contractor's name, address, and Virginia Contractor Registration Class and Number shall be placed on the outside of the envelope.

(b) If a contract is for $120,000.00 or more, or if the total value of all such construction, removal, repair, or improvements undertaken by the bidder within any 12 month period is for $750,000.00 or more, the bidder is required under Title 54, Chapter 11, Code of Virginia, 1950 (as amended), to show evidence of being licensed as a Class A Contractor. If a contract is $7,500.00 or more, but less than $120,000.00, or if the total value of all such construction, removal, repair or improvements undertaken by the bidder within any 12 month period is less than $150,000, the bidder is required to show evidence of being licensed as a Class B Contractor. If a contract is $1,000 or more, but less than $7,500, or if the total value of all such construction, removal, repair or improvements undertaken by the bidder within any 12 month period is less than $150,000, the bidder is required to show evidence of being licensed as a Class C Contractor. The bidder shall place on the bid above its signature its Virginia Contractor Registration Class and Number. If a contract is less than $1,000.00, licensure is not required under Title 54, Chapter 11, Code of Virginia, 1950 (as amended).

(c) If bids are submitted by mail, enclose the above noted envelope in a second sealed, opaque envelope and address to: **City of Norfolk, Department of Public Works, Attn: Contracts Office, Room 700, 7th floor, City Hall Building, 810 Union St., Norfolk, VA 23510.** Bids submitted by mail must be received at the above address before the time designated for bid opening.

(d) Fully fill in all blanks in ink or typewritten**,** and state numbers in both writing and figures. Signatures shall be in longhand with name and title printed below. Bidders shall acknowledge all addenda in spaces provided on the bid form. For unit price contracts, in the event of a discrepancy between the Total Base Bid and the total of the extension of unit prices, the total extension of unit prices governs in determining the bid amount.

(e) Interlineations, alterations, and irregularities of any kind may be cause for rejection of the bid. Erasures or any physical changes on the form shall be initialed by the Bidder.

(f) Bidders may withdraw a bid after it has been submitted to the City any time prior to the stipulated time for opening such bids. Withdrawal of bids will be in accordance with Section 33.1-42.1 of the Norfolk City Code and Section 2.2-4330 of the Code of Virginia, 1950 (as amended).

3. EXAMINATION OF SITE

The bidder shall be responsible for having ascertained all pertinent local and existing conditions determinable by inspection and inquiry both on the site and adjacent thereto, including any other work being performed thereon, and shall include in its bid all cost attendant upon problems arising from said conditions existing at the time of submission of its bid.

Reference is made to the Contract Documents for information relating to reports, explorations, underground facilities, and easements. On request, the owner will provide each Bidder access to the site to conduct such examinations, investigations, explorations, tests and studies as each Bidder deems necessary for submission of a Bid. The Bidder must fill all holes, clean up, and restore the site to its former condition upon completion of such explorations, investigations, tests and studies, and hold the Owner harmless from any damage to property or injury to persons resulting from or arising out of such explorations, investigations, tests, and studies.

4. INQUIRIES, INTERPRETATION AND ADDENDA

Should a bidder find discrepancies in, or omissions from, the drawings or documents, or should it be in doubt as to their meaning, it should at once notify the Owner in writing. The Owner will welcome such inquiries and they will be given consideration. Every interpretation made by the Owner will be in the form of a printed addendum which will be on file in the office of the Owner. Addenda will be sent to each bidder, but it will be the bidder's responsibility to know of, examine and become familiar with all addenda issued. All addenda shall become a part of the Contract Documents. The Owner will not be responsible for any oral instruction.

The submission of a Bid will constitute inconvertible representation by the Bidder that the Bidder has complied with every requirement of this Section, that without exception, the Bid is premised upon the agreement by the Bidder to perform the Work required by the Contract Documents, and applying specific means, methods, techniques, sequence or procedures of construction (if any) that may be shown or indicated or expressly required by the Contract Documents, that the Bidder has given Written Notice to the Owner of all conflicts, errors, ambiguities, and discrepancies that the Bidder has discovered in the Contract Documents and the written resolutions thereof by the Owner is acceptable to the Bidder, and that the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions of performance and furnishing the Work.

5. CONFLICT HIERARCHY

Where conflicts occur with the Virginia Department of Transportation (VDOT) standards and specification, the City standards and specifications, and the requirements set forth herein, the (VDOT) standards and specifications shall govern. Waiver of any requirements set forth by the standards and specifications is at the discretion of the owner.

6. BID GUARANTEE

Bids shall be accompanied by a bid guarantee of five percent (5%) of the amount of the total bid including all additive alternates, if any, and may be a certified check or cashier's check or a Bid Bond, made payable to**: Treasurer, City of Norfolk.** Such bid bond or check shall be submitted with the understanding that it shall guarantee that the bidder will not withdraw its bid during the period of sixty (60) days following the opening of bids; that if its bid is accepted, it will enter into a Contract with the Owner in accordance with a form of agreement acceptable to and approved by the Owner and that the required Performance and Payment Bonds will be given; and that in the event of the withdrawal of said bid within said period, or failure to enter into said contract and given said bonds within ten (10) days after it has received notice of acceptance of its bid, the bidder shall be liable to the Owner for the full amount of the bid guarantee as representing the damage to the Owner on account of the default of the bidder in any particular thereof. The bid bonds and checks will be returned to the bidders after the Owner and the lowest, responsive, responsible bidder have executed a contract. If the required contract has not been executed within sixty (60) days after the date of the opening of the bids, then the bond or check of any bidder will be returned upon its request, provided it has not been notified of the acceptance of its bid prior to the date of such request.

7. PERFORMANCE AND PAYMENT BOND

The Contractor shall furnish a performance bond and a labor and material payment bond each in the amount of 100% of the contract price. Said bonds shall be delivered to the Owner (in duplicate) and shall be approved by the Owner prior to the execution of a construction contract between the Contractor and the Owner. Bonds shall be City of Norfolk standard form and shall be in accordance with Section 33.1-76 of the Norfolk City Code. All costs of bonds shall be paid by the Contractor. A bond rider will be required should change orders increase the amount of the contract by $100,000 or more.

8. TIME OF COMPLETION

(a) Time is of the essence. All work shall be completed within **Two Hundred Fifty Five (255) calendar days** from the Notice to Proceed. Work shall commence within (10) ten days from date of Notice to Proceed.

(b) Work shall not commence until the Contractor has received a fully executed copy of the Contract which authorizes the Work and has also received a Notice to Proceed issued by the authorized City representative. Work commenced prior to receipt of both a fully executed copy of the Contract and a written Notice to Proceed from an authorized City official shall be deemed unauthorized and such work will progress solely at Contractor's risk.

9. NON-DISCRIMINATION CLAUSE

The Contractor agrees to comply, and to require all suppliers and subcontractors paid in whole or in part from funds made available under this contract to comply with Section 122(a)(1) of the State and Local Fiscal Assistance Act of 1972 (P. L. 92-512), as amended, to wit:

"No person in the United States shall, on the grounds of race, color, national origin, or sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity of a State government or unit of local government, which government or unit receives funds made available under Subtitle A (of Title I of the Act.)

Any prohibition against discrimination on the basis of age under the Age Discrimination Act of 1975 or with respect to an otherwise qualified handicapped individual as provided in Section 504 of the Rehabilitation Act of 1973 shall also apply to any such program or activity.

Any prohibition against discrimination on the basis of religion, or any exemption from such prohibition, as provided in the Civil Rights Act of 1964 or Title VIII of the Act of April 11, 1968, hereafter referred to as the Civil Rights Act of 1968, shall also apply to any such program or activity."

Further, the Contractor agrees to comply with Section 33.l-53 of the Code of the City of Norfolk, Virginia 1979, as amended, regarding prohibited employment discrimination.

10. MINORITY BUSINESS CLAUSE

It is the policy of the City of Norfolk to facilitate the establishment, preservation, and strengthening of small businesses and businesses owned by women and minorities and to encourage their participation in the City's procurement activities. Toward that end, the City encourages these firms to compete and encourages non-minority firms to provide for the participation of small businesses and businesses owned by women and minorities through partnerships, joint ventures, subcontracts, and other contractual opportunities. Bidders (offerors) are asked, as part of their submission, to describe any planned use of such businesses in fulfilling this contract.

11. NON-COLLUSION AFFIDAVIT

(a) Every bidder, by submitting a bid, shall be deemed to covenant, with regard to said bid, as follows:

(1) that said bid was arrived at independently without collusion, consultation, communication, or agreement for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor.

(2) that, unless otherwise required by law, the prices which have been quoted in the bid submitted have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor.

(3) that no attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

A bid shall not be considered for award nor shall any award be made where the bidder shall have failed to comply with a(1), a(2), or a(3) above.

(b) Every bidder, in addition to making the above covenants (a)(1), (a)(2) and (a)(3) will be required to provide the City of Norfolk, with the bid submitted, the affidavit contained herein.
(c) Every bidder will be required to disclose, with the submitted bid, the following information:

(1) the correct mailing address of the bidder.

(2) if a corporation, the name and current mailing address of the President, the Secretary and the Treasurer of the corporation.

(3) if a partnership, proprietorship or other firm, the name and current mailing address of each partner, proprietor or member of said firm.

(4) whether or not the bidder is associated with; owns, in whole or in part; or is owned, in whole or in part, or is a subsidiary of, any other bidder.

(d) The fact that a bidder (1) has published price lists, rates or tariffs covering items included in the submitted bid; (2) has informed prospective customers of proposed or pending publication of new or revised price lists for such items; or (3) has sold the same items to other customers at the same prices being bid, does not constitute a disclosure within the meaning of Subparagraph 9(a).

(e) Any bid submitted by a corporate bidder shall be deemed to have been authorized by the Board of Directors of the bidder and such authorization shall be deemed to include the signing and submission of the bid and the execution of the affidavit required in (b) above as the acts and deeds of the corporation.

12. SUBSTANCE ABUSE AND DRUG-FREE WORK PLACE

The Contractor agrees to comply with Section 33.1-58 of the Code of the City of Norfolk, Virginia, 1996, as amended, regarding substance Abuse and Drug-Free Work Place Policy.

Bids to be opened:	**2:00 p.m., Tuesday**
	August 27, 2013
Work to be Completed in:	**255 calendar days**
Liquidated Damages:	**$600.00 per day to Substantial Completion**
	$600.00 per day to Final Completion
Performance Bond:	**100%**
Payment Bond:	**100%**
Bid Bond:	**5%**

BID FORM

To: City of Norfolk
Department of Public Works
City Hall Building
810 Union Street, Room 700
Norfolk, Virginia 23510

A. **UNIT PRICE BID**

In compliance with the Invitation for Bids and Instructions to Bidders, the General Conditions of the Contract, the contract drawings and specifications titled **CITYWIDE INTERSECTION SAFETY IMPROVEMENT PROJECT HSIP – GROUP 1; UPC 102524; VDOT Project U000-122-S55, PHASE P101 – HSIP-5A03 (537); PHASE M501 - HSIP-5A03 (616)** and all addenda issued to date, all of which are part of this bid, the undersigned hereby proposes to furnish all items, including materials, labor, and equipment called for by, and in strict accordance with Contract Documents and the list of unit prices hereto attached and referred to as Attachment A, for the sum of:

$_____

(Use words)

_____Dollars ($_____)

B. **ADDENDA**

The undersigned acknowledges receipt of the following addenda:

Addendum No._____Dated:_____

Addendum No._____Dated:_____

We agree to enter into a contract with the City of Norfolk, Virginia within ten (10) days of the award of same to us for the price named in our bid.

It is expressly agreed by us that the City of Norfolk, Virginia shall have the right to reject any and all bids and to waive any informalities.

In default of the performance on our part of the conditions of bid, our failure to enter into a contract with the City of Norfolk, Virginia, within the time above set, we herewith furnish a certified check, cashier's check (or Bid Bond) in the amount of $_____, which shall be forfeited as liquidated damages to the City of Norfolk, Virginia, but otherwise the said check or Bid Bond shall be returned.

We agree to begin work at any time after receipt of the Notice to Proceed from the Director of Public Works and complete all of the Work within **Two Hundred Fifty Five (255) calendar days**.

C. Norfolk Businesses: It is the policy of the City to support Norfolk businesses and workforce development and it encourages companies with corporate offices in Norfolk and which employ Norfolk residents to compete for City contracts. Bidders are asked, as part of their submission, to advise of their Norfolk location and detail their employment of Norfolk residents.

D. Equal Opportunity Business Development: It is the policy of the City of Norfolk to facilitate the establishment, preservation, and strengthening of small businesses and businesses owned by women and minorities and to encourage their participation in the City's procurement activities. Toward that end, the City encourages these firms to compete and encourages non-minority firms to provide for the participation of small businesses and businesses owned by women and minorities through partnerships, joint ventures, subcontracts, and other contractual opportunities. Bidders (offerors) are asked, as part of their submission, to describe any planned use of such businesses.

1. Is your firm a minority owned business? Yes ___ No ___ If yes, please check the appropriate category: ___ African American (male), ___ African American (female), ___ Caucasian (female), ___ Hispanic (male), ___ Hispanic (female), ___ Asian American (male), ___ Asian American (female), ___ American Indian (male), ___ American Indian (female), ___ Eskimo (male), ___ Eskimo (female), ___ Aleut (male), ___ Aleut (female), ___ Other (male), ___ Other (female).

2. Subcontracting Opportunities for Small, Women Owned, Minority Business Enterprises and Disabled Veterans. All prime contractors are requested to furnish the following information regarding participation of small, women owned, minority business enterprises and disabled veterans:

a. Proposed Name of your Subcontractor(s):

b. Proposed Minority Category of Subcontractor(s) - please check the appropriate category(ies):

___ African American (male)	___ African American (female)
___ Hispanic (male)	___ Hispanic (female)
___ Asian American (male)	___ Asian American (female)
___ American Indian (male)	___ American Indian (female
___ Eskimo (male)	___ Eskimo (female)
___ Aleut (male)	___ Aleut (female)
___ Other (male)	___ Caucasian (female)
	___ Other (female)

c. Proposed Amount of Subcontracts:

d. Proposed Description of commodity (i.e. masonry, hauling, insulation, etc.):

e. Proposed Description of Project:

f. Proposed Total value of awards to all subcontractors:

g. Proposed Total Number of minority subcontracts awarded:

h. If you do not propose the use of any subcontractors, please check here ____.

E. The undersigned has read all sections under "Instructions to Bidders."

F. **CONTRACTOR'S REGISTRATION AND SIGNATURE**

Registered Virginia Contractor Class and No._____

City of Norfolk Business License No. _____

Contractor_____ Signed_____ (SEAL)

Date_____ Title_____

NOTE: If Bidder is a corporation, write state of incorporation under signature and if a partnership, give full names of all partners.

END OF PAGE

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AFFIDAVIT

City of Norfolk, Virginia project: **Citywide Intersection Safety Improvement Project HSIP – Group 1; UPC 102524; VDOT Project U000-122-S55; Phase P101 – HSIP-5A03 (537); Phase M501 – HSIP-5A03 (616)**

Bid Date:_____

STATE OF VIRGINIA
(City/County)

This day personally appeared before the undersigned, a Notary Public in and for the City/County and State aforesaid,

_____, who having been first duly sworn according to law, did depose and aver as follows:

(a) That he is_____
(owner, partner, president, etc.)

of_____
(insert name of bidder)

(b) That he is personally familiar with the bid of

_____submitted in connection with the above captioned City of Norfolk project.

(c) That said bid was formulated and submitted in good faith as the true bid of said bidder.

(d) That said bid in no manner violates the Sherman Antitrust Act (15 U.S.C. '1 *et seq*.), The Virginia Antitrust Act (§59.1-9.1 through §59.1-9.17 Code of Virginia, (1950), as amended) or the Conspiracy to Rig Bids to Government Act (§§59.1-68.8, Code of Virginia (1950), as amended.

And further this deponent saith not.

_____
Affiant

Subscribed and sworn to before me this_____day of_____, 20___.

My commission expires:_____, 20___

_____
Notary Public

MAILING ADDRESS, FAX AND TELEPHONE NUMBER OF BIDDER:

_____

_____

_____

IF CORPORATION, PROVIDE NAME AND MAILING ADDRESS AS REQUIRED BELOW

PRESIDENT	SECRETARY	TREASURER
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

IF PARTNERSHIP, PROPRIETORSHIP, OR OTHER FIRM, PROVIDE NAME AND MAILING ADDRESS OF EACH PARTNER, PROPRIETOR, OR MEMBER OF FIRM.

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

END OF PAGE

A. COMPLIANCE WITH STATE LAW

B. AUTHORIZATION TO TRANSACT BUSINESS IN THE COMMONWEALTH

I. **CERTIFICATION**

A. The Bidder/Vendor (Please fill in with your enterprise's complete name)

_____

certifies that it is organized or authorized to transact business in the Commonwealth pursuant to Title 13.1 or Title 50.

The identification number issued to Bidder/Vender by the State Corporation Commission:

_____

B. Bidder/Vendor 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 describe why it is not required to be so authorized:

_____

_____

_____

II. **INSTRUCTIONS**

a. The Bidder/Vendor shall provide immediate written notice to the Contracting Officer if, at any time prior to contract award, the Vendor learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

b. A certification that any of the items in paragraph (a) of this provision exists will not necessarily result in withholding of an award under this solicitation. However, the certification will be considered in connection with a determination of the Bidder's/Vendor's responsibility. Failure of the Bidder/Vendor to furnish a certification or provide such additional information as requested by the appropriate City purchasing official may render the Bidder/Vendor non-responsible.

c. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (a) of this provision. The knowledge and information of a Bidder/Vendor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

d. The certification in paragraph (a) of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Bidder/Vendor knowingly rendered an erroneous certification, in addition to other remedies available to the City, the appropriate City purchasing official may terminate the contract resulting from this solicitation for default.

End of Page

SCHEDULE OF UNIT PRICES

CITYWIDE INTERSECTION SAFETY IMPROVEMENT PROJECT HSIP – GROUP 1
UPC 102524
VDOT Project U000-122-S55
Phase P101 – HSIP-5A03 (537)
Phase M501 – HSIP-5A03 (616)

OWNER: CITY of NORFOLK, VIRGINIA

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities provided, determined as provided in the Contract Documents. The prices quoted shall include, without exception, all materials, labor, equipment, appliances, clean-up, applicable sales, use and other taxes, building permits or fees, and the Contractor's labor, overhead, profit, mobilization and other mark-ups, and in full accordance with the Specifications. Include allowance for waste where appropriate. The unit prices shall be maintained throughout the contract period. Unit prices shall be used in determining additions or deductions from the TOTAL CONTRACT AWARD amount in the event of changes in the work.

Item #	Description	Unit	Qty	Price	Extension
1	Maintaining Traffic	LS	1		
2	Removal of Existing Traffic Control Equipment and Supports – 27th St. and Granby St.	LS	1		
3	Removal of Existing Traffic Control Equipment and Supports – 27th St. and Monticello Ave.	LS	1		
4	Removal of Existing Traffic Control Equipment and Supports – 27th St. and Church St.	LS	1		
5	Removal of Existing Traffic Control Equipment and Supports – Chesapeake Blvd. and Johnstons Rd.	LS	1		
6	Removal of Existing Traffic Control Equipment and Supports – St. Pauls Blvd. and Market St.	LS	1		
7	Remove Existing Junction Box	EA	2		
8	Remove and Relocate Existing Sign Panel	EA	21		
9	Remove Existing Sign Post	EA	6		
10	Remove Existing Sign Panel and Post	EA	5		
11	Relocate Existing Fiber Optic Cable	LS	4		
12	Relocate Existing Water Meter Valve	EA	1		
13	Adjust Existing Frame and Cover	EA	1		
14	Management of Contaminated Soil	DRUM	1		

Attachment A-1

Item #	Description	Unit	Qty	Price	Extension
15	Management of Contaminated Soil (Conc. Less than 10x treatment standards)	DRUM	1		
16	Pavement Message mark. Elongated Arrow Single	EA	30		
17	Pavement Message mark. Elongated Arrow Double	EA	6		
18	Pavement Message Mark. “Only”	EA	13		
19	Type B, Class I, pavement line marking, 4” Yellow	LF	70		
20	Type B, Class I, pavement line marking, 4” White	LF	1,300		
21	Type B, Class I, pavement line marking, 6” White	LF	510		
22	Type B, Class I, pavement line marking, 12” White	LF	2,290		
23	Type B, Class I, pavement line marking, 24” White	LF	695		
24	Type B, Class I, pavement marking, Yield Bar	LF	15		
25	Sidewalk Ramp Type A	EA	22		
26	Sidewalk Ramp Type B	EA	2		
27	Sidewalk Ramp Type C	EA	3		
28	Sidewalk Ramp, Type M2	EA	2		
29	Sidewalk Ramp Type R11	EA	1		
30	Hydraulic Cement Concrete	SY	250		
31	Drop Inlet Silt Traps (Type B)	EA	25		
32	Asphalt Concrete Type SM-9.5D	TON	10		
33	Untreated Aggregate Type I, No. 21A or 21B (aggregate base material, Type I, No. 21A or 21B)	TON	20		
34	Landscaping Improvements	LS	1		
35	Furnish and Install Sign Post STP-1, 2 ½”	LF	165		
36	Sign Post Wood 6” x 6”	LF	80		
37	Modify Existing Sign Post (Black Finish)	EA	8		

Attachment A-2

Item #	Description	Unit	Qty	Price	Extension
38	Modify Existing Sign panel (Black Finish)	SF	134		
39	Furnish and Install Traffic sign	SF	290		
40	Furnish and Install Traffic Sign Assembly (Mast Arm Installation)	SF	365		
41	Furnish and Install LED blankout sign assembly	EA	2		
42	Modify Signal Pole Foundation (27th St. and Granby St.)	EA	1		
43	Modify Signal Pole Foundation (St. Pauls Blvd. and Market St.)	EA	1		
44	Furnish and Install Signal Pole Foundation	CY	121		
45	Furnish and Install Pedestal Pole Foundation	EA	25		
46	Furnish and Install Traffic Controller Cabinet Foundation	EA	4		
47	Furnish and Install Mast Arm Assembly (VDOT Std MP-1, Type A, 20’ Pole Height, 20’ Mast Arm)	EA	1		
48	Furnish and Install Mast Arm Assembly (VDOT Std MP-1, Type A, 20’ Pole Height, 30’ Mast Arm)	EA	1		
49	Furnish and Install Mast Arm Assembly (VDOT Std MP-1, Type A, 20’ Pole Height, 65’ Mast Arm)	EA	1		
50	Furnish and Install Mast Arm Assembly (VDOT Std MP-1, Type A, 22’ Pole Height, 25’ Mast Arm)	EA	1		
51	Furnish and Install Mast Arm Assembly (VDOT Std MP-1, Type A, 22’ Pole Height, 75’ Mast Arm)	EA	1		
52	Furnish and Install Dual Mast Arm Assembly (VDOT Std MP-1, Type A, 22’ Pole Height, 30’ Mast Arm/35’ Mast Arm)	EA	1		
53	Furnish and Install Mast Arm Assembly (VDOT Std MP-1, Type C, 30’ Pole Height, 5’ Mast Arm)	EA	1		

Attachment A-3

Item #	Description	Unit	Qty	Price	Extension
54	Furnish and Install Mast Arm Assembly (VDOT Std MP-1, Type C, 30’ Pole Height, 55’ Mast Arm)	EA	2		
55	Furnish and Install Mast Arm Assembly (VDOT Std MP-1, Type C, 30’ Pole Height, 60’ Mast Arm)	EA	1		
56	Furnish and Install Mast Arm Assembly (VDOT Std MP-1, Type C, 30’ Pole Height, 65’ Mast Arm)	EA	1		
57	Pedestal Pole and Base (Type A, 20’)	EA	1		
58	Pedestal Pole and Base (Type A, 15’)	EA	3		
59	Pedestal Pole and Base (Type A, 12’)	EA	12		
60	Pedestal Pole and Base (Type A, 6’)	EA	1		
61	Pedestal Pole and Base (Type C, 20’)	EA	1		
62	Pedestal Pole and Base (Type C, 12’)	EA	7		
63	Furnish and Install Traffic Signal Head Assembly, 3-section	EA	49		
64	Furnish and Install Traffic Signal Head Assembly, 4-section	EA	4		
65	Furnish and Install Traffic Signal Head Assembly, 5-section	EA	1		
66	Furnish and Install Pedestrian Pushbutton Assembly	EA	42		
67	Furnish and Install Pedestrian Signal Head SP-8	EA	42		
68	Furnish and Install Junction Box (Type JB-S1)	EA	35		
69	Furnish and Install Junction Box (Type JB-S3)	EA	4		
70	Furnish and Install Decorative Median Fence	LF	625		
71	Electrical Service SE-3B	EA	2		
72	Electrical Service SE-5	EA	2		
73	Furnish and Install 4” PVC Conduit (Trench)	LF	520		
74	Furnish and Install 2” PVC Conduit (Trench)	LF	75		
75	Furnish and Install (2) 4” PVC Conduits (Trench)	LF	80		

Attachment A-4

Item #	Description	Unit	Qty	Price	Extension
76	Furnish and Install 2” HDPE conduit (directional drill)	LF	310		
77	Furnish and Install (2) 4” HDPE conduits (directional drill)	LF	1,125		
78	Furnish and Install 1-1/2” metal conduit	LF	235		
79	Jacked 4” pipe	LF	130		
80	Furnish and Install Pull Wire	LF	370		
81	14/3 conductor cable	LF	6,045		
82	14/5 conductor cable	LF	14,490		
83	14/7 conductor cable	LF	1,730		
84	8 conductor cable	LF	50		
85	6 conductor cable	LF	1,020		
86	Furnish and Install Emergency Priority System Conductor Cable	LF	2,435		
87	Furnish and Install Video Detection Conductor Cable	LF	2,835		
88	Furnish and Install Traffic Controller Assembly (Type 170, 332 Cabinet, Type A)	EA	3		
89	Furnish and Install Traffic Controller Assembly (Type 170, 332S Cabinet, Type C)	EA	1		
90	Furnish and Install Internal 170 Ethernet Card	EA	1		
91	Fiber Optic Cable Splice	EA	4		
92	Furnish and Install Fiber Optic Communications Cable Riser	EA	2		
93	Provide OTDR Traces	EA	2		
94	Optical Light Meter Testing	EA	4		
95	Furnish and Install Fiber Optic Media Converter	EA	1		
96	Furnish and Install Ethernet Switch	EA	1		
97	Furnish and Install Battery Backup Assembly (Stand-alone Cabinet, Type A Finish)	EA	1		
98	Furnish and Install Battery Backup Assembly (Stand-Alone Cabinet, Type C Finish)	EA	1		

Attachment A-5

Item #	Description	Unit	Qty	Price	Extension
99	Furnish and Install Emergency Priority System Optical Detector – Model 711	EA	4		
100	Furnish and Install Emergency Priority System Optical Detector – Model 721	EA	8		
101	Furnish and Install Emergency Priority System Optical Detector – Model 722	EA	1		
102	Furnish and Install Emergency Priority System Phase Selector Model 764	EA	4		
103	Furnish and Install Video Detection Optical Detector (Camera)	EA	14		
104	Furnish and Install Video Detection Video Processor Board – VIP3D.2	EA	8		
105	Furnish and Install VIP Communications Module (Viewcom/E Max+)	EA	3		
106	Furnish and Install video Surveillance System (CCTV)	EA	1		
107	Furnish and Install Video Surveillance System Conductor Cable Assembly (300 foot)	EA	1		
108	Wireless Magnetic Sensor Vehicle Detection System	EA	2		
	TOTAL BID				**$**

TOTAL UNIT PRICE BID:

$_____

_____DOLLARS_____CENTS

_____

Contractor's Signature Date

Attachment A-6

THE CITY OF NORFOLK, VIRGINIA

OFFICE OF THE CITY MANAGER

CONTRACT

THIS AGREEMENT, made as of the ___ day of _____ in the year **2013**, is between the **City of Norfolk, Virginia**, acting by and through the City Manager, hereinafter styled the **City**, and

party of the second part, hereinafter styled the **Contractor**.

WITNESSETH, That whereas the City has awarded to the Contractor, in accordance with his bid of **August 27, 2013** a contract for **CITYWIDE INTERSECTION SAFETY IMPROVEMENT PROJECT - HSIP – GROUP 1; UPC 102524; VDOT Project U000-122-S55; Phase P101 – HSIP-5A03 (537); Phase M501 - HSIP-5A03 (616)** as described in specifications and drawings prepared therefor by **Kimley-Horn and Associates, 4500 Main Street, Room 500, Virginia Beach, Virginia 23462** hereinafter styled the Engineer, or the City of Norfolk and on file in the office of the Director of Public Works of the City of Norfolk, Virginia.

ARTICLE 1 - THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except to the extent specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 2 - DATE OF COMMENCEMENT AND COMPLETION TIMES

The Contractor further agrees to begin Work at such a date as the Director of Public Works Department, Norfolk, Virginia, shall notify it to begin via a Notice to Proceed letter, and that it will achieve Substantial Completion of the entire Work in accordance with Paragraph 9.8 of the General Conditions not later than **Two Hundred Fifty Five (255) consecutive calendar days** from the date of commencement as well as achieve Final Completion in accordance with Paragraph 9.10 of the General Conditions not later than **Thirty (30) consecutive calendar days** from the last day of final completion.

ARTICLE 3 - LIQUIDATED DAMAGES

The Contractor and the City recognize that time is of the essence of this Agreement. In view of the difficulty of ascertaining the loss which the City will suffer by reason of delay in the performance of the Work, the Contractor and the City hereby agree upon as the liquidated damages set below that the City will suffer by reason of delay and/or default, and not as a penalty. Further, the City shall deduct and retain the amount of such liquidated damages out of the moneys which may be due or become due to the Contractor under this Agreement.

Accordingly, should the Contractor fail to achieve Substantial Completion of the aforesaid Work in accordance with the contract documents to the satisfaction and approval of the Engineer within the time

stipulated in Article 2 above, the Contractor shall pay to the City of Norfolk, Virginia, **Six Hundred Dollars and Zero Cents ($600.00**) for every calendar day beyond the time set for substantial completion.

After Substantial Completion, if the Contractor shall neglect, refuse, or fail to complete the remaining Work within the contract time or any proper extension thereof granted by the City, the Contractor shall pay the City **Six Hundred Dollars and Zero Cents ($600.00**) for every calendar day beyond the time set for final completion until the Work is completed and ready for final payment

ARTICLE 4 - CONTRACT PRICE

The City shall pay the Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined below subject to additions and deductions as provided in the Contract Documents:

For all Unit Price Work, an amount equal to the sum of the established unit prices hereto attached and referred to as Attachment A, for:

_____ Dollars and ____ Cents ($_____)

As provided in Subparagraph 7.3.3.2 of the General Conditions of the Contract (as modified), estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by the Engineer's recommendation to the City.

ARTICLE 5 - PAYMENTS

Based upon applications for payment submitted to the Engineer by the Contractor and certificates for payment issued by the Engineer, the City shall make monthly progress payments on account of the contract sum to the Contractor as provided in the conditions of the contract as follows:

The City will pay the Contractor, on or about the thirtieth calendar day after receipt of a Request for Payment, one hundred percent (100%) of the portion of the contract sum properly allocable to labor, materials, and equipment incorporated in the Work and eighty percent (80%) of the portion of the contract sum properly allocable to materials and equipment suitably stored at the site or at some other location agreed upon in writing by the parties, less the aggregate of previous payments in each case; provided, however, that the owner, at any time after fifty percent (50%) of the Work has been completed, if it finds that satisfactory progress is being made, may make any of the remaining partial payments in full; and upon final completion, a sum sufficient to increase the total payment to one-hundred percent (100%) of the contract sum. But such full payment or payments shall in no manner be construed as reducing the amount of the bond, or the liability of the surety thereon, until final completion and acceptance of all items of Work herein set forth.

The action of the Engineer by which the Contractor is to be bound according to the terms of this contract shall be that evidenced by his final estimate and certificate, all prior estimates upon which eighty percent (80%) or more may be made, being merely payment on account, and not payments for accepted Work, and subject to the correction of such final estimate, which may be made with notice to the Contractor.

ARTICLE 6 - CONTRACTOR'S REPRESENTATION

To induce the City to enter into this Agreement, the Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents and other related data identified in the Bidding Documents.

B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all federal, state, and local laws and regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site which have been provided with the Contract Documents, and (2) reports and drawings of a hazardous environmental condition, if any, at the site, which have been provided with the Contract Documents.

E. Contractor has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work.

F. Contractor is aware of the general nature of Work to be performed by City and others at the Site that relates to the Work as indicated in the Contract Documents.

G. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor

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

I. Contractor hereby certifies that it has familiarized itself with Sections 33.1-86 through 33.1-93 of the Code of the City of Norfolk, Virginia, 1979, as amended, entitled "Ethics in Public Contracting," including the additional statutes set forth in Section 33.1-86 thereof, and further that all amounts received by the Contractor pursuant to this Agreement are proper and in accordance therewith.

J. Contractor hereby certifies that at all times during which any term of this Agreement is in effect, it does not and shall not knowingly employ any unauthorized alien. For purposes of this section, an "unauthorized alien" shall mean any alien who is neither lawfully admitted for permanent residence in the United States nor authorized to be employed by either Title 8, section 1324a of the United States Code or the U.S. Attorney General.

K. Contractor hereby represents that it is organized as a stock or non-stock corporation, limited liability company, business trust, or limited partnership or registered as a registered limited liability partnership and is authorized to transact business in the Commonwealth as a domestic or foreign business entity if so required by Title 13.1 or Title 50 or as otherwise required by law.

ARTICLE 7 - CONTRACT DOCUMENTS

The Contract Documents consist of the following:

a. Invitation for Bids

b. Instructions to Bidders

c. Bid Form/Affidavit

d. Bid Bond

e. Contract

f. Performance Bond

g. Payment Bond

h. Certificate of Insurance

i. Notice of Award

j. Notice to Proceed

k. Change Orders (if any)

l. Other Documents as may be required by law or appended hereto

m. Drawings and Specifications prepared by: **Kimley-Horn and Associates, 4500 Main Street, Room 500, Virginia Beach, Virginia 23462.** Where conflicts occur with the Virginia Department of Transportation (VDOT) standards and specification, the City standards and specifications, and the requirements set forth herein, the (VDOT) standards and specifications shall govern. Waiver of any requirements set forth by the standards and specifications is at the discretion of the Owner.

n. Addendum (as listed in Bid Form)

End of Page

Witness the following signatures and seals:

Witness:

_____ _____
Contractor

_____
Signature

_____
Printed Name

Seal if Incorporated

_____
Title

Virginia State Contractor's License No. _____

City of Norfolk Business License No. _____

Contents Approved: _____
Director of Public Works

Approved as to form and correctness: _____
Deputy City Attorney

CITY OF NORFOLK, VIRGINIA

By_____
City Manager

Attest: _____
City Clerk

I hereby certify that the money required for this contract (agreement, obligation or expenditure) is in the City Treasury to the credit of the fund from which it is to be drawn, and not appropriated for any other purpose.

Account: _____ Amount: _____

Contract No.: _____ Vendor Code: _____

_____
Director of Finance Date

THIS

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PERFORMANCE BOND

Bond No. _____
Amount: **$_____**

KNOW ALL PERSONS BY THESE PRESENTS, that _____ of _____, hereinafter called the Contractor and _____ a corporation duly organized and existing under and by virtue of the laws of the State of _____, hereinafter called the Surety, and authorized to transact business within the Commonwealth of Virginia as the Surety, are held and firmly bound unto the City of Norfolk as Owner, in the sum of **_____ HUNDRED _____ DOLLARS and ____ CENTS ($_____)**, lawful money of the United States of America, for payment of which, well and truly be made to the Owner, the Contractor and the Surety bind themselves and each of their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents as follows:

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH THAT:

WHEREAS, the Contractor has executed and entered into a certain Agreement, hereto attached, with the Owner dated **_____. 2013**, for

CITYWIDE INTERSECTION SAFETY IMPROVEMENT PROJECT – HSIP – GROUP 1
UPC 102524
VDOT Project U000-122-S55; Phase P101 – HSIP-5A03 (537); Phase M501 – HSIP-5A03 (616)

NOW THEREFORE, if the Contractor, and its successors and assigns, shall at all times duly, promptly, and faithfully perform the Work and any alteration in or addition to the obligations of the Contractor arising thereunder, including the matter of infringement, if any, of patents or other proprietary rights, and shall assure all guarantees against defective workmanship and materials, including the guarantee period following final completion by the Contractor and final acceptance by the Owner and comply with all the covenants therein contained in the Specifications, Drawings, and other Contract Documents required to be performed by the Contractor, in the manner and within the times provided in the Agreement, and shall fully indemnify and save harmless the Owner from all costs and damage which it may suffer by reason or failure to do so, and shall fully reimburse and repay it all outlay and expenses which it may incur in making good any default, and reasonable counsel fees incurred in the prosecution of or defense of any action arising out of or in connection with any such default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that the Surety, for value received, for itself and its successors and assigns, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Contract Documents or to the Work to be performed thereunder, or payment thereunder before the time required therein, or waiver of any provision thereof, or assignment, subletting or transfer thereof or any part thereof, shall in any way affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration, addition to the terms of the Contract Documents or any such payment, waiver, assignment, subcontract or transfer.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

Whenever Contractor shall be declared by Owner to be in default under the Contract, the Owner having performed Owner's obligations thereunder, the Owner shall have the right, at its option, to require the Surety to promptly proceed to remedy the default within 30 days of notice by proceeding or procuring others to proceed with completing the Agreement with its terms and conditions including the correction of any defective work and the provision of safety measures required as the result of such default; and all reserves, deferred payments, and other funds provided by the Agreement to be paid to Contractor shall be paid to Surety at the same times and

under the same conditions as by the terms of that Agreement such fund would have been paid to Contractor had the Agreement been performed by Contractor; and Surety shall be entitled to such funds in preference to any assignee of Principal of any adverse claimant. Notwithstanding the above, the Owner shall have the right, with the approval of the Surety which shall not be unreasonably withheld, to take over and assume completion of the Agreement and be promptly paid in cash by the Surety for the cost of such completion less the balance of the Contract price.

IN WITNESS WHEREOF, all above parties bounded together have executed this instrument this _____ day of _____, 2013, the name and corporate seal of each corporate party being hereto affixed and those presents duly signed by its undersigned representative, pursuant to authority of its governing body.

CONTRACTOR

(_____)

By:_____(Seal)

Name:_____

Title: _____

_____
Attest

SURETY

_____

By:_____(Seal)

_____
Attest

APPROVED AS TO FORM: _____, 2013

City of Norfolk, OWNER

By: _____
Deputy City Attorney

NOTE: Date of Bond shall not be prior to the date of the Agreement. If the Contractor is a partnership, all partners shall execute the Bond.

IMPORTANT: The Surety named on this Bond shall be one who is licensed to conduct business in the Commonwealth of Virginia, and named in the current list of Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies, as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. All Bonds signed by an agent shall be accompanied by a certified copy of the authority to act for the Surety at the time of signing of this Bond.

End of Page

PAYMENT BOND

Bond No._____
Amount: **$**_____

KNOW ALL PERSONS BY THESE PRESENTS, that _____ of _____**,** hereinafter called the Contractor and _____ a corporation duly organized and existing under and by virtue of the laws of the State _____, hereinafter called the Surety, and authorized to transact business within the Commonwealth of Virginia as the Surety, are held and firmly bound unto the City of Norfolk as Owner, in the sum of _____ **DOLLARS and** _____ **CENTS ($**_____**)**, lawful money of the United States of America, for payment of which, well and truly be made to the Owner, the Contractor and the Surety bind themselves and each of their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents as follows:

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH THAT:

WHEREAS, the Contractor has executed and entered into a certain Agreement, hereto attached, with the Owner dated _____**, 2013**, for

CITYWIDE INTERSECTION SAFETY IMPROVEMENT PROJECT – HSIP – GROUP 1
UPC 102524
VDOT Project U000-122-S55; Phase P101 – HSIP-5A03 (537); Phase M501 – HSIP-5A03 (616)

NOW THEREFORE, if the Contractor shall promptly make payments to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the Work provided for in the Agreement, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, repairs on machinery, equipment, and tools consumed, used or rented in connection with the construction of the Work, and all insurance premiums on the Work, and for all labor performed in the Work, whether by Subcontractor or otherwise, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Contract Documents or to the Work to be performed thereunder, shall in any way affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract Documents.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, all above parties bounded together have executed this instrument this ____ day of _____, 2013, the name and corporate seal of each corporate party being hereto affixed and those presents duly signed by its undersigned representative, pursuant to authority of its governing body.

CONTRACTOR
(_____)

By:_____(Seal)

Name: _____

Title: _____

_____
Attest

SURETY

_____

By: _____(Seal)

_____
Attest

APPROVED AS TO FORM: _____, 2013

City of Norfolk, OWNER

By: _____
Deputy City Attorney

NOTE: Date of Bond shall not be prior to the date of the Agreement. If the Contractor is a partnership, all partners shall execute the Bond.

IMPORTANT: The Surety named on this Bond shall be one who is licensed to conduct business in the Commonwealth of Virginia, and named in the current list of Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies, as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. All Bonds signed by an agent shall be accompanied by a certified copy of the authority to act for the Surety at the time of signing of this Bond.

End of Page

CITY OF NORFOLK
LOCALLY ADMINISTERED
FEDERALLY FUNDED PROJECTS
REQUIRED SPCN, SP, AND SS

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VDOT SUPPLEMENTAL SPECIFICATIONS (SSs), SPECIAL PROVISIONS (SPs) AND SPECIAL PROVISION COPIED NOTES (SPCNs)

Where Virginia Department of Transportation (VDOT) Supplemental Specifications, Special Provisions and Special Provision Copied Notes are used in this contract, the references therein to "the Specifications" shall refer to the *Virginia Department of Transportation Road and Bridge Specifications*, dated 2007 for both imperial and metric unit projects. References to the "Road and Bridge Standard(s)" shall refer to the *Virginia Department of Transportation Road and Bridge Standards*, dated 2008 for both imperial and metric unit projects. References to the "Virginia Work Area Protection Manual" shall refer to the 2011 edition of the *Virginia Work Area Protection Manual* for imperial and metric unit projects. References to the "MUTCD" shall refer to the 2009 edition of the *MUTCD* and the current *Virginia Supplement to the MUTCD* for imperial and metric unit projects.

Where the terms "Department", "Engineer" and "Contract Engineer" appear in VDOT Supplemental Specifications, Special Provisions and Special Provision Copied Notes used in this contract and the VDOT publication(s) that each references, the authority identified shall be in accordance with the definitions in Section 101.02 of the *Virginia Department of Transportation Road and Bridge Specifications*, dated 2007. Authority identified otherwise for this particular project will be stated elsewhere in this contract.

VDOT Supplemental Specifications, Special Provisions and Special Provision Copied Notes used in this contract and the VDOT publication(s) that each reference are intended to be complementary to the each other. In case of a discrepancy, the order of priority stated in Section 105.12 of the *Virginia Department of Transportation Road and Bridge Specifications*, dated 2007 shall apply.

VDOT Special Provision Copied Notes in this contract are designated with "(SPCN)" after the date of each document. VDOT Supplemental Specifications and Special Provision Copied Notes in this contract are designated as such above the title of each document.

The information enclosed in parenthesis "( )" at the left of each VDOT Special Provision Copied Note in this contract is file reference information for VDOT use only. The information in the upper left corner above the title of each VDOT Supplemental Specification and VDOT Special Provision in this contract is file reference information for VDOT use only.

The system of measurement to be used in this project is stated elsewhere in this contract. VDOT Supplemental Specifications, Special Provisions and Special Provision Copied Notes containing imperial units of measure with accompanying expressions in metric units shall be referred to hereinafter as "dual unit measurement" documents. Such a "dual unit measurement" is typically expressed first in the imperial unit followed immediately to the right by the metric unit in parenthesis "( )" or brackets "[ ]" where parenthesis is used in the sentence to convey other information. Where a "dual unit measurement" appears in VDOT documents, the unit that applies shall be in accordance with the system of measurement as stated elsewhere in this contract. The unit shown that is <u>not</u> of the declared unit of measurement is not to be considered interchangeable and mathematically convertible to the declared unit and shall not be used as an alternate or conflicting measurement. Where VDOT Specifications are used for metric unit projects and only imperial units of measurement appear the document, the provision(s) in this contract for imperial unit to metric unit conversion shall apply.

12-1-11 (SPCN)

PERSONNEL REQUIREMENTS FOR WORK ZONE TRAFFIC CONTROL - Section 105 and 512 of the Specifications are amended as follows:

Section 105.14—Maintenance During Construction is amended to add the following:

The Contractor shall provide at least one person on the project site during all work operations who is currently verified either by the Department in Intermediate Work Zone Traffic Control, or by the American Traffic Safety Services Association (ATSSA) as a Traffic Control Supervisor (TCS). This person must have the verification card with them while on the project site. This person shall be responsible for the oversight of work zone traffic control within the project limits in compliance with the contract requirements involving the plans, specifications, the VWAPM, and the MUTCD. This person's duties shall include the supervision of the installation, adjustment (if necessary), inspection, maintenance and removal when no longer required of all traffic control devices on the project.

If none of the Contractor's on-site personnel responsible for the supervision of such work has the required verification with them or if they have an outdated verification card showing they are not currently verified either by the Department in Intermediate Work Zone Traffic Control, or by the American Traffic Safety Services Association (ATSSA) as a Traffic Control Supervisor (TCS) all work on the project will be suspended by the Engineer.

The Contractor shall provide at least one person on site who is, at a minimum, verified by the Department in Basic Work Zone Traffic Control for each construction and\or maintenance operation that involves installing, maintaining, or removing work zone traffic control devices. This person shall be responsible for the placement, maintenance and removal of work zone traffic control devices.

In the event none of the Contractor's on-site personnel of any construction/maintenance operation has, at a minimum, the required verification by the Department in Basic Work Zone Traffic Control, that construction/maintenance operation will be suspended by the Engineer until that operation is appropriately staffed in accordance with the requirements herein.

Section 512.03 Procedures is amended to add (r) **Work Zone Traffic Control** as the following:

(r) **Work Zone Traffic Control**: The Contractor shall provide individuals trained in Work Zone Traffic Control in accordance with the requirements of Section 105.14 of the Specifications.

Section 512.04 Measurement and Payment is amended to add the following:

Basic Work Zone Traffic Control – Separate payment will not be made for providing a person to meet the requirements of Section 105.14 of the Specifications. The cost thereof shall be included in the price of other appropriate pay items.

Intermediate Work Zone Traffic Control - Separate payment will not be made for providing a person to meet the requirements of Section 105.14 of the Specifications. The cost thereof shall be included in the price of other appropriate pay items.

6-11-09a (SPCN)

(**c105hf1**-0309) **SECTION 105.06 SUBCONTRACTING** of the Specifications is amended to include the following:

Any distribution of work shall be evidenced by a written binding agreement on file at the project site. Where no field office exists, such agreement shall be readily available upon request to Department inspector(s) assigned to the project.

The provisions contained in Form FHWA-1273 specifically, and other federal provisions included with the prime Contract are generally applicable to all Federal-aid construction projects and must be made a part of, and physically incorporated into all contracts, as well as, appropriate subcontracts for work so as to be binding in those agreements.

12-19-08 (SPCN)

General Decision Number: VA130013 01/04/2013 VA13

Superseded General Decision Number: VA20120013

State: Virginia

Construction Type: Highway

Counties: Chesapeake*, Isle of Wight, Norfolk*, Portsmouth*, Suffolk* and Virginia Beach* Counties in Virginia.

* INDEPENDENT CITIES

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Modification Number	Publication Date
0	01/04/2013

* SUVA2010-003 02/01/2011

	Rates	Fringes

CARPENTER (STRUCTURE).....$ 16.02

CEMENT MASON/CONCRETE FINISHER...$ 17.82

ELECTRICIAN.....$ 26.73

FORM SETTER.....$ 14.00

IRONWORKER, REINFORCING.....$ 20.00

LABORER

Asphalt Raker.....$ 11.00

Construction Laborer I

(Skilled Laborer).....$ 15.12

Construction Worker II

(Laborer).....$ 11.52

Fence Erector.....$ 15.18

Flagger.....$ 9.00

Guardrail Erector.....$ 14.13

Landscape Worker.....$ 13.20

Pipe Layer.....$ 13.00

Power Tool Operator.....$ 16.25

PAINTER.....$ 11.50

PILEDRIVERMAN.....$ 13.25

PLUMBER.....$ 16.00

POWER EQUIPMENT OPERATOR:

Asphalt Distributor.....$ 14.00

Asphalt Paver.....$ 20.98

Backhoe.....$ 16.71

Bulldozer (Utility).....$ 11.50

Bulldozer.....$ 17.50

Concrete Finish Machine.....$ 15.00

Concrete Paving Machine.....$ 14.00

Crane, Derrick, Dragline

(1 cm & under).....$ 25.51

Crane, Derrick, Dragline

(over 1 cm).....$ 25.51

Excavator (Gradall).....$ 17.54

Front End Loader (2 cm &

under).....$ 15.68

Front End Loader (over 2

cm).....$ 18.40

Hydro Seeder.....$ 16.00

Mechanic.....$ 16.00

Motor Grader (Fine Grade)...$ 16.72

Motor Grader (Rough Grade)..$ 18.40

Oiler, Greaser.....$ 14.00

Pavement Marking Operator...$ 11.00

Pavement Planing.....$ 14.75

Pile Driver.....$ 13.25

Roller (Finish).....$ 15.19

Roller (Rough).....$ 13.94

Scraper Pan.....$ 14.00

Slurry Seal Paver Machine...$ 18.50

Stone-Spreader.....$ 15.80

Tractor Operator (Crawlers).$ 14.21

Trenching Machine.....$ 10.00

Truck Operator (Utility)....$ 12.35

Vacuum Machine.....$ 15.05

SHEET METAL WORKER.....$ 19.20

TRUCK DRIVER

Fuel & Lubricant Service

Truck Driver.....$ 12.00

Truck Driver (Multi-Rear

Axle).....$ 14.84

Truck Driver (Single Rear

Axle).....$ 14.18

Truck Driver (Tandem Rear

Axle).....$ 14.31

Truck Driver, Heavy Duty

(7 c.y. & under).....$ 16.25

Truck Driver, Heavy Duty

(over 7 c.y.).....$ 13.73

WELDERS - Receive rate prescribed for craft performing

operation to which welding is incidental.

==========

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union

number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued

as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

END OF GENERAL DECISION.

PREDETERMINED MINIMUM WAGE RATES

U.S. DEPARTMENT OF LABOR
OFFICE OF THE SECRETARY
WASHINGTON
DECISION OF THE SECRETARY

This case is before the Department of Labor pursuant to a request for a wage predetermination as required by law applicable to the work described.

A study has been made of wage conditions in the locality and based on information available to the Department of Labor the wage rates and fringe payments listed are hereby determined by the Secretary of Labor as prevailing for the described classes for labor in accordance with applicable law.

This wage determination decision and any modifications thereof during the period prior to the stated expiration date shall be made a part of every contract for performance of the described work as provided by applicable law and regulations of the Secretary of Labor, and the wage rates and fringe payments contained in this decision, including modifications, shall be the minimums to be paid under any such contract and subcontractors on the work.

The contracting officer shall require that any class of laborers and mechanics which is not listed in the wage determination and which is to be employed under the contract, shall be classified or reclassified conformably to the wage determination, and a report of the action taken shall be sent by the Federal agency to the Secretary of Labor. In the event the interested parties cannot agree on the proper classification or reclassification of a particular class of laborers and mechanics to be used, the question accompanied by the recommendation of the contracting officer shall be referred to the Secretary for determination.

Before using apprentices on the job the contractor shall present to the contracting officer written evidence of registration of such employees in a program of a State apprenticeship and training agency approved and recognized by the U.S. Bureau of Apprenticeship and Training. In the absence of such a State agency, the contractor shall submit evidence of approval and registration by the U.S. Bureau of Apprenticeship and Training.

The contractor shall submit to the contracting officer written evidence of the established apprentice-journeyman ratios and wage in the project area, which will be the basis for establishing such ratios and rates for the project under the applicable contract provisions.

Fringe payments include medical and hospital care, compensation for injuries or illness resulting from occupational activity, unemployment benefits, life insurance, disability and sickness insurance, accident insurance (all designated as health and welfare), pensions, vacation and holiday pay, apprenticeship or other similar programs and other bona fide fringe benefits.

By direction of the Secretary of Labor

E. Irving Manger, Associate Administrator
Division of Wage Determinations
Wage and Labor Standards Administration

Form C-104
Rev. 7-13-05

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

PROJECT: U000-122-S55, P101, M501 (UPC 102524)

FHWA: HSIP-5A03 (537), HSIP-5A03 (616)

This form must be completed, signed and returned with bid; and failure to do so may result in the rejection of your bid. **THE CONTRACTOR SHALL AFFIRM THE FOLLOWING STATEMENT EITHER BY SIGNING THE AFFIDAVIT AND HAVING IT NOTARIZED OR BY SIGNING THE UNSWORN DECLARATION UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE UNITED STATES.** A SEPARATE FORM MUST BE SUBMITTED BY EACH PRINCIPAL OF A JOINT VENTURE BID.

STATEMENT, In preparation and submission of this bid, I, the firm, corporation or officers, agents or employees thereof did not, either directly or indirectly, enter into any combination or arrangement with any persons, firm or corporation or enter into any agreement, participate in any collusion, or otherwise take any action in the restraint of free, competitive bidding in violation of the Sherman Act (15 U.S.C. Section 1) or Article 1.1 or Chapter 12 of Title 18.2 (Virginia Governmental Frauds Act), Sections 59.1-9.1 through 59.1-9.17 or Sections 59.1-68.6 through 59.1-68.8 of the Code of Virginia.

AFFIDAVIT

The undersigned is duly authorized by the bidder to make the foregoing statement to be filed with bids submitted on behalf of the bidder for contracts to be let by the Commonwealth Transportation Board.

Signed at _____ , this ____ day of _____ , 20 ____
County (City), STATE

_____ By: _____ _____
(Name of Firm) (Signature) Title (print)

STATE of HSIP-5A03 (537), HSIP-5A03 COUNTY (CITY) of _____
To-wit:

I _____ , a Notary Public in and for the State and

County(City) aforesaid, hereby certify that this day _____

personally appeared before me and made oath that he is duly authorized to make the above statements and that such statements are true and correct.

Subscribed and sworn to before me this _____ day of _____ , 20 _____

_____ My Commission expires _____
Notary Public

OR

UNSWORN DECLARATION

The undersigned is duly authorized by the bidder to make the foregoing statement to be filed with bids submitted on behalf of the bidder for contracts to be let by the Commonwealth Transportation Board.

Signed at _____ , this ____ day of _____ , 20 ____
County (City), STATE

_____ By: _____ _____
(Name of Firm) (Signature) Title (print)

Form C-105
Rev. 7-13-05

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
AFFIDAVIT

PROJECT: **U000-122-S55, P101, M501 (UPC 102524)**

FHWA: HSIP-5A03 (537), HSIP-5A03 (616)

This form must be completed, signed, notarized and returned with bid; and failure to do so, may result in the rejection of your bid. A separate form must be submitted by each principal of a joint venture bid.

1. I, the firm, corporation or officers, agents or employees thereof have neither directly nor indirectly entered into any combination or arrangement with any person, firm or corporation or entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with such contract, the effect of which is to prevent competition or increase the cost of construction or maintenance of roads or bridges.

   During the preceding twelve months, I (we) have been a member of the following Highway Contractor's Associations, as defined in Section 33.1-336 of the Code of Virginia (1970). (If none, so state).

NAME	Location of Principal Office
_____	_____
_____	_____
_____	_____

2. I (we) have _____, have not _____, participated in a previous contract or subcontract subject to the equal opportunity clause, as required by Executive Orders 10925, 11114, or 11246, and that I/We have _____, have not _____, filed with the joint Reporting Committee, the Director of the Office of Federal Contract Compliance, a Federal Government contracting or administering agency, or the former President's Committee on Equal Employment Opportunity, all reports due under the applicable filing requirements.

   Note: The above certification is required by the Equal Employment Opportunity Regulations of the Secretary of Labor [41 CFR 60-1.7(b)(1)], and must be submitted by bidders and proposed subcontractors only in connection with contracts and subcontracts which are subject to the equal opportunity clause. Contracts and subcontracts which are exempt from the equal opportunity clause are set forth in 41 CFR 60-1.5. (Generally only contract or subcontracts of $10,000 or under are exempt.)

   Currently, Standard Form 100 (EEO-1) is the only report required by the Executive Orders or their implementing regulations.

Proposed prime contractors and subcontractors who have participated in a previous contract or subcontract subject to the Executive Orders and have not filed the required reports should note that 41 CFR 60-1.7(b) (1) prevents the award of contract and subcontract unless such contractor submits a report covering the delinquent period or such other period specified by the Federal Highway Administration or by the Director, Office of Federal Contract Compliance, U.S. Department of Labor.

(Continued)

ORDER NO.:
CONTRACT ID. NO.:

3. The bidder certifies to the best of its knowledge and belief, that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any Federal department or agency;

(b) Have not within a three year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offence in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated above; and

(d) Where the bidders is unable to certify to any of the statements in this certification, the bidder shall show an explanation below.

Explanations will not necessarily result in denial of award, but will be considered in determining bidder responsibility. For any explanation noted, indicate below to whom it applies, initiating agency, and dates of action. Providing false information may result in federal criminal prosecution or administration sanctions. The bidder shall provide immediate written notice to the Department if at any time the bidder learns that its certification was erroneous when submitted or has become erroneous by reason of change circumstances.

The undersigned is duly authorized by the bidder to make the foregoing statements to be filed with bids submitted on behalf of the bidder for contracts to be let by the Commonwealth Transportation Board.

Signed at _____ , this ____ day of _____ , 20 ____
County (City), STATE

_____ By: _____ _____
(Name of Firm) (Signature) Title (print)

STATE of _____ COUNTY (CITY) of _____
To-wit:

I _____ , a Notary Public in and for the State and County(City) aforesaid, hereby certify that this day _____ personally appeared before me and made oath that he is duly authorized to make the above statements and that such statements are true and correct.

Subscribed and sworn to before me this _____ day of _____ , 20 _____

_____ My Commission expires _____
Notary Public

Form C-111
Rev. 2-15-11

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
MINIMUM DBE REQUIREMENTS

PROJECT NO. U000-122-S55, P101, M501 (UPC 102524)

FHWA NO. HSIP-5A03 (537) and HSIP-5A-3 (616)

*** * * INSTRUCTIONS * * ***

THIS FORM CAN BE USED BY THE CONTRACTOR TO SUBMIT THE NAMES OF DBE FIRMS TO BE UTILIZED ON THE PROJECT. THE CONTRACTOR SHALL INDICATE THE DESCRIPTION OF THE CATEGORY (S, M, SP or H) AND THE TYPE OF WORK THAT EACH DBE WILL PERFORM AND THE ALLOWABLE CREDIT PER ITEM(S). ADDITIONAL SHEETS TO SHOW THE ALLOWABLE CREDIT PER ITEM MAY BE ATTACHED IF NECESSARY. **PLEASE NOTE:** THE AMOUNT OF ALLOWABLE CREDIT FOR A DBE SUPPLIER IS 60% OF THE TOTAL COST OF THE MATERIALS OR SUPPLIES OBTAINED AND 100% FOR A DBE MANUFACTURER OF THE MATERIALS AND SUPPLIES OBTAINED. A CONTRACTOR MAY COUNT 100% OF THE FEES PAID TO A DBE HAULER FOR THE DELIVERY OF MATERIALS AND SUPPLIES TO THE PROJECT SITE, BUT NOT FOR THE COST OF THE MATERIALS AND SUPPLIES THEMSELVES.

DBE REQUIREMENT 5 **%**

PERCENT ATTAINED BY BIDDER _____ **%**

NAMES(S) AND CERTIFICATION NO. OF DBE(S) TO BE USED	USED AS SUBCONTR. (S) MFG. (M) SUPPLIER (SP) HAULER (H)	TYPE OF WORK AND ITEM NO(S)	$ AMOUNT OF ALLOWABLE CREDIT PER ITEM
		TOTAL	**$**

TOTAL CONTRACT VALUE $ _____ x REQUIRED DBE 5 % = $ _____

I/WE CERTIFY THAT THE PROPOSED DBE(S) SUBMITTED WILL BE USED ON THIS CONTRACT AS STATED HEREON AND ASSURE THAT DURING THE LIFE OF THE CONTRACT. I/WE WILL MEET OR EXCEED THE PARTICIPATION ESTABLISHED HEREON BY THE DEPARTMENT.

_____ BY _____
BIDDER SIGNATURE

_____ BY _____
TITLE DATE

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
CERTIFICATION OF BINDING AGREEMENT
WITH
DISADVANTAGED BUSINESS ENTERPRISE FIRMS

Project No.: **U000-122-S55, P101, M501 (UPC 102524)**

Federal Project No.: HSIP-5A03 (537), HSIP-5A03 (616)

This form is to be submitted in accordance with the Department's Special Provision for Section 107.15.

It is hereby certified by the below signed Contractors that there exists a written quote, acceptable to the parties involved preliminary to a binding subcontract agreement stating the details concerning the work to be performed and the price which will be paid for the aforementioned work. This document is not intended to, nor should it be construed to, contain the entire text of the agreement between the contracting parties. This document does not take the place of, nor may it be substituted for, an official subcontracting agreement in those situations that may require such an agreement. A copy of the fully executed *subcontract agreement* shall be submitted to the Engineer within fourteen (14) business days after contract execution.

It is further certified that the aforementioned mutually acceptable quote and fully executed subcontract agreement represent the entire agreement between the parties involved and that no conversations, verbal agreements, or other forms of non-written representations shall serve to add to, delete, or modify the terms as stated.

The prime Contractor further represents that the aforementioned mutually acceptable quote and fully executed subcontract agreement shall remain on file for a period of not less than one year following completion of the prime's contract with the Department or for such longer period as provisions of governing Federal or State law or regulations may require. For purposes of this form, the term Prime Contractor shall refer to any Contractor utilizing a DBE subcontractor, regardless of tier, in which they are claiming DBE credit toward the contract goal.

Contractors further jointly and severally represent that said binding agreement is for the performance of a "commercially useful function" as that term is employed in 49 C.F.R. Part 26.55 (c), (d).

TO BE SIGNED BY THE SUBCONTRACTOR TO THE PRIME CONTRACTOR, AND ANY LOWER TIER SUBCONTRACTORS HAVING A CONTRACT WITH THE BELOW NAMED DBE FIRM

Prime Contractor _____

By: _____ _____
Signature Title

Date: _____

First Tier Subcontractor if Applicable _____

By: _____ _____
Signature Title

Date: _____

Second Tier Subcontractor if Applicable _____

By: _____ _____
Signature Title

Date: _____

Third Tier Subcontractor if Applicable _____

By: _____ _____
Signature Title

Date: _____

DBE Contractor _____

By: _____ _____
Signature Title

Date: _____

Form C-48
Rev. 2-23-11

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION
SUBCONTRACTOR/SUPPLIER SOLICITATION AND UTILIZATION FORM (ALL BIDDERS)

PROJECT NO. U000-122-S55, P101, M501 (UPC 102524) **CONTRACT I.D. NO.** _____

FHWA NO. HSIP-5A03 (537), HSIP-5A03 (616) **DATE SUBMITTED** _____

All bidders, including DBEs bidding as Prime Contractors, shall complete and submit the following information as requested in this form within ten (10) business days after the opening of bids.

The bidder certifies this form accurately represents its solicitation and utilization or non-utilization, as indicated, of the firms listed below for performance of work on this contract. The bidder also certifies he/she has had direct contact with the named firms regarding participation on this project.

BIDDER _____ **SIGNATURE** _____

TITLE _____

SUBCONTRACTOR/SUPPLIER SOLICITATION AND UTILIZATION (ALL)

VENDOR NUMBER	NAME OF SUBCONTRACTOR/SUPPLIER	TELEPHONE NUMBER	DBE OR NON-DBE	UTILIZED (Y/N)

NOTE: ATTACH ADDITIONAL PAGES, IF NECESSARY.

BIDDER MUST SIGN EACH ADDITIONAL SHEET TO CERTIFY ITS CONTENT AND COMPLETION OF FORM.

COMM0NWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

DBE GOOD FAITH EFFORTS DOCUMENTATION

--DO NOT DETACH--

THIS INFORMATION MUST BE SUBMITTED WITH YOUR BID PROPOSAL IF YOUR BID DOES NOT MEET THE PROJECT DBE REQUIREMENTS, OR WHEN REQUESTED BY VDOT

CONTRACT I.D. NUMBER_____

PROJECT NUMBER U000-122-S55, P101, M501 (UPC 102524)

FHWA NUMBER HSIP-5A03 (537), HSIP-5A03 (616)

DISTRICT Hampton Roads

DATE BID SUBMITTED_____

BIDDER'S NAME_____

SIGNATURE_____

TITLE_____

VENDOR NUMBER_____

DBE GOAL FROM BID PROPOSAL 5%

COMM0NWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

DBE GOOD FAITH EFFORTS DOCUMENTATION

CONTRACT I.D. NO._____**DATE SUBMITTED**_____

IF THE DBE GOAL ESTABLISHED FOR THIS CONTRACT HAS NOT BEEN MET OR VDOT REQUESTS THE SUBMITTAL THEREOF, THE BIDDER IS REQUIRED TO SUBMIT GOOD FAITH EFFORTS AS OUTLINED IN THIS DOCUMENT.

THE BIDDER ACKNOWLEDGES AND CERTIFIES THAT THIS FORM ACCURATELY REPRESENTS THE INFORMATION CONTAINED HEREIN.

BIDDER_____**SIGNATURE**_____

TITLE_____

NAMES OF CERTIFIED DBEs AND THE DATES ON WHICH THEY WERE SOLICITED TO BID ON THIS PROJECT

INCLUDE THE ITEMS OF WORK OFFERED AND THE DATES AND METHODS USED FOR FOLLOWING UP INITIAL SOLICITATIONS TO DETERMINE WHETHER OR NOT DBEs WERE INTERESTED.

NAMES AND VENDOR NUMBERS OF DBEs SOLICITED	DATE OF INITIAL SOLICITATION	ITEM(S) OF WORK	FOLLOW-UP METHODS AND DATES

NOTE: ATTACH ADDITIONAL PAGES IF NECESSARY

ATTACH COPIES OF SOLICITATIONS, TELEPHONE RECORDS, FAX CONFIRMATIONS, ELECTRONIC INFORMATION, ETC.

COMM0NWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

DBE GOOD FAITH EFFORTS DOCUMENTATION

CONTRACT I.D. NO._____**DATE SUBMITTED**_____

IF THE DBE GOAL ESTABLISHED FOR THIS CONTRACT HAS NOT BEEN MET OR VDOT REQUESTS THE SUBMITTAL THEREOF, THE BIDDER IS REQUIRED TO SUBMIT GOOD FAITH EFFORTS AS OUTLINED IN THIS DOCUMENT.

THE BIDDER ACKNOWLEDGES AND CERTIFIES THAT THIS FORM ACCURATELY REPRESENTS THE INFORMATION CONTAINED HEREIN.

BIDDER_____**SIGNATURE**_____

TITLE_____

TELEPHONE LOG

DBE(s) CALLED	TELEPHONE NUMBER	DATE CALLED	TIME CALLED	CONTACT PERSON OR VOICE MAIL STATUS

NOTE: ATTACH ADDITIONAL PAGES IF NECESSARY

COMM0NWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

DBE GOOD FAITH EFFORTS DOCUMENTATION

CONTRACT I.D. NO._____**DATE SUBMITTED**_____

IF THE DBE GOAL ESTABLISHED FOR THIS CONTRACT HAS NOT BEEN MET OR VDOT REQUESTS THE SUBMITTAL THEREOF, THE BIDDER IS REQUIRED TO SUBMIT GOOD FAITH EFFORTS AS OUTLINED IN THIS DOCUMENT.

THE BIDDER ACKNOWLEDGES AND CERTIFIES THAT THIS FORM ACCURATELY REPRESENTS THE INFORMATION CONTAINED HEREIN.

BIDDER_____**SIGNATURE**_____

TITLE_____

ITEM(S) OF WORK THAT THE BIDDER MADE AVAILABLE TO DBE FIRMS

IDENTIFY THOSE ITEM(S) OF WORK THAT THE BIDDER MADE AVAILABLE TO DBE FIRMS OR THOSE ITEM(S) THE BIDDER IDENTIFIED AND DETERMINED TO SUBDIVIDE INTO ECONOMICALLY FEASIBLE UNITS TO FACILITATE DBE PARTICIPATION. FOR EACH ITEM LISTED, SHOW THE DOLLAR VALUE AND PERCENTAGE OF THE TOTAL CONTRACT AMOUNT. IT IS THE BIDDER'S RESPONSIBILITY TO DEMONSTRATE THAT SUFFICIENT WORK TO MEET THE GOAL WAS MADE AVAILABLE TO DBE FIRMS.

ITEM(S) OF WORK MADE AVAILABLE	BIDDER NORMALLY PERFORMS ITEM(S) (Y/N)	ITEM(S) BROKEN DOWN TO FACILITATE PARTICIPATION (Y/N)	AMOUNT IN DOLLARS	PERCENTAGE OF CONTRACT

NOTE: INFORMATION REQUIRED FOR THIS SECTION CONTINUED ON SHEET 5
ATTACH ADDITIONAL PAGES IF NECESSARY

COMM0NWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

DBE GOOD FAITH EFFORTS DOCUMENTATION

CONTRACT I.D. NO._____DATE SUBMITTED_____

IF THE DBE GOAL ESTABLISHED FOR THIS CONTRACT HAS NOT BEEN MET OR VDOT REQUESTS THE SUBMITTAL THEREOF, THE BIDDER IS REQUIRED TO SUBMIT GOOD FAITH EFFORTS AS OUTLINED IN THIS DOCUMENT.

THE BIDDER ACKNOWLEDGES AND CERTIFIES THAT THIS FORM ACCURATELY REPRESENTS THE INFORMATION CONTAINED HEREIN.

BIDDER_____SIGNATURE_____

TITLE_____

ADDITIONAL INFORMATION REGARDING ITEM(S) OF WORK THAT THE BIDDER MADE AVAILABLE TO DBE FIRMS (Continued From Sheet 4)

ITEM(S) OF WORK MADE AVAILABLE, NAMES OF SELECTED FIRMS AND DBE STATUS, DBEs THAT PROVIDED QUOTES, PRICE QUOTE FOR EACH FIRM, AND THE PRICE DIFFERENCE FOR EACH DBE IF THE SELECTED FIRM IS NOT A DBE.

ITEM(S) OF WORK MADE AVAILABLE(CONT.)	NAME OF SELECTED FIRM AND VENDOR NUMBER	DBE OR NON-DBE	NAME OF REJECTED FIRM(S)	QUOTE IN DOLLARS	PRICE DIFFERENCE IN DOLLARS

NOTE: ATTACH ADDITIONAL PAGES IF NECESSARY.

IF THE FIRM SELECTED FOR THE ITEM IS NOT A DBE, PROVIDE THE REASON(S) FOR THE SELECTION ON A SEPARATE PAGE AND ATTACH.

PROVIDE NAMES, ADDRESSES, AND TELEPHONE NUMBERS FOR THE FIRMS LISTED ABOVE.

COMM0NWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

DBE GOOD FAITH EFFORTS DOCUMENTATION

CONTRACT I.D. NO._____**DATE SUBMITTED**_____

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BIDDER_____**SIGNATURE**_____

TITLE_____

ADVERTISEMENTS OR PROOFS OF PUBLICATION.

NAMES AND DATES OF EACH PUBLICATION IN WHCH A REQUEST FOR DBE PARTICIPATION FOR THE PROJECT WAS PLACED BY THE BIDDER. ATTACH COPIES OF PUBLISHED ADVERTISEMENTS OR PROOFS OF PUBLICATION.

PUBLICATIONS	DATES OF ADVERTISEMENT

NOTE: ATTACH ADDITIONAL PAGES IF NECESSARY

COMM0NWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

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BIDDER_____SIGNATURE_____

TITLE_____

NAMES OF AGENCIES CONTACTED TO PROVIDE ASSISTANCE

NAMES OF AGENCIES (SEE SPECIAL PROVISION FOR 107.15) AND THE DATES THESE AGENCIES WERE CONTACTED TO PROVIDE ASSISTANCE IN CONTACTING, RECRUITING, AND USING DBE FIRMS. IF THE AGENCIES WERE CONTACTED IN WRITING, ATTACH COPIES OF SUPPORTING DOCUMENTS.

NAME OF AGENCY	METHOD AND DATE OF CONTACT	RESULTS

NOTE: ATTACH ADDITIONAL PAGES IF NECESSARY**.**

COMM0NWEALTH OF VIRGINIA
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BIDDER_____SIGNATURE_____

TITLE_____

TECHNICAL ASSISTANCE AND INFORMATION PROVIDED TO DBEs

EFFORTS MADE TO PROVIDE INTERESTED DBEs WITH ADEQUATE INFORMATION ABOUT THE PLANS, SPECIFICATIONS, AND REQUIREMENTS OF THE BID DOCUMENTS TO ASSIST THE DBEs IN RESPONDING TO A SOLICITATION.

IDENTIFY THE DBEs ASSISTED, THE INFORMATION PROVIDED, AND THE DATE OF CONTACT. ATTACH COPIES OF SUPPORTING DOCUMENTS.

DBEs ASSISTED	INFORMATION PROVIDED	DATE OF CONTACT

NOTE: ATTACH ADDITIONAL PAGES IF NECESSARY.

COMM0NWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

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BIDDER_____**SIGNATURE**_____

TITLE_____

EFFORTS MADE TO ASSIST DBEs OBTAIN BONDING, LINES OF CREDIT, INSURANCE, ETC.

EFFORTS MADE TO PROVIDE INTERESTED DBEs IN OBTAINING BONDING, LINES OF CREDIT, INSURANCE, NECESSARY EQUIPMENT, SUPPLIES, MATERIALS, OR RELATED ASSISTANCE OR SERVICES, EXCLUDING SUPPLIES AND EQUIPMENT THE SUBCONTRACTOR PURCHASES OR LEASES FROM THE PRIME CONTRACTOR OR ITS AFFILIATES.

IDENTIFY THE DBEs ASSISTED, THE ASSISTANCE OFFERED, AND THE DATES OF SERVICES OFFERED AND PROVIDED. ATTACH COPIES OF SUPPORTING DOCUMENTS.

DBEs ASSISTED	ASSISTANCE OFFERED	DATES SERVICES OFFERED AND/OR PROVIDED

NOTE: ATTACH ADDITIONAL PAGES IF NECESSARY.

COMM0NWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

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BIDDER_____SIGNATURE_____

TITLE_____

ADDITIONAL DATA TO SUPPORT DEMONSTRATION OF GOOD FAITH EFFORTS

ADDITIONAL DATA TO SUPPORT DEMONSTRATION OF GOOD FAITH EFFORTS

NOTE: ATTACH ADDITIONAL PAGES, IF NECESSARY

SF010DF-0712

May 1, 2012
FHWA-1273 (Electronic Version)

The following Form **FHWA-1273** titled **REQUIRED CONTRACT PROVISIONS, FEDERAL-AID CONSTRUCTION CONTRACTS** shall apply to this contract:

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FHWA-1273 – Revised May 1, 2012

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. General
II. Nondiscrimination
III. Nonsegregated Facilities
IV. Davis-Bacon and Related Act Provisions
V. Contract Work Hours and Safety Standards Act Provisions
VI. Subletting or Assigning the Contract
VII. Safety: Accident Prevention
VIII. False Statements Concerning Highway Projects
IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
X. Compliance with Governmentwide Suspension and Debarment Requirements
XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

   The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

   Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. **Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

> "It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. **EEO Officer:** The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. **Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. **Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential

minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. **Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. **Reasonable Accommodation for Applicants / Employees with Disabilities:** The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. **Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. Davis-Bacon and Related Act Provisions

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH–1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(I) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(II) The classification is utilized in the area by the construction industry; and

(II) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime

contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor

to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency.

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(I) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(II) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(III) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of

Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless

the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime

contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

   a. The term “perform work with its own organization” refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

      (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;

      (2) the prime contractor remains responsible for the quality of the work of the leased employees;

      (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

      (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

   b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the

contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

> "Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.

2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1. Instructions for Certification – First Tier Participants:

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who

has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

   a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

   b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

2. The goals for female and minority participation, expressed in percentage terms of the Contractor's aggregate work force in each trade on all construction works in the covered area, are as follows:

   Females- 6.9%
   Minorities - See Attachment "A"

   The goals are applicable to all the Contractor's construction work performed in the covered area, whether or not it is Federal or federally assisted. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and non-federally involved construction.

   The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications, set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals established herein. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executives Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs <u>within 10 workings days</u> the award of any construction subcontract in excess of $10,000 at any tier for construction works under this contract. The notification shall list the name, address and telephone number of the subcontractor, employer identification number, estimated dollar amount of the subcontract, estimated starting and completion dates of the subcontract and the geographical area in which the contract is to be performed.

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246)

1. As, used in this provision:

   a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;

   b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;

   c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U. S. Treasury Department Form 941;

   d. "Minority" includes:

      (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

(ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);

(iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U. S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors and Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the coverer area. Covered construction Contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U. S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

   a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. <u>The Contractor, where possible, shall assign two or more women to each construction project.</u> The Contractor shall specifically ensure that all foreman, superintendents and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off the street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union, or if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or women sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources complied under 7b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper or annual report; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents and General Foremen prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including in any news media advertisement that the Contractor is "An Equal Opportunity Employer" for minority and female, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Directs its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures and tests to be used m the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of Contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for such opportunities through appropriate training or other means.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated, except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. Goals for women have been established. However, the Contractor IS required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner, that is even thought the Contractor has achieved its goals for women, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized.

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex or nation origin.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246. as amended.

13. The Contractor, in fulfilling its obligations under these specifications shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from Its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director will proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate and make known to the Department a responsible official as the EEO Officer to monitor all employment related activity, to ensure that the company EEO policy is being carried out, to submit

reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, Contractors will not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

ATTACHMENT A

Economic Area	Goal (Percent)
Virginia:	
021 Roanoke-Lynchburg, VA	
SMSA Counties:	
4640 Lynchburg, VA	19.3
VA Amherst; VA Appomattox; VA Campbell; VA Lynchburg	
6800 Roanoke, VA	10.2
VA Botetourt; VA Craig; VA Roanoke; VA Roanoke City; VA Salem	
Non-SMSA Counties	12.0
VA Alleghany; VA Augusta; VA Bath; VA Bedford; VA Bland; VA Carroll; VA Floyd; VA Franklin; VA Giles; VA Grayson; VA Henry; VA Highland; VA Montgomery; VA Nelson; VA Patrick; VA Pittsylvania; VA Pulaski; VA Rockbridge; VA Rockingham; VA Wythe; VA Bedford City; VA Buena Vista: VA Clifton Forge; VA Covington; VA Danville; VA Galax; VA Harrisonburg; VA Lexington; VA Martinsville; VA Radford; VA Staunton; VA Waynesboro; WV Pendleton.	
022 Richmond, VA	
SMSA Counties:	
6140 Petersburg - Colonial Heights - Hopewell, VA	30.6
VA Dinwiddie; VA Prince George; VA Colonial Heights; VA Hopewell; VA Petersburg.	
6760 Richmond, VA	24.9
VA Charles City; VA Chesterfield; VA Goochland, VA Hanover; VA Henrico; VA New Kent; VA Powhatan; VA Richmond.	
Non-SMSA Counties	27.9
VA Albemarle; VA Amelia; VA Brunswick; VA Buckingham, VA Caroline; VA Charlotte; VA Cumberland; VA Essex; VA Fluvanna; VA Greene; VA Greensville; VA Halifax; VA King and Queen; VA King William; VA Lancaster; VA Louisa; VA Lunenburg; VA Madison; VA Mecklenburg; VA Northumberland; VA Nottoway; VA Orange; VA Prince Edward; VA Richmond VA Sussex; VA Charlottesville; VA Emporia; VA South Boston	
023 Norfolk - Virginia Beach - Newport News VA:	
SMSA Counties:	
5680 Newport News- Hampton, VA	27.1
VA Gloucester; VA James City; VA York; VA Hampton; VA Newport News; VA Williamsburg.	
5720 Norfolk - Virginia Beach - Portsmouth, VA - NC	26.6
NC Currituck; VA Chesapeake; VA Norfolk; VA Portsmouth; VA Suffolk; VA Virginia Beach.	

Non-SMSA Counties 29.7
NC Bertie; NC Camden; NC Chowan; NC Gates; NC Hertford;
NC Pasquotank; NC Perquimans; VA lsle of Wight; VA Matthews;
VA Middlesex; VA Southampton; VA Surry; VA Franklin.

Washington, DC:

020 Washington, DC.

SMSA Counties:

8840 Washington, DC - MD - VA 28.0
DC District of Columbia; MD Charles; MD Montgomery MD Prince
Georges; VA Arlington; VA Fairfax; VA Loudoun; VA Prince William
VA Alexandria; VA Fairfax City; VA Falls Church.

Non- SMSA Counties 25.2
MD Calvert; MD Frederick; MD St. Marys: MD Washington; VA Clarke;
VA Culpeper; VA Fauquier; VA Frederick; VA King George; VA Page; VA
Rappahannock; VA Shenandoah; VA Spotsylvania; VA Stafford; VA
Warren: VA Westmoreland; VA Fredericksburg; VA Winchester WV Berkeley;
WV Grant; WV Hampshire; WV Hardy; WV Jefferson; WV Morgan.

Tennessee:

052 Johnson City - Kingsport - Bristol, TN - VA

SMSA Counties:

3630 Johnson City - Kingsport -Bristol, TN-VA 2.6
TN Carter; TN Hawkins; TN Sullivan; TN Washington; VA Scott: VA
Washington; VA Bristol.

Non-SMSA Counties 3.2
TN Greene; TN Johnson; VA Buchanan; VA Dickenson; VA Lee;
VA Russell; VA Smyth; VA Tazewell; VA Wise; VA Norton; WV McDowell;
WV Mercer.

Maryland:

019 Baltimore MD

Non-SMSA Counties 23.6
MD Caroline; MD Dorchester; MD Kent; MD Queen Annes; MD Somerset;
MD Talbot; MD Wicomico; MD Worchester; VA Accomack; VA Northampton.

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
SECTION 107.15

December 10, 2010

Section 107.15 of the Specifications is replaced by the following:

Section 107.15—Use of Disadvantaged Business Enterprises (DBEs)

A. Disadvantaged Business Enterprise (DBE) Program Requirements

Any Contractor, subcontractor, supplier, DBE firm, and contract surety involved in the performance of work on a federal-aid contract shall comply with the terms and conditions of the United States Department of Transportation (USDOT) DBE Program as the terms appear in Part 26 of the Code of Federal Regulations (49 CFR as amended), the USDOT DBE Program regulations; and the Virginia Department of Transportation's (VDOT or the Department) Road and Bridge Specifications and DBE Program rules and regulations.

For the purposes of this provision, Contractor is defined as the Prime Contractor of the contract; and sub-contractor is defined as any DBE supplier, manufacturer, or subcontractor performing work or furnishing material, supplies or services to the contract. The Contractor shall physically include this same contract provision in every supply or work/service subcontract that it makes or executes with a subcontractor having work for which it intends to claim credit.

In accordance with 49 CFR Part 26 and VDOT's DBE Program requirements, the Contractor, for itself and for its subcontractors and suppliers, whether certified DBE firms or not, shall commit to complying fully with the auditing, record keeping, confidentiality, cooperation, and anti-intimidation or retaliation provisions contained in those federal and state DBE Program regulations. By bidding on this contract, and by accepting and executing this contract, the Contractor agrees to assume these contractual obligations and to bind the Contractor's subcontractors contractually to the same at the Contractor's expense.

The Contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award, administration, and performance of this contract. Failure by the Contractor to carry out these requirements is a material breach of this contract, which will result in the termination of this contract or other such remedy, as VDOT deems appropriate.

All administrative remedies noted in this provision are automatic unless the Contractor exercises the right of appeal within the required timeframe(s) specified herein. Appeal requirements, processes, and procedures shall be in accordance with guidelines stated herein and current at the time of the proceedings. Where applicable, the Department will notify the Contractor of any changes to the appeal requirements, processes, and procedures after receiving notification of the Contractor's desire to appeal.

All time frames referenced in this provision are expressed in business days unless otherwise indicated. Should the expiration of any deadline fall on a weekend or holiday, such deadline will automatically be extended to the next normal business day.

B. DBE Certification

The only DBE firms eligible to perform work on a federal-aid contract for DBE contract goal credit are firms certified as Disadvantaged Business Enterprises by the Virginia Department of Minority Business Enterprise (DMBE) or the Metropolitan Washington Airports Authority (MWAA) in accordance with federal and VDOT guidelines. DBE firms must be certified in the specific work listed for DBE contract goal credit. A directory listing of certified DBE firms can be obtained from the Virginia Department of Minority Business Enterprise and the Metropolitan Washington Airports Authority Internet websites: *http://www.dmbe.virginia.gov/ ; http://mwaa.com/362.htm*

C. Bank Services

The Contractor and each subcontractor are encouraged to use the services of banks owned and controlled by socially and economically disadvantaged individuals. Such banking services and the fees charged for services typically will not be eligible for DBE Program contract goal credit. Such information is available from the VDOT's Internet Civil Rights Division website: *http://insidevdot/C7/Civil%20Rights/default.aspx*

D. DBE Program-Related Certifications Made by Bidders\Contractors

By submitting a bid and by entering into any contract on the basis of that bid, the bidder/Contractor certifies to each of the following DBE Program-related conditions and assurances:

1. That the management and bidding officers of its firm agree to comply with the bidding and project construction and administration obligations of the USDOT DBE Program requirements and regulations of 49 CFR Part 26 as amended, and VDOT's Road and Bridge Specifications and DBE Program requirements and regulations.

2. Under penalty of perjury and other applicable penal law that it has complied with the DBE Program requirements in submitting the bid, and shall comply fully with these requirements in the bidding, award, and execution of the contract.

3. To ensure that DBE firms have been given full and fair opportunity to participate in the performance of the contract. The bidder certifies that all reasonable steps were, and will be, taken to ensure that DBE firms had, and will have, an opportunity to compete for and perform work on the contract. The bidder further certifies that the bidder shall not discriminate on the basis of race, color, age, national origin, or sex in the performance of the contract or in the award of any subcontract. Any agreement between a bidder and a DBE whereby the DBE promises not to provide quotations for performance of work to other bidders is prohibited.

4. As a bidder, good faith efforts were made to obtain DBE participation in the proposed contract at or above the goal for DBE participation established by VDOT. It has submitted as a part of its bid true, accurate, complete, and detailed documentation of the good faith efforts it performed to meet the contract goal for DBE participation. The bidder, by signing and submitting its bid, certifies the DBE participation information submitted within the stated time thereafter is true, correct, and complete, and that the information provided includes the names of all DBE firms that will participate in the contract, the specific line item(s) that each listed DBE firm will perform, and the creditable dollar amounts of the participation of each listed DBE. The specific line item must reference the VDOT line number and item number contained in the proposal.

5. The bidder further certifies, by signing its bid, it has committed to use each DBE firm listed for the specific work item shown to meet the contract goal for DBE participation. Award of the contract will be conditioned upon meeting these and other listed requirements of 49 CFR Part 26.53 and the contract documents. By signing the bid, the bidder certifies on work that it proposes to sublet; it has made good faith efforts to seek out and consider DBEs as potential subcontractors. The bidder shall contact DBEs to solicit their interest, capability, and prices in sufficient time to

allow them to respond effectively, and shall retain on file proper documentation to substantiate its good faith efforts. Award of the contract will be conditioned upon meeting these and other listed requirements of 49 CFR Part 26.53 and the contract documents.

6. Once awarded the contract, the Contractor shall make good faith efforts to utilize DBE firms to perform work designated to be performed by DBEs at or above the amount or percentage of the dollar value specified in the bidding documents. Further, the Contractor understands it shall not unilaterally terminate, substitute for, or replace any DBE firm that was designated in the executed contract in whole or in part with another DBE, any non-DBE firm, or with the Contractor's own forces or those of an affiliate of the Contractor without the prior written consent of VDOT as set out within the requirements of this provision.

7. Once awarded the contract, the Contractor shall designate and make known to the Department a liaison officer who is assigned the responsibility of administering and promoting an active and inclusive DBE program as required by 49 CFR Part 26 for DBEs. The designation and identity of this officer need be submitted only once by the Contractor during any twelve (12) month period at the preconstruction conference for the first contract the Contractor has been awarded during that reporting period. The Department will post such information for informational and administrative purposes at VDOT's Internet Civil Rights Division website.

8. Once awarded the contract, the Contractor shall comply fully with all regulatory and contractual requirements of the USDOT DBE Program, and that each DBE firm participating in the contract shall fully perform the designated work items with the DBE's own forces and equipment under the DBE's direct supervision, control, and management. Where a contract exists and where the Contractor, DBE firm, or any other firm retained by the Contractor has failed to comply with federal or VDOT DBE Program regulations and/or their requirements on that contract, VDOT has the authority and discretion to determine the extent to which the DBE contract regulations and\or requirements have not been met, and will assess against the Contractor any remedies available at law or provided in the contract in the event of such a contract breach.

9. In the event a bond surety assumes the completion of work, if for any reason VDOT has terminated the prime Contractor, the surety shall be obligated to meet the same DBE contract terms and requirements as were required of the original prime Contractor in accordance with the requirements of this specification.

E. Disqualification of Bidder

Bidders may be disqualified from bidding for failure to comply with the requirements of this Special Provision, the contract specifications, and VDOT Road and Bridge Specifications.

F. Bidding Procedures

The following bidding procedures shall apply to the contract for DBE Program compliance purposes:

1. **Contract Goal, Good Faith Efforts Specified:** All bidders evidencing the attainment of DBE goal commitment equal to or greater than the required DBE goal established for the project must submit completed Form C-111, Minimum DBE Requirements, and Form C-48, Subcontractor/Supplier Solicitation and Utilization, as a part of the bid documents.

   Form C-111 may be submitted electronically or may be faxed to the Department, but in no case shall the bidder's Form C-111 be received later than 10:00 a.m. the next business day after the time stated in the bid proposal for the receipt of bids. Form C-48 must be received within ten (10) business days after the bid opening.

If, at the time of submitting its bid, the bidder knowingly cannot meet or exceed the required DBE contract goal, it shall submit Form C-111 exhibiting the DBE participation it commits to attain as a part of its bid documents. The bidder shall then submit Form C-49, DBE Good Faith Efforts Documentation, within two (2) business days after the bid opening.

The lowest responsive and responsible bidder must submit its properly executed Form C-112, Certification of Binding Agreement, within three (3) business days after the bids are received. DBEs bidding as prime contractors are not required to submit Form C-112 unless they are utilizing other DBEs as subcontractors.

If, after review of the apparent lowest bid, VDOT determines the DBE requirements have not been met, the apparent lowest successful bidder must submit Form C-49, DBE Good Faith Efforts Documentation, which must be received by the Contract Engineer within two (2) business days after official notification of such failure to meet the aforementioned DBE requirements.

Forms C-48, C-49, C-111, and C-112 can be obtained from the VDOT website at:
http://vdotforms.vdot.virginia.gov/

Instructions for submitting Form C-111 can be obtained from the VDOT website at:
http://www.virginiadot.org/business/resources/const/Exp_DBE_Commitments.pdf

2. **Bid Rejection:** The failure of a bidder to submit the required documentation within the timeframes specified in the **Contract Goal, Good Faith Efforts Specified** section of this Special Provision may be cause for rejection of that bidder's bid.

   If the lowest bidder is rejected for failure to submit the required documentation in the specified time frames, the Department may award the work to the next lowest bidder, or re-advertise the proposed work at a later date or proceed otherwise as determined by the Commonwealth.

3. **Good Faith Efforts Described:** In order to award a contract to a bidder that has failed to meet DBE contract goal requirements, VDOT will determine if the bidder's efforts were adequate good faith efforts, and if given all relevant circumstances, those efforts were made actively and aggressively to meet the DBE requirements. Efforts to obtain DBE participation are not good faith efforts if they could not reasonably be expected to produce a level of DBE participation sufficient to meet the DBE Program and contract goal requirements.

   Good faith efforts may be determined through use of the following list of the types of actions the bidder may make to obtain DBE participation. This is not intended to be a mandatory checklist, nor is it intended to be exclusive or exhaustive. Other factors or types of efforts of similar intent may be relevant in appropriate cases:

   (a) Soliciting through reasonable and available means, such as but not limited to, attendance at pre-bid meetings, advertising, and written notices to DBEs who have the capability to perform the work of the contract. Examples include: advertising in at least one daily/weekly/monthly newspaper of general circulation, as applicable; phone contact with a completely documented telephone log, including the date and time called, contact person, or voice mail status; and internet contacts with supporting documentation, including dates advertised. The bidder shall solicit this interest no less than five (5) business days before the bids are due so that the solicited DBEs have enough time to reasonably respond to the solicitation. The bidder shall determine with certainty if the DBEs are interested by taking reasonable steps to follow up initial solicitations as evidenced by documenting such efforts as requested on Form C-49, DBE Good Faith Efforts Documentation.

   (b) Selecting portions of the work to be performed by DBEs in order to increase the likelihood that the DBE goals will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the

Contractor might otherwise prefer to completely perform all portions of this work in its entirety or use its own forces;

(c) Providing interested DBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner, which will assist the DBEs in responding to a solicitation;

(d) Negotiating for participation in good faith with interested DBEs;

1. Evidence of such negotiation shall include the names, addresses, and telephone numbers of DBEs that were considered; dates DBEs were contacted; a description of the information provided regarding the plans, specifications, and requirements of the contract for the work selected for subcontracting; and, if insufficient DBE participation seems likely, evidence as to why additional agreements could not be reached for DBEs to perform the work;

2. A bidder using good business judgment should consider a number of factors in negotiating with subcontractors, including DBE subcontractors, and should take a firm's price, qualifications, and capabilities, as well as contract goals, into consideration. However, the fact that there may be some additional costs involved in finding and using DBEs is not sufficient reason for a bidder's failure to meet the contract goal for DBE participation, as long as such costs are reasonable and comparable to costs customarily appropriate to the type of work under consideration. Also, the ability or desire of a bidder to perform the work of a contract with its own organization does not relieve the bidder of the responsibility to make diligent good faith efforts. Bidders are not, however, required to accept higher quotes from DBEs if the price difference can be shown by the bidder to be excessive, unreasonable, or greater than would normally be expected by industry standards;

(e) A bidder cannot reject a DBE as being unqualified without sound reasons based on a thorough investigation of the DBE's capabilities. The DBE's standing within its industry, membership in specific groups, organizations, associations, and political or social affiliations, and union vs. non-union employee status are not legitimate causes for the rejection or non-solicitation of bids in the bidder's efforts to meet the project goal for DBE participation;

(f) Making efforts to assist interested DBEs in obtaining bonding, lines of credit, or insurance as required by VDOT or by the bidder/Contractor;

(g) Making efforts to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services subject to the restrictions contained in these provisions;

(h) Effectively using the services of appropriate personnel from VDOT and from DMBE; available minority/women community or minority organizations; contractors' groups; local, state, and Federal minority/ women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and utilization of qualified DBEs.

G. Documentation and Administrative Reconsideration of Good Faith Efforts

During Bidding: As described in the **Contract Goal, Good Faith Efforts Specified** section of this Special Provision, the bidder must provide Form C-49, DBE Good Faith Efforts Documentation, of its efforts made to meet the DBE contract goal as proposed by VDOT within the time frame specified in this provision. The means of transmittal and the risk for timely receipt of this information shall be the responsibility of the bidder. The bidder shall attach additional pages to the certification, if necessary,

in order to fully detail specific good faith efforts made to obtain the DBE firms participation in the proposed contract work.

However, regardless of the DBE contract goal participation level proposed by the bidder or the extent of good faith efforts shown, all bidders shall timely and separately file their completed and executed forms C-111, C-112, C-48, and C-49, as aforementioned, or face potential bid rejection.

If a bidder does not submit its completed and executed forms C-111, or C-112, when required by this Special Provision, the bidder's bid will be considered non-responsive and may be rejected.

Where the Department upon initial review of the bid results determines the apparent low bidder has failed or appears to have failed to meet the requirements of the **Contract Goal, Good Faith Efforts Specified** section of this Special Provision and has failed to adequately document that it made a good faith effort to achieve sufficient DBE participation as specified in the bid proposal, that firm upon notification of the Department's initial determination will be offered the opportunity for administrative reconsideration before VDOT rejects that bid as non-responsive. The bidder shall address such request for reconsideration in writing to the Contract Engineer within five (5) business days of receipt of notification by the Department and shall be given the opportunity to discuss the issue and present its evidence in person to the Administrative Reconsideration Panel. The Administrative Reconsideration Panel will be made up of VDOT Division Administrators or their designees, none of who took part in the initial determination that the bidder failed to make the goal or make adequate good faith efforts to do so. After reconsideration, VDOT shall notify the bidder in writing of its decision and explain the basis for finding that the bidder did or did not meet the goal or make adequate good faith efforts to do so.

If, after reconsideration, the Department determines the bidder has failed to meet the requirements of the contract goal and has failed to make adequate good faith efforts to achieve the level of DBE participation as specified in the bid proposal, the bidder's bid will be rejected.

If sufficient documented evidence is presented to demonstrate that the apparent low bidder made reasonable good faith efforts, the Department will award the contract and reduce the DBE requirement to the actual commitment identified by the lowest successful bidder at the time of its bid. The Contractor is still encouraged to seek additional DBE participation during the life of the contract.

However, such action will not relieve the Contractor of its responsibility for complying with the reduced DBE requirement during the life of the contract or any administrative sanctions as may be appropriate.

During the Contract: If a DBE, through no fault of the Contractor, is unable or unwilling to fulfill his agreement with the Contractor, the Contractor shall immediately notify the Department and provide all relevant facts. If a Contractor relieves a DBE subcontractor of the responsibility to perform work under their subcontract, the Contractor is encouraged to take the appropriate steps to obtain a DBE to perform an equal dollar value of the remaining subcontracted work. In such instances, the Contractor is expected to seek DBE participation towards meeting the goal during the performance of the contract.

If the Contractor fails to conform to the schedule of DBE participation as shown on the progress schedule, or at any point at which it is clearly evident that the remaining dollar value of allowable credit for performing work is insufficient to obtain the scheduled participation, and the Contractor has not taken the preceding actions, the Contractor and any aforementioned affiliates may be subject to disallowance of DBE credit until such time as conformance with the schedule of DBE participation is achieved.

Project Completion: If the Contractor fails upon completion of the project to meet the required participation, the Contractor and any prime contractual affiliates, as in the case of a joint venture, may be enjoined from bidding as a prime Contractor, or participating as a subcontractor on VDOT projects for a period of 90 days.

Prior to enjoinment from bidding or denial to participate as a subcontractor for failure to comply with participation requirements, as provided hereinbefore, the Contractor may submit documentation to the State Construction Engineer to substantiate that failure was due solely to quantitative underrun(s), elimination of items subcontracted to DBEs, or to circumstances beyond their control, and that all feasible means have been used to obtain the required participation. The State Construction Engineer upon verification of such documentation shall make a determination whether or not the Contractor has met the requirements of the contract.

If it is determined that the aforementioned documentation is insufficient or the failure to meet required participation is due to other reasons, the Contractor may request an appearance before the Administrative Reconsideration Panel to establish that all feasible means were used to meet such participation requirements. The decision of the Administrative Reconsideration Panel shall be administratively final. If the decision is made to enjoin the Contractor from bidding on other VDOT work as described herein, the enjoinment period will begin upon the Contractor's failure to request a hearing within the designated time frame or upon the Administrative Reconsideration Panel's decision to enjoin, as applicable.

H. DBE Participation for Contract Goal Credit

DBE participation on the contract will count toward meeting the DBE contract goal in accordance with the following criteria:

1. Cost-plus subcontracts will not be considered to be in accordance with normal industry practice and will not normally be allowed for credit.

2. The applicable percentage of the total dollar value of the contract or subcontract awarded to the DBE will be counted toward meeting the contract goal for DBE participation in accordance with the **DBE Program-Related Certifications Made by Bidders\Contractors** section of this Special Provision for the value of the work, goods, or services that are actually performed or provided by the DBE firm itself or subcontracted by the DBE to other DBE firms.

3. When a DBE performs work as a participant in a joint venture with a non-DBE firm, the Contractor may count toward the DBE goal only that portion of the total dollar value of the contract equal to the distinctly defined portion of the contract work that the DBE has performed with the DBE's own forces or in accordance with the provisions of this Section. The Department shall be contacted in advance regarding any joint venture involving both a DBE firm and a non-DBE firm to coordinate Department review and approval of the joint venture's organizational structure and proposed operation where the Contractor seeks to claim the DBE's credit toward the DBE contract goal.

4. When a DBE subcontracts part of the work of the contract to another firm, the value of that subcontracted work may be counted toward the DBE contract goal only if the DBE's subcontractor at a lower tier is a certified DBE. Work that a DBE subcontracts to either a non-DBE firm or to a non-certified DBE firm will not count toward the DBE contract goal. The cost of supplies and equipment a DBE subcontractor purchases or leases from the prime Contractor or the prime's affiliated firms will not count toward the contract goal for DBE participation.

5. The Contractor may count expenditures to a DBE subcontractor toward the DBE contract goal only if the DBE performs a Commercially Useful Function (CUF) on that contract.

6. A Contractor may not count the participation of a DBE subcontractor toward the Contractor's final compliance with the DBE contract goal obligations until the amount being counted has actually been paid to the DBE. A Contractor may count sixty (60) percent of its expenditures actually paid for materials and supplies obtained from a DBE certified as a regular dealer, and one hundred

(100) percent of such expenditures actually paid for materials and supplies obtained from a certified DBE manufacturer.

(a) For the purposes of this Special Provision, a regular dealer is defined as a firm that owns, operates, or maintains a store, warehouse, or other establishment in which the materials, supplies, articles, or equipment required and used under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. To be a regular dealer, the DBE firm shall be an established business that regularly engages, as its principal business and under its own name, in the purchase and sale or lease of the products or equipment in question. Packagers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions will not be considered regular dealers.

(b) A DBE firm may be a regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating, or maintaining a place of business where it keeps such items in stock if the DBE both owns and operates distribution equipment for the products it sells and provides for the contract work. Any supplementation of a regular dealer's own distribution equipment shall be by a long-term lease agreement and not on an *ad hoc* or contract-by-contract basis to be eligible for credit to meet the DBE contract goal.

(c) If a DBE regular dealer is used for DBE contract goal credit, no additional credit will be given for hauling or delivery to the project site goods or materials sold by that DBE regular dealer. Those delivery costs shall be deemed included in the price charged for the goods or materials by the DBE regular dealer, who shall be responsible for their distribution.

(d) For the purposes of this Special Provision, a manufacturer will be defined as a firm that operates or maintains a factory or establishment that produces on the premises the materials, supplies, articles, or equipment required under the contract and of the general character described by the project specifications. A manufacturer shall include firms that produce finished goods or products from raw or unfinished material, or purchase and substantially alter goods and materials to make them suitable for construction use before reselling them.

(g) A Contractor may count toward the DBE contract goal the following expenditures to DBE firms that are not regular dealers or manufacturers for DBE program purposes:

1. The entire amount of fees or commissions charged by a DBE firm for providing a bona fide service, such as professional, technical, consultant or managerial services, or for providing bonds or insurance specifically required for the performance of the federal-aid contract, if the fee is reasonable and not excessive or greater than would normally be expected by industry standards for the same or similar services.

2. The entire amount of that portion of the construction contract that is performed by the DBE's own forces and equipment under the DBE's supervision. This includes the cost of supplies and materials ordered and paid for by the DBE for contract work, including supplies purchased or equipment leased by the DBE, except supplies and equipment a DBE subcontractor purchases or leases from the prime Contractor or its affiliates.

(h) A Contractor may count toward the DBE contract goal one hundred (100) percent of the fees paid to a DBE trucker or hauler for the delivery of material and supplies required on the project job site, but not for the cost of those materials or supplies themselves, provided that the trucking or hauling fee is determined by VDOT to be reasonable, as compared with fees customarily charged by non-DBE firms for similar services. A Contractor shall not count costs for the removal or relocation of excess material from or on the job site when the DBE trucking company is not the manufacturer of or a regular dealer in those materials and supplies. The DBE trucking firm shall also perform a Commercially Useful Function (CUF) on the project and not operate merely as a pass through for the purposes of gaining credit toward the DBE contract goal. Prior to submitting a bid, the Contractor shall determine, or

contact the VDOT Civil Rights Division or its district Offices for assistance in determining, whether a DBE trucking firm will meet the criteria for performing a CUF on the project. See section on **Miscellaneous DBE Program Requirements; Factors used to Determine if a DBE Trucking Firm is Performing a CUF**.

(i) The Contractor will receive DBE contract goal credit for the fees or commissions charged by and paid to a DBE broker who arranges or expedites sales, leases, or other project work or service arrangements provided that those fees are determined by VDOT to be reasonable and not excessive as compared with fees customarily charged by non-DBE firms for similar services. For the purposes of this Special Provision, a broker is defined as a person or firm that regularly engages in arranging for delivery of material, supplies, and equipment, or regularly arranges for the providing of project services as a course of routine business but does not own or operate the delivery equipment necessary to transport materials, supplies, or equipment to or from a job site.

I. Performing a Commercially Useful Function (CUF)

No credit toward the DBE contract goal will be allowed for contract payments or expenditures to a DBE firm if that DBE firm does not perform a CUF on that contract. A DBE performs a CUF when the DBE is solely responsible for execution of a distinct element of the contract work and the DBE actually performs, manages, and supervises the work involved with the firm's own forces or in accordance with the provisions of the **DBE Participation for Contract Goal Credit** section of this Special Provision. To perform a CUF the DBE alone shall be responsible and bear the risk for the material and supplies used on the contract, selecting a supplier or dealer from those available, negotiating price, determining quality and quantity, ordering the material and supplies, installing those materials with the DBE's own forces and equipment, and paying for those materials and supplies. The amount the DBE firm is to be paid under the contract shall be commensurate with the work the DBE actually performs and the DBE credit claimed for the DBE's performance.

Monitoring CUF Performance: It shall be the Contractor's responsibility to ensure that all DBE firms selected for subcontract work on the contract, for which he seeks to claim credit toward the contract goal, perform a CUF. Further, the Contractor is responsible for and
shall ensure that each DBE firm fully performs the DBE's designated tasks with the DBE's own forces and equipment under the DBE's own direct supervision and management or in accordance with the provisions of the **DBE Participation for Contract Goal Credit** section of this Special Provision. For the purposes of this provision the DBE's equipment will mean either equipment directly owned by the DBE as evidenced by title, bill of sale or other such documentation, or leased by the DBE, and over which the DBE has control as evidenced by the leasing agreement from a firm not owned in whole or part by the prime Contractor or an affiliate of the Contractor under this contract.

VDOT will monitor the Contractor's DBE involvement during the performance of the contract. However, VDOT is under no obligation to warn the Contractor that a DBE's participation will not count toward the goal.

DBEs Must Perform a Useful and Necessary Role in Contract Completion: A DBE does not perform a commercially useful function if the DBE's role is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of DBE participation.

DBEs Must Perform The Contract Work With Their Own Workforces: If a DBE does not perform and exercise responsibility for at least thirty (30) percent of the total cost of the DBE's contract with the DBE's own work force, or the DBE subcontracts a greater portion of the work of a contract than would be expected on the basis of normal industry practice for the type of work involve, VDOT will presume that the DBE is not performing a CUF and such participation will not be counted toward the contract goal.

VDOT Makes Final Determination On Whether a CUF Is Performed: VDOT has the final authority to determine whether a DBE firm has performed a CUF on a federal-aid contract. To determine whether a DBE is performing or has performed a CUF, VDOT will evaluate the amount of work subcontracted by that DBE firm or performed by other firms and the extent of the involvement of other firms' forces and equipment. Any DBE work performed by the Contractor or by employees or equipment of the Contractor shall be subject to disallowance under the DBE Program, unless the independent validity and need for such an arrangement and work is demonstrated.

J. Verification of DBE Participation and Imposed Damages

Within fourteen days after contract execution, the Contractor shall submit to the Responsible Engineer, with a copy to the District Civil Rights Office (DCRO), a fully executed subcontract agreement for each DBE used to claim credit in accordance with the requirements stated on Form C-112. The subcontract agreement shall be executed by both parties stating the work to be performed, the details or specifics concerning such work, and the price which will be paid to the DBE subcontractor. Because of the commercial damage that the Contractor and its DBE subcontractor could suffer if their subcontract pricing, terms, and conditions were known to competitors, the Department staff will treat subcontract agreements as proprietary Contractor trade secrets with regard to Freedom of Information Act requests. In lieu of subcontract agreements, purchase orders may be submitted for haulers, suppliers, and manufacturers. These too, will be treated confidentially and protected. Such purchase orders must contain, as a minimum, the following information: authorized signatures of both parties; description of the scope of work to include contract item numbers, quantities, and prices; and required federal contract provisions.

The Contractor shall also furnish, and shall require each subcontractor to furnish, information relative to all DBE involvement on the project for each quarter during the life of the contract in which participation occurs and verification is available. The information shall be indicated on Form C-63, DBE and SWAM Payment Compliance Report. The department reserves the right to request proof of payment via copies of cancelled checks with appropriate identifying notations. Failure to provide Form C-63 to the District Civil Rights Office (DCRO) within five (5) business days after the reporting period may result in delay of approval of the Contractor's monthly progress estimate for payment. The names and certification numbers of DBE firms provided by the Contractor on the various forms indicated in this Special Provision shall be exactly as shown on the DMBE's or MWAA's latest list of certified DBEs. Signatures on all forms indicated herein shall be those of authorized representatives of the Contractor as shown on the Prequalification Application, Form C-32 or the Prequalification/Certification Renewal Application, Form C-32A, or authorized by letter from the Contractor. If DBE firms are used which have not been previously documented with the Contractor's bid and for which the Contractor now desires to claim credit toward the project goal, the Contractor shall be responsible for submitting necessary documentation in accordance with the procedures stipulated in this Special Provision to cover such work prior to the DBE beginning work.

Form C-63 can be obtained from the VDOT website at: *http://vdotforms.vdot.virginia.gov/*

The Contractor shall submit to the Responsible Engineer its progress schedule with a copy to the DCRO, as required by Section 108.03 of the Specifications or other such specific contract scheduling specification that may include contractual milestones, i.e., monthly or VDOT requested updates. The Contractor shall include a narrative of applicable DBE activities relative to work activities of the Contractor's progress schedule, including the approximate start times and durations of all DBE participation to be claimed for credit that shall result in full achievement of the DBE goal required in the contract.

On contracts awarded on the basis of good faith efforts, narratives or other agreeable format of schedule information requirements and subsequent progress determination shall be based on the commitment information shown on the latest Form C-111 as compared with the appropriate Form C-63.

Prior to beginning any major component or quarter of the work, as applicable, in which DBE work is to be performed, the Contractor shall furnish a revised Form C-111 showing the name(s) and certification number(s) of any current DBEs not previously submitted who will perform the work during that major component or quarter for which the Contractor seeks to claim credit toward the contract DBE goal. The Contractor shall obtain the prior approval of the Department for any assistance it may provide to the DBE beyond its existing resources in executing its commitment to the work in accordance with the requirements listed in the **Good Faith Efforts Described** section of this Special Provision. If the Contractor is aware of any assistance beyond a DBE's existing resources that the Contractor, or another subcontractor, may be contemplating or may deem necessary and that have not been previously approved, the Contractor shall submit a new or revised narrative statement for VDOT's approval prior to assistance being rendered.

If the Contractor fails to comply with correctly completing and submitting any of the required documentation requested by this provision within the specified time frames, the Department will withhold payment of the monthly progress estimate until such time as the required submissions are received VDOT. Where such failures to provide required submittals or documentation are repeated the Department will move to enjoin the Contractor and any prime contractual affiliates, as in the case of a joint venture, from bidding as a prime Contractor, or participating as a subcontractor on VDOT projects until such submissions are received.

K. Documentation Required for Semi-final Payment

On those projects nearing completion, the Contractor must submit Form C-63 marked "Semi-Final" within twenty (20) days after the submission of the last regular monthly progress estimate to the DCRO. The form must include each DBE used on the contract work and the work performed by each DBE. The form shall include the actual dollar amount paid to each DBE for the accepted creditable work on the contract. The form shall be certified under penalty of perjury, or other applicable law, to be accurate and complete. VDOT will use this certification and other information available to determine applicable DBE credit allowed to date by VDOT and the extent to which the DBEs were fully paid for that work. The Contractor shall acknowledge by the act of filing the form that the information is supplied to obtain payment regarding a federal participation contract. A letter of certification, signed by both the prime Contractor and appropriate DBEs, will accompany the form, indicating the amount, including any retainage, if present, that remains to be paid to the DBE(s).

L. Documentation Required for Final Payment

On those projects that are complete, the Contractor shall submit a final Form C-63 marked "Final" to the DCRO, within thirty (30) days of the final estimate. The form must include each DBE used on the contract and the work performed by each DBE. The form shall include the actual dollar amount paid to each DBE for the creditable work on the contract. VDOT will use this form and other information available to determine if the Contractor and DBEs have satisfied the DBE contract goal percentage specified in the contract and the extent to which credit was allowed. The Contractor shall acknowledge by the act of signing and filing the form that the information is supplied to obtain payment regarding a federal participation contract.

M. Prompt Payment Requirements

The Contractor shall make prompt and full payment to the subcontractor(s) of any retainage held by the prime Contractor after the subcontractor's work is satisfactorily completed.

For purposes of this Special Provision, a subcontractor's work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished, documented, and accepted as required by the contract documents by VDOT. When VDOT has made partial acceptance of a portion of the prime contract, the Department will consider the work of any subcontractor covered by that partial acceptance to be satisfactorily completed. Payment will be made in accordance with the requirements of Section 107.01, Section 109.08, and Section 109.09 of the Specifications.

Upon VDOT's payment of the subcontractor's portion of the work as shown on the monthly progress estimate and the receipt of payment by the Contractor for such work, the Contractor shall make compensation in full to the subcontractor for that portion of the work satisfactorily completed and accepted by the Department. For the purposes of this Special Provision, payment of the subcontractor's portion of the work shall mean the Contractor has issued payment in full, less agreed upon retainage, if any, to the subcontractor for that portion of the subcontractor's work that VDOT paid to the Contractor on the monthly progress estimate.

The Contractor shall make payment of the subcontractor's portion of the work within seven (7) days of the receipt of payment from VDOT in accordance with the requirements of Section 107.01, Section 109.08, and Section 109.09 of the Specifications.

If the Contractor fails to make payment for the subcontractor's portion of the work within the time frame specified herein, the subcontractor shall contact the Responsible Engineer and the Contractor's bonding company in writing. The bonding company and VDOT will investigate the cause for non-payment and, barring mitigating circumstances that would make the subcontractor ineligible for payment, ensure payment in accordance with the requirements of Section 107.01, Section 109.08, and Section 109.09 of the Specifications.

By bidding on this contract, and by accepting and executing this contract, the Contractor agrees to assume these contractual obligations, and to bind the Contractor's subcontractors contractually to those prompt payment requirements.

Nothing contained herein shall preclude the Contractor from withholding payment to the subcontractor in accordance with the terms of the subcontract in order to protect the Contractor from loss or cost of damage due to a breach of agreement by the subcontractor.

N. Miscellaneous DBE Program Requirements

Loss of DBE Eligibility: When a DBE firm has been removed from eligibility as a certified DBE firm, the following actions will be taken:

1. When a Bidder/Contractor has made a commitment to use a DBE firm that is not currently certified, thereby making the Contractor ineligible to receive DBE participation credit for work performed, and a subcontract has not been executed, the ineligible DBE firm does not count toward either the contract goal or overall goal. The Contractor shall meet the contract goal with a DBE firm that is eligible to receive DBE credit for work performed, or must demonstrate to the Contract Engineer that it has made good faith efforts to do so.

2. When a Bidder/Contractor has executed a subcontract with a certified DBE firm prior to official notification of the DBE firm's loss of eligibility, the Contractor may continue to use the firm on the contract and shall continue to receive DBE credit toward its DBE goal for the subcontractor's work.

3. When VDOT has executed a prime contract with a DBE firm that is certified at the time of contract execution but that is later ruled ineligible, the portion of the ineligible firm's performance on the contract before VDOT has issued the notice of its ineligibility shall count toward the contract goal.

Termination of DBE: If a certified DBE subcontractor is terminated, or fails, refuses, or is unable to complete the work on the contract for any reason, the Contractor must promptly request approval to substitute or replace that firm in accordance with this section of this Special Provision.

The Contractor, as aforementioned in **DBE Program-Related Certifications Made by Bidders/Contractors**, shall notify VDOT in writing before terminating and/or replacing the DBE that was committed as a condition of contract award or that is otherwise being used or represented to fulfill DBE contract obligations during the contract performance period. Written consent from the Department for terminating the performance of any DBE shall be granted only when the Contractor can demonstrate that the DBE is unable, unwilling, or ineligible to perform its obligations for which the Contractor sought credit toward the contract DBE goal. Such written consent by the Department to terminate any DBE shall concurrently constitute written consent to substitute or replace the terminated DBE with another DBE. Consent to terminate a DBE shall not be based on the Contractor's ability to negotiate a more advantageous contract with another subcontractor whether that subcontractor is, or is not, a certified DBE.

1. All Contractor requests to terminate, substitute, or replace a certified DBE shall be in writing, and shall include the following information:

   (a) The date the Contractor determined the DBE to be unwilling, unable, or ineligible to perform.

   (b) The projected date that the Contractor shall require a substitution or replacement DBE to commence work if consent is granted to the request.

   (c) A brief statement of facts describing and citing specific actions or inaction by the DBE giving rise to the Contractor's assertion that the DBE is unwilling, unable, or ineligible to perform;

   (d) A brief statement of the affected DBE's capacity and ability to perform the work as determined by the Contractor;

   (e) A brief statement of facts regarding actions taken by the Contractor which are believed to constitute good faith efforts toward enabling the DBE to perform;

   (f) The current percentage of work completed on each bid item by the DBE;

   (g) The total dollar amount currently paid per bid item for work performed by the DBE;

   (h) The total dollar amount per bid item remaining to be paid to the DBE for work completed, but for which the DBE has not received payment, and with which the Contractor has no dispute;

   (i) The total dollar amount per bid item remaining to be paid to the DBE for work completed, but for which the DBE has not received payment, and over which the Contractor and/or the DBE have a dispute.

2. Contractor's Written Notice to DBE of Pending Request to Terminate and Substitute with another DBE.

   The Contractor shall send a copy of the "request to terminate and substitute" letter to the affected committed DBE firm, in conjunction with submitting the request to the DCRO. The affected DBE firm may submit a response letter to the Department within two (2) business days of receiving the notice to terminate from the Contractor. The affected DBE firm shall explain its position concerning performance on the committed work. The Department will consider both the Contractor's request and the DBE's response and explanation before approving the Contractor's termination and substitution request, or determining if any action should be taken against the Contractor.

   If, after making its best efforts to deliver a copy of the "request to terminate and substitute" letter, the Contractor is unsuccessful in notifying the affected DBE firm, the Department will verify that

the affected, committed DBE firm is unable or unwilling to continue the contract. The Department will immediately approve the Contractor's request for a substitution.

3. Proposed Substitution of Another Certified DBE

   Upon termination of a DBE, the Contractor shall use reasonable good faith efforts to replace the terminated DBE. The termination of such DBE shall not relieve the Contractor of its obligations pursuant to this section, and the unpaid portion of the terminated DBE's contract will not be counted toward the contract goal.

   When a DBE substitution is necessary, the Contractor shall submit an amended Form C-111 with the name of another DBE firm, the proposed work to be performed by that firm, and the dollar amount of the work to replace the unfulfilled portion of the work of the originally committed DBE firm. The Contractor shall furnish all pertinent information including the contract I.D. number, project number, bid item, item description, bid unit and bid quantity, unit price, and total price. In addition, the Contractor shall submit documentation for the requested substitute DBE as described in this section of this Special Provision.

   Should the Contractor be unable to commit the remaining required dollar value to the substitute DBE, the Contractor shall provide written evidence of good faith efforts made to obtain the substitute value requirement. The Department will review the quality, thoroughness, and intensity of those efforts. Efforts that are viewed by VDOT as merely superficial or pro-forma will not be considered good faith efforts to meet the contract goal for DBE participation. The Contractor must document the steps taken that demonstrated its good faith efforts to obtain participation as set forth in the **Good Faith Efforts Described** section of this Special Provision.

Factors Used to determine if a DBE Trucking Firm is performing a CUF:

The following factors will be used to determine whether a DBE trucking company is performing a CUF:

1. To perform a CUF the DBE trucking firm shall be completely responsible for the management and supervision of the entire trucking operation for which the DBE is responsible by subcontract on a particular contract. There shall not be a contrived arrangement, including, but not limited to, any arrangement that would not customarily and legally exist under regular construction project subcontracting practices for the purpose of meeting the DBE contract goal;

2. The DBE must own and operate at least one fully licensed, insured, and operational truck used in the performance of the contract work. This does not include a supervisor's pickup truck or a similar vehicle that is not suitable for and customarily used in hauling the necessary materials or supplies;

3. The DBE receives full contract goal credit for the total reasonable amount the DBE is paid for the transportation services provided on the contract using trucks the DBE owns, insures, and operates using drivers that the DBE employs and manages;

4. The DBE may lease trucks from another certified DBE firm, including from an owner-operator who is certified as a DBE. The DBE firm that leases trucks from another DBE will receive credit for the total fair market value actually paid for transportation services the lessee DBE firm provides on the contract;

5. The DBE may also lease trucks from a non-DBE firm, including an owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit for the total value of the transportation services provided by non-DBE lessees, *not to exceed the value of transportation services provided by DBE-owned trucks on the contract.* For additional participation by non-DBE lessees, the DBE will only receive credit for the fee or commission it receives as a result of the lease arrangement.

EXAMPLE

DBE Firm X uses two (2) of its own trucks on a contract. The firm leases two (2) trucks from DBE Firm Y and six (6) trucks from non-DBE Firm Z.

		Value of Trans. Serv. (For Illustrative Purposes Only**)**
Firm X		
Truck 1	Owned by DBE	$100 per day
Truck 2	Owned by DBE	$100 per day
Firm Y		
Truck 1	Leased from DBE	$110 per day
Truck 2	Leased from DBE	$110 per day
Firm Z		
Truck 1	Leased from Non DBE	$125 per day
Truck 2	Leased from Non DBE	$125 per day
Truck 3	Leased from Non DBE	$125 per day
Truck 4	Leased from Non DBE	$125 per day
Truck 5	Leased from Non DBE*	$125 per day
Truck 6	Leased from Non DBE*	$125 per day

DBE credit would be awarded for the total transportation services provided by DBE Firm X and DBE Firm Y, and may also be awarded for the total value of transportation services by four (4) of the six (6) trucks provided by non-DBE Firm Z (not to exceed the value of transportation services provided by DBE-owned trucks).

Credit = 8 Trucks
Total Value of Transportation Services = $820

In all, full DBE credit would be allowed for the participation of eight (8) trucks (twice the number of DBE trucks owned and leased) and the dollar value attributable to the Value of Transportation Services provided by the 8 trucks.

* With respect to the other two trucks provided by non-DBE Firm Z, DBE credit could be awarded only for the fees or commissions pertaining to those trucks that DBE Firm X receives as a result of the lease with non-DBE Firm Z.

6. For purposes of this section, the lease must indicate that the DBE firm leasing the truck has exclusive use of and control over the truck. This will not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, provided the lease gives the DBE absolute priority for and control over the use of the leased truck. Leased trucks must display the name and identification number of the DBE firm that has leased the truck at all times during the life of the lease.

Data Collection: In accordance with 49CFR Section 26.11, all firms bidding on prime contracts and bidding or quoting subcontracts on federal-aid projects shall provide the following information to the Contract Engineer annually.

- Firm name
- Firm address
- Firm's status as a DBE or non-DBE
- The age of the firm and
- The annual gross receipts of the firm

The means of transmittal and the risk for timely receipt of this information shall be the responsibility of the bidder. However, the above information can be submitted by means of the Annual Gross Receipts Survey as required in the Prequalification/Certification application.

All bidders, including DBE prime Contractor bidders, shall complete and submit to the Contract Engineer the Subcontractor/Supplier Solicitation and Utilization Form C-48 for each bid submitted; to be received within ten (10) business days after the bid opening. Failure of bidders to submit this form in the time frame specified may be cause for disqualification of the bidder and rejection of their bid in accordance with the requirements of this Special Provision, the contract specifications, and VDOT Road and Bridge specifications.

O. Suspect Evidence of Criminal Behavior

Failure of a bidder, Contractor, or subcontractor to comply with the Virginia Department of Transportation Road and Bridge Specifications and these Special Provisions wherein there appears to be evidence of criminal conduct shall be referred to the Attorney General for the Commonwealth of Virginia and/or the FHWA Inspector General for criminal investigation and, if warranted, prosecution.

Suspected DBE Fraud

In appropriate cases, VDOT will bring to the attention of the U. S. Department of Transportation (USDOT) any appearance of false, fraudulent, or dishonest conduct in connection with the DBE program, so that USDOT can take the steps, e.g., referral to the Department of Justice for criminal prosecution, referral to the USDOT Inspector General, action under suspension and debarment or Program Fraud and Civil Penalties rules provided in 49CFR Part 31.

P. Summary of Remedies for Non-Compliance with DBE Program Requirements

Failure of any bidder\Contractor to comply with the requirements of this Special Provision for Section 107.15 of the Virginia Road and Bridge Specifications, which is deemed to be a condition of bidding, or where a contract exists, is deemed to constitute a breach of contract shall be remedied in accordance with the following:

1. Disadvantaged Business Enterprise (DBE) Program Requirements

The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award, administration, and performance of this contract. Failure by the Contractor to carry out these requirements is a material breach of this contract, which will result in the termination of this contract or other such remedy, as VDOT deems appropriate.

All administrative remedies noted in this provision are automatic unless the Contractor exercises the right of appeal within the required timeframe(s) specified herein.

2. DBE Program-Related Certifications Made by Bidders\Contractors

Once awarded the contract, the Contractor shall comply fully with all regulatory and contractual requirements of the USDOT DBE Program, and that each certified DBE firm participating in the contract shall fully perform the designated work items with the DBE's own forces and equipment

under the DBE's direct supervision, control, and management. Where a contract exists and where the Contractor, DBE firm, or any other firm retained by the Contractor has failed to comply with federal or VDOT DBE Program regulations and/or their requirements on that contract, VDOT has the authority and discretion to determine the extent to which the DBE contract requirements have not been met, and will assess against the Contractor any remedies available at law or provided in the contract in the event of such a contract breach.

3. Disqualification of Bidder

Bidders may be disqualified from bidding for failure to comply with the requirements of this Special Provision, the contract specifications, and VDOT Road and Bridge Specifications.

4. Bidding Procedures

The failure of a bidder to submit the required documentation within the timeframes specified in the **Contract Goal, Good Faith Efforts Specified** section of this Special Provision may be cause for rejection of that bidder's bid. If the lowest bidder is rejected for failure to submit required documentation in the specified time frames, the Department may either award the work to the next lowest bidder, or re-advertise and construct the work under contract or otherwise as determined by the Commonwealth.

In order to award a contract to a bidder that has failed to meet DBE contract goal requirements, VDOT will determine if the bidder's efforts were adequate good faith efforts, and if given all relevant circumstances, those efforts were to the extent a bidder actively and aggressively seeking to meet the requirements would make. Regardless of the DBE contract goal participation level proposed by the bidder or the extent of good faith efforts shown, all bidders shall timely and separately file their completed and executed Forms C-111, C-112, C-48, and Form C-49, as aforementioned, or face potential bid rejection. If a bidder does not submit it's completed and executed C-111, or C-112, when required by this Special Provision, the bidder's bid will be considered non-responsive and may be rejected. If, after reconsideration, the Department determines the bidder has failed to meet the requirements of the contract goal and has failed to make adequate good faith efforts to achieve the level of DBE participation as specified in the bid proposal, the bidder's bid will be rejected. If sufficient documented evidence is presented to demonstrate that the apparent low bidder made reasonable good faith efforts, the Department will award the contract and reduce the DBE requirement to the actual commitment identified by the lowest successful bidder at the time of its bid. The Contractor is encouraged to seek additional participation during the life of the contract.

If the Contractor fails to conform to the schedule of DBE participation as shown on the progress schedule, or at any point at which it is clearly evident that the remaining dollar value of allowable credit for performing work is insufficient to obtain the scheduled participation, the Contractor and any aforementioned affiliates may be enjoined from bidding for 60 days or until such time as conformance with the schedule of DBE participation is achieved. In such instances, the Contractor is expected to seek DBE participation towards meeting the goal during the prosecution of the contract.

If the Contractor fails upon completion of the project to meet the required participation, the Contractor and any prime contractual affiliates, as in the case of a joint venture, may be enjoined from bidding as a prime Contractor, or participating as a subcontractor on VDOT projects for a period of 90 days.

Prior to enjoinment from bidding or denial to participate as a subcontractor for failure to comply with participation requirements, as provided hereinbefore, the Contractor may submit documentation to the State Construction Engineer to substantiate that failure was due solely to

quantitative underrun(s) or elimination of items subcontracted to DBEs, and that all feasible means have been used to obtain the required participation. The State Construction Engineer upon verification of such documentation shall make a determination whether or not the Contractor has met the requirements of the contract.

If it is determined that the aforementioned documentation is insufficient or the failure to meet required participation is due to other reasons, the Contractor may request an appearance before the Administrative Reconsideration Panel to establish that all feasible means were used to meet such participation requirements. The decision of the Administrative Reconsideration Panel shall be administratively final. The enjoinment period will begin upon the Contractor's failure to request a hearing within the designated time frame or upon the Administrative Reconsideration Panel's decision to enjoin, as applicable.

5. Verification of DBE Participation and Imposed Damages

If the Contractor fails to comply with correctly completing and submitting any of the required documentation requested by this provision within the specified time frames, the Department will withhold payment of the monthly progress estimate until such time as the required submissions are received by VDOT. Where such failures to provide required submittals or documentation are repeated the Department will move to enjoin the Contractor and any prime contractual affiliates, as in the case of a joint venture, from bidding as a prime Contractor, or participating as a subcontractor on VDOT projects until such submissions are received.

In addition to the remedies described heretofore in this provision VDOT also exercises its rights with respect to the following remedies:

Suspect Evidence of Criminal Behavior

Failure of a bidder, Contractor, or subcontractor to comply with the Virginia Department of Transportation Road and Bridge Specifications and these Special Provisions wherein there appears to be evidence of criminal conduct shall be referred to the Attorney General for the Commonwealth of Virginia and/or the FHWA Inspector General for criminal investigation and, if warranted prosecution.

In appropriate cases, VDOT will bring to the attention of the U. S. Department of Transportation (USDOT) any appearance of false, fraudulent, or dishonest conduct in connection with the DBE program, so that USDOT can take the steps, e.g., referral to the Department of Justice for criminal prosecution, referral to the USDOT Inspector General, action under suspension and debarment or Program Fraud and Civil Penalties rules provided in 49CFR Part 31.

S102CF1-0309

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
USE OF DOMESTIC MATERIAL

February 26, 2009

SECTION 102.05 PREPARATION OF BID of the Specifications is amended to include the following:

In accordance with the provisions of Section 635.410(b) of Title 23 CFR, hereinafter referred to as "Buy America", except as otherwise specified, all iron and steel products (including miscellaneous steel items such as fasteners, nuts, bolts and washers) to be permanently incorporated for use on federal aid projects shall be produced in the United States of America regardless of the percentage they exist in the manufactured product or final form they take. Therefore, "Domestically produced in the United States of America" means all manufacturing processes must occur in the United States of America, to mean, in one of the 50 States, the District of Columbia, Puerto Rico or in the territories and possessions of the United States. Manufacturing processes are defined as any process which alters or modifies the chemical content, physical size or shape or final finish of iron or steel material) such as rolling, extruding, bending, machining, fabrication, grinding, drilling, finishing, or coating whereby a raw material or a reduced iron ore material is changed, altered or transformed into a steel or iron item or product which, because of the process, is different from the original material. For the purposes of satisfying this requirement "coating" is defined as the application of epoxy, galvanizing, painting or any other such process that protects or enhances the value of the material. Materials used in the coating process need not be domestic materials.

For the purposes herein the manufacturing process is considered complete when the resultant product is ready for use as an item in the project (e.g. fencing, posts, girders, pipe, manhole covers, etc.) or is incorporated as a component of a more complex product by means of further manufacturing. Final assembly of a product may occur outside of the United States of America provided no further manufacturing process takes place.

Raw materials such as iron ore, pig iron, processed, pelletized and reduced iron ore, waste products (including scrap, that is, steel or iron no longer useful in its present form from old automobiles, machinery, pipe, railroad rail, or the like and steel trimmings from mills or product manufacturing) and other raw materials used in the production of steel and\or iron products may, however, be imported. Extracting, handling, or crushing the raw materials which are inherent to the transporting the materials for later use in the manufacturing process are exempt from Buy America. The use of foreign source steel or iron billet is not acceptable under the provisions of Buy America. For the purposes of this provision all steel or iron material not meeting the criteria as domestically produced in the United States of America will be considered as "foreign" material. All iron and steel items will be classified hereinafter as "domestic" or "foreign", identified by and subject to the provisions herein.

Domestically produced iron or steel ingots or billets shipped outside the United States of America for any manufacturing process and returned for permanent use in a project would not comply with "Buy America" requirements.

Buy America provisions do not apply to iron or steel products used temporarily in the construction of a project such as temporary sheet piling, temporary bridges, steel scaffolding, falsework or such temporary material or product or material that remains in place for the Contractor's convenience.

Section 635.410(b) of Title 23 CFR permits a minimal amount of steel or iron material to be incorporated in the permanent work on a federal-aid contract. The cost of such materials or products must not exceed one-tenth of one percent of the contract amount or $2500, whichever is greater. The cost of the foreign iron or steel material is defined as its monetary value delivered to the job site and supported by invoices or bill of sale to the Contractor. This delivered to site cost must include transportation, assembly, installation and testing.

In the event the total cost of all "foreign" iron and steel product or material does not exceed one-tenth of one percent of the total contract cost or $2,500, whichever is greater, the use of such material meeting the limitations herein will not be restricted by the domestic requirements herein. However, by signing the bid, the Bidder certifies that such cost does not exceed the limits established herein.

Waivers:

With prior concurrence from Federal Highway Administration (FHWA) headquarters, the Federal Highway Division Administrator may grant a waiver to specific projects provided it can be demonstrated:

1 that the use of domestic steel or iron materials would be inconsistent with the public interest; or

2. materials or products requested for use are not produced in the United States in sufficient or reasonably available quantities and are of satisfactory quality for use in the permanent work.

The waiver request shall be submitted with supportive information to include:

1. Project number\description, project cost, waiver item, item cost, country of origin for the product, reason for the waiver, and

2. Analysis of redesign of the project using alternative or approved equal domestic products

In order to grant such a waiver the request for the waiver must be published in the Federal Register for a period not less than 15 days or greater than 60 days prior to waiving such requirement. An initial 15 day comment period to the waiver will be available to the public by means of the FHWA website: http://www.fhwa.dot.gov/construction/contracts/waivers.cfm. Following that initial 15 day period of review and comment the request for waiver will be published by the FHWA in the Federal Register. The effective date of the FHWA finding, either to approve or deny the waiver request, will be 15 days following publication in the Federal Register.

Only the FHWA Administrator may grant nationwide waivers which still are subject to the public rulemaking and review process.

Alternative Bidding Procedures:

An alternative bidding procedure may be employed to justify the use of foreign iron and\or steel. To qualify under this procedure the total project is bid using two alternatives, one based on the use of domestic products and the other, the use of corresponding foreign source steel and\or iron materials.

In accordance with the provisions of Section 103.02 the Contract will be awarded to the lowest responsive and responsible bidder who submits the lowest total bid based on furnishing domestic iron or steel unless such total exceeds the lowest total bid based on furnishing foreign iron and\or steel by more than 25 percent, in which case the award will be made to the lowest responsive and responsible bidder furnishing foreign iron and\or steel based upon furnishing verifiable supportive data. The bidder shall submit a bid based on permanently incorporating only domestic iron and\or steel in the construction of the project. The bidder may also submit a bid for the same proposed contract based on being allowed to permanently incorporate corresponding foreign iron and\or steel materials meeting the other contract requirements into the work on the contract. If he chooses to submit such a bid, that alternate bid shall clearly indicate which foreign iron and\or steel items will be permanently installed in the work as well as contain prices for all other items listed in the corresponding domestic proposal to complete a total “Foreign” bid.

In the event the contract is awarded to the bidder furnishing foreign iron and\or steel materials or items the provision for price adjustment of steel items will be permitted, however, price fluctuations shall use the U.S. index as stated in the Special Provision for Price Adjustment For Steel. The Contractor must indicate which corresponding eligible steel items he chooses price adjustment to apply. In the event the contract is awarded to a bidder furnishing foreign iron and\or steel items and during the life of that contract the Contractor discovers

he can not furnish foreign iron and\or steel material as originally anticipated and agreed upon, he shall be responsible to honor the total bid price and furnish such iron and\or steel materials meeting the contract requirements from other sources as necessary to complete the work.

In the event the Contractor proposes to furnish "foreign" iron and steel and can verify a savings in excess of 25 percent of the overall project cost if bid using domestic materials, the Contractor shall submit a second complete paper bid proposal clearly marked “Foreign” including Form C-7 and supportive data supplement on all sheets. Supportive data shall list, but not be limited to, origin of material, best price offer, quantity and complete description of material, mill analysis, evidence or certification of conformance to contract requirements, etc. The “Foreign” bid shall be completed using the best price offer for each corresponding bid item supplying foreign material in the alternative bid and submit the same with the Contractor’s “Domestic” bid. The Contractor shall write the word “Foreign” by the bid total shown on Form C-7 as well as last page of Schedule of Items showing the total bid amount. The bidder shall also contact the State Contract Engineer to inform him that he is also submitting an alternate “Foreign” paper bid..

The information listed on the supportive data sheet(s) will be used to provide the basis for verification of the required cost savings. In the event comparison of the prices given, or corrected as provided in Section 103.01 of the Specifications, shows that use of "foreign" iron and steel items does not represent a cost savings exceeding the aforementioned 25 percent, "domestic" iron and\or steel and prices given there for shall be used and the "100 percent Domestic Items Total" shall be the Contractor's bid.

Certification of Compliance:

Where domestic material is supplied, prior to final payment the Contractor shall furnish to the Department a certificate of compliance (such as may be furnished by steel mill test reports) that all steel and\or iron products supplied to the project except as may be permitted (one-tenth of one percent of the total contract cost or $2,500, whichever is greater) and permanently incorporated into the work satisfies the domestic requirements herein. This certification shall contain a definitive statement about the origin of all products covered under the provisions of Buy America as stated herein.

In lieu of the Contractor providing personal certification, the Contractor may furnish a stepped certification in which each handler of the product, such as supplier, fabricator, manufacturer, processor, etc. furnishes an individual certification that their step in the process was domestically performed.

USDOT 1050.2
APPENDIX A

During the performance of this contract, the consultant, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

(1) **Compliance with Regulations:** The contractor shall comply with the Regulation relative to nondiscrimination in federally-assisted programs of the Department of Transportation (hereinafter, "DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

(2) **Nondiscrimination:** The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

(3) **Solicitations for Subcontractors, Including Procurements of Materials and Equipment:** In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

(4) **Information and Reports:** The contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Virginia Department of Transportation to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information the contractor shall so certify to the Virginia Department of Transportation as appropriate, and shall set forth what efforts it has made to obtain the information.

(5) **Sanctions for Noncompliance:** In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the Virginia Department of Transportation shall impose such contract sanctions as it may determine to be appropriate, including, but not limited to:
(a.) withholding of payments to the contractor under the contract until the contractor complies, and/or
(b.) cancellation, termination or suspension of the contract, in whole or in part.

(6) **Incorporation of Provisions:** The contractor shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto.

The contractor shall take such action with respect to any subcontract. or procurement as the Virginia Department of Transportation may direct as a means of enforcing such provisions including sanctions for non-compliance: Provided, however, that, in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the Virginia Department of Transportation to enter into such litigation to protect the interests of the Virginia Department of Transportation, and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

CITY OF NORFOLK
LOCALLY ADMINISTERED
FEDERALLY FUNDED PROJECTS
REVISIONS TO THE 2007 VDOT SPECIFICATIONS

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VIRGINIA DEPARTMENT OF TRANSPORTATION
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SUPPLEMENTAL DIVISION I—GENERAL PROVISIONS

SECTION 101—DEFINITIONS OF ABBREVIATIONS, ACRONYMS, AND TERMS

Section 101.02—Terms of the Specifications is amended to replace the definition for **Notice to Proceed** with the following:

> **Notice to Proceed.** A date selected by the Contractor that is no earlier than 15 nor later than 30 calendar days after the date of contract execution on which the Contractor intends to begin the work, or a contract specific date on which the Contractor may begin the work identified as the Notice to Proceed date in the Contract Documents.

Section 101.02 Terms of the Specifications is amended to add the following:

> **Storm Sewer System -** A drainage system consisting of a series of at least two interconnecting pipes and structures (minimum of two drop inlets, manholes, junction boxes, etc.) designed to intercept and convey stormwater runoff from a specific storm event without surcharge.

SECTION 102—BIDDING REQUIREMENTS AND CONDITIONS

Section 102.01—Prequalification of Bidders of the Specifications is amended to replace the first paragraph of (a) with the following:

> All prospective Bidders, including all members of a joint venture, must prequalify with the Department and shall have received a certification of qualification in accordance with the Rules Governing Prequalification Privileges prior to bidding. These rules and regulations can be found within the Department's Rules Governing Prequalification Privileges via the Prequalification Application. This requirement may be waived by a project-specific provision in the bid proposal.
>
> All subcontractors must be prequalified prior to performing any work on the contract, except that prequalification will not be required for subcontractors only performing a service as defined by the Code of Virginia, or only performing work items noted in the proposal as "Specialty Items".
>
> In order to be eligible for DBE credit under Special Provision for Section 107.15, DBE federal-aid contract subcontractors must be VDOT prequalified and DMBE certified at the time of bid submission. The prequalification and certification status of a DBE may affect the award of the contract to the prime contractor and the award of the subcontract to the DBE at any point during the contract.

Section 102.04(c) **Notice of Alleged Ambiguities** of the Specifications is amended to replace the first paragraph with the following:

> If a word, phrase, clause, or any other portion of the proposal is alleged to be ambiguous, the Bidder shall submit to the State Contract Engineer a written notice of the alleged ambiguity not later than 10 days prior to the date of receipt of bids and request an interpretation thereof. This written notice shall be submitted via the CABB (Contractor Advertisement Bulletin Board) system located on the Construction website at www.VDOT.Virginia.gov. Authorized interpretations will be issued by the State Contract Engineer to each person who received a proposal and will be posted on the CABB system.

Section 102.11— eVA Business-To-Government Vendor Registration of the Specifications is replaced with the following:

Bidders are not required to be registered with "eVA Internet e-procurement solution" at the time bids are submitted, however, prior to award, the lowest responsive and responsible bidder must be registered with "eVA Internet e-procurement solution" or the bid will be rejected. Registration shall be performed by accessing the eVA website portal www.eva.state.va.us, following the instructions and complying with the requirements therein.

When registering with eVa it is the bidder's responsibility to enter or have entered their correct PA type address or addresses in eVa in order to receive payments on any contracts that the Department (VDOT) may award to them as the lowest responsive and responsible bidder. The Bidder shall also ensure their prequalification address(es) match those registered with eVa. Failure on the part of the bidder or Contractor to meet either of these requirements may result in late payment of monthly estimates.

SECTION 105—CONTROL OF WORK

Section 105.01—Notice to Proceed of the Specifications is replaced with the following:

Unless otherwise indicated in the Contract, the Notice to Proceed date will be the date selected by the Contractor on which the Contractor intends to begin the work. That date shall be no earlier than 15 nor later than 30 calendar days after the date of contract execution. The State Contract Engineer will contact the Contractor on the date of contract execution to inform him that the contract has been executed. The State Contract Engineer will also confirm this date in the Letter of Contract Execution. Copies of the Letter of Contract Execution will be distributed to Department personnel involved in the administration of the Contract and to the Contractor. Within 10 calendar days after the date of contract execution the Contractor shall submit to the Engineer written notice of the date he has selected as his Notice to Proceed date. If the Contractor fails to provide written notice of his selected Notice to Proceed Date within 10 calendar days of contract execution, the selected Notice to Proceed Date will become the date 15 calendar days after the date of contract execution. The Contractor shall begin work no later than 10 calendar days after the date he has selected as his Notice to Proceed date, unless the Notice to Proceed date is otherwise indicated in the Contract, in which case the Contractor shall begin work within 10 calendar days after the specific Notice to Proceed date indicated in the Contract.

Contract Time will commence on the date of the Notice to Proceed. The Letter of Contract Execution will identify the Chief Engineer's authorized representative, hereafter referred to as the Engineer, who is responsible for written directives and changes to the Contract. The Engineer will contact the Contractor after notice of award to arrange a pre-construction conference.

In the event the Contractor, for matters of his convenience, wishes to begin work earlier than 15 calendar days or later than 30 calendar days after the date of contract execution, he shall make such a request in writing to the Engineer within 10 calendar days of the date of contract execution or once a Notice to Proceed Date has been established, if he wishes to begin work more than 10 calendar days after his selected Notice to Proceed date or the Notice to Proceed Date indicated in the Contract, he shall make such a request to the Engineer in writing no later than 5 calendar days after the Notice to Proceed date. If this requested start date is acceptable to the Department, the Contractor will be notified in writing; however, the Contract fixed completion date will not be adjusted but will remain binding. The Contractor's request to adjust the start date for the work on the Contract will not be considered as a basis for claim that the time resulting from the Contractor's adjusted start date, if accepted by the Engineer, is insufficient to accomplish the work nor shall it relieve the Contractor of his responsibility to perform the work in accordance with the scope of work and requirements of the Contract. In no case shall work begin before the Department executes the Contract or prior to the Notice to Proceed date unless otherwise permitted by the Contract or authorized by the Engineer. The Contractor shall notify the Engineer at least 24 hours prior to the date on which he will begin the work.

Section 105.02—Pre-Construction Conference of the Specifications is amended to replace the first paragraph with the following:

After notification of award and prior to the Notice to Proceed date the Contractor shall attend a pre-construction conference scheduled by the Engineer to discuss the Contractor's planned operations for prosecuting and completing the work within the time limit of the Contract. At the pre-construction conference the Engineer and the Contractor will identify in writing the authorities and responsibilities of project personnel for each party. The pre-construction conference may be held simultaneously with the scheduling conference when the Engineer so indicates this in advance to the Contractor. When these are simultaneously held, the Contractor shall come prepared to discuss preparation and submittal details of the progress schedule in accordance with the requirements of the Contract.

Section 105.10(c)(1)**—Steel Structures** of the Specifications is replaced with the following:

Working drawings for steel structures, including metal handrails, shall consist of shop detail, erection, and other working drawings showing details, dimensions, sizes of units, and other information necessary for the fabrication and erection of metal work.

Section 105.14—Maintenance During Construction of the Specifications is amended to add the following:

The Contractor shall provide at least one person on the project site during all work operations who is currently verified either by the Department in Intermediate Work Zone Traffic Control, or by the American Traffic Safety Services Association (ATSSA) as a Traffic Control Supervisor (TCS). This person must have the verification card with them while on the project site. This person shall be responsible for the oversight of work zone traffic control within the project limits in compliance with the contract requirements involving the plans, specifications, the VWAPM, and the MUTCD. This person's duties shall include the supervision of the installation, adjustment (if necessary), inspection, maintenance and removal when no longer required of all traffic control devices on the project.

If none of the Contractor's on-site personnel responsible for the supervision of such work has the required verification with them or if they have an outdated verification card showing they are not currently verified either by the Department in Intermediate Work Zone Traffic Control, or by the American Traffic Safety Services Association (ATSSA) as a Traffic Control Supervisor (TCS) all work on the project will be suspended by the Engineer.

The Contractor shall provide at least one person on site who is, at a minimum, verified by the Department in Basic Work Zone Traffic Control for each construction and\or maintenance operation that involves installing, maintaining, or removing work zone traffic control devices. This person shall be responsible for the placement, maintenance and removal of work zone traffic control devices.

In the event none of the Contractor's on-site personnel of any construction/maintenance operation has, at a minimum, the required verification by the Department in Basic Work Zone Traffic Control, that construction/maintenance operation will be suspended by the Engineer until that operation is appropriately staffed in accordance with the requirements herein.

Section 105.15(b) **Mailboxes and Newspaper Boxes** of the Specifications is replaced with the following:

(b) **Mailboxes and Newspaper Boxes:** When removal of existing mailboxes and newspaper boxes is made necessary by construction operations, the Contractor shall place them in temporary locations so that access to them will not be impaired. Prior to final acceptance, boxes shall be placed in their permanent locations as designated by the Engineer and left in as good condition as when found. Boxes or their supports that are damaged through negligence on the part of the Contractor shall be replaced at his expense. The cost of removing and resetting existing boxes shall be included in other pay items of the Contract. New mailboxes designated in the plans shall be paid for in accordance with the provisions of Section 521 of the Specifications.

SECTION 107—LEGAL RESPONSIBILITIES

Section 107.13—Labor and Wages of the Specifications is amended to add the following:

(c) **Job Service Offices:** In advance of the Contract starting date, the Contactor may contact the Job Service Office of the Virginia Employment Commission at the nearest location to secure referral of available qualified workers in all occupational categories. The closest office may be obtained by accessing the VEC website at http://www.vec.virginia.gov/vec-local-offices.

Section 107.14(f) **Training** of the Specifications is amended to replace 5 and 6 with the following:

5. If the Contract provides a pay item for trainees, training shall be in accordance with the requirements of Section 518 of the Specifications.

Section 107.16(a) **Erosion and Siltation** of the Specifications is amended to replace the fourth paragraph with the following:

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 and Sediment control who shall inspect erosion and siltation control devices and measures for proper installation and operation and promptly report their findings to the Inspector. Inspections shall include all areas of the site disturbed by construction activity and all off site support facilities covered by the project's Stormwater Pollution Prevention Plan. Inspections shall be conducted at least once every 14 calendar days and within 48 hours following any runoff producing storm event (Note: If an inspection is conducted as a result of a storm event, another inspection is not required for 14 calendar days following provided there are no more runoff producing storm events during the that period). For those areas that have been temporarily stabilized or runoff is unlikely to occur due to winter conditions (e.g., the site is covered with snow or ice or frozen ground exists), inspections shall be conducted at least once a month. 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. Failure of the Contractor to maintain a certified employee within the limits of the project will result in the Engineer suspending work related to any land disturbing activity until such time as a certified employee is present on the project. Failure on the part of the Contractor to maintain appropriate erosion and siltation control devices in a functioning condition may result in the Engineer notifying the Contractor in writing of specific deficiencies. Deficiencies shall be corrected immediately. If the Contractor fails to correct or take appropriate actions to correct the specified deficiencies within 24 hours 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.

Section 107.16(e) **Storm Water Pollution Prevention Plan** of the Specifications is replaced with the following:

(e) **Storm Water Pollution Prevention Plan and Virginia Stormwater Management Program General Permit for the Discharge of Stormwater from Construction Activities**

A Stormwater Pollution Prevention Plan (c) identifies potential sources of pollutants which may reasonably be expected to affect the stormwater discharges from the construction site and any off site support areas and describes and ensures implementation of practices which will be used to reduce pollutants in such discharges.

The SWPPP is comprised of, but not limited to, the Erosion and Sediment Control (ESC) Plan, the Stormwater Management (SWM) Plan and related Specifications and Standards 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, or 2,500 square feet or greater in an area designated as a Chesapeake Bay Preservation Area, require coverage under the Department of Conservation and Recreation's Virginia Stormwater Management Program (VSMP) General Permit for the Discharge of Stormwater from Construction Activities (hereafter referred to as the VSMP Construction Permit). Where applicable, the Department will apply for and retain coverage under the VSMP Construction Permit for those land disturbing activities for which it has contractual control.

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 (4VAC50-60-1170). 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.

The Contractor and all other persons that oversee or perform activities covered by the VSMP 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 and pollutant runoff control measures identified within or referenced within the SWPPP, plans, Specifications, permits, and other contract documents.

   The Contractor shall take all reasonable steps to 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 herein, the Contractor shall certify his activities by completing, signing, and submitting Form C-45 VDOT SWPPP Contractor and Subcontractor Certification Statement to the Engineer at least 7 days prior to commencing any project related land-disturbing activities, both on-site and off-site.

3. SWPPP Requirements for Support Facilities

   Where not included in the plans, the Contractor shall develop erosion and sediment control plan(s) and stormwater pollution prevention plan(s) for submission and acceptance by the Engineer prior to usage of any on-site or off-site support facilities including but not limited to, borrow and disposal areas, construction and waste material storage areas, equipment and vehicle storage and fueling areas, storage areas for fertilizers or chemicals, sanitary waste facilities and any other areas that may generate a stormwater or non-stormwater discharge directly related to the construction process. Such plans shall document the location and description of potential pollutant sources from these areas and shall include a description of the controls to reduce, prevent and control pollutants from these sources including spill prevention and response. The Contractor shall submit such plans and documentation as specified herein to the Engineer and, upon review and approval, they shall immediately become a component of the project's SWPPP and VSMP Construction Permit (where applicable) and shall be subject to all conditions and requirements of the VSMP Construction Permit (where applicable) and all other contract documents.

4. Reporting Procedures

a. Inspection Requirements

The Contractor shall be responsible for conducting inspections in accordance with the requirements herein. The Contractor shall document such inspections by completion of Form C-107 (a) and (b), Construction Runoff Control Inspection Form and Continuation Sheet, in strict accordance with the directions contained within the form.

b. Unauthorized Discharge Requirements

The Contractor shall not discharge into state waters sewage, industrial wastes, other wastes or any noxious or deleterious substances nor shall otherwise alter the physical, chemical, or biological properties of such waters that render 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 potential of any unauthorized, unusual, extraordinary, or non-compliant discharge from the land disturbing activity. 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 its volume, location, cause, and any apparent or potential effects on private and/or public properties and state waters or endangerment to public health, as well as steps being taken to eliminate the discharge. A completed Form C-107 (a) and (b) shall be included in such reports.

5. Changes, Deficiencies and Revisions

a. 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 or increase the quantity of the pollutants discharged from the land disturbing activity to surface waters.

b. Revisions to the SWPPP

Where site conditions, construction sequencing or scheduling necessitates revisions or modifications to the erosion and sediment control plan or any other component of the SWPPP for the land disturbing activity, such revisions or modifications shall be approved by the Engineer and shall be documented by the Contractor on a designated plan set (Record Set).

Such plans shall be maintained on the project site or at a location convenient to the project site where no on site facilities are available and shall be available for review upon request during normal business working hours.

Section 107.21—Size and Weight Limitations of the Specifications is amended to add the following:

(d) **Construction Loading of Structures** - In the construction, reconstruction, widening, or repair of bridge, culvert, retaining wall and other similar type structures including approaches, the Contractor shall consider

construction loads during the planning and prosecution of the work. If the loading capacity of these type structure(s) is not shown in the contract documents, the Contractor is responsible for contacting the office of the appropriate district bridge engineer to obtain the loading capacity information. Construction loads include but are not limited to the weight of cranes, trucks, other heavy construction or material delivery equipment, as well as the delivery or storage of materials placed on or adjacent to the structure or parts thereof during the various stages (phases) of the work in accordance with the Contractor's proposed work plan. The Contractor shall consider the effect(s) of construction loads on the loading capacity of these type structure(s) in his sequencing of the work and operations, including phase construction. At the Engineer's request the Contractor shall be prepared to discuss or review his proposed operations with the Engineer with regard to construction loads to demonstrate he has taken such into consideration in the planning and execution of the work.

SECTION 108—PROSECUTION AND PROGRESS OF WORK

Section 108.01—Prosecution of Work of the Specifications is amended to replace the first paragraph with the following:

The Contractor shall begin work on the Contract within 10 calendar days after the date selected by the Contractor as his Notice to Proceed date or within 10 calendar days after the specific Notice to Proceed date indicated in the Contract, unless otherwise altered or amended by specific language in the Contract or as permitted by the provisions of Section 105.01 or Section 108.02 of the Specifications.

Section 108.02(b) **Holidays** of the Specifications is amended to include the following:

In addition to the Sunday or Holiday work limitations, mobile, short duration, short-term stationary, or intermediate-term stationary temporary traffic control zone (as defined in the *Virginia Work Area Protection Manual*) lane closures on mainline lanes, shoulders, or ramps shall not be performed during the following Holiday time periods without the written permission of the Engineer. Additionally, a long-term stationary temporary traffic control zone (as defined in the *Virginia Work Area Protection Manual*) shall not be initially put in place, adjusted, or removed during the following Holiday time periods without the written permission of the Engineer:

- **January 1**: From Noon on the preceding day until Noon on the following day, except as indicated below.
- **Easter**: As indicated below.
- **Memorial Day**: As indicated below.
- **July 4:** From Noon on the preceding day until Noon on the following day, except as indicated below.
- **Labor Day**: As indicated below.
- **Thanksgiving Day**: From Noon on the Wednesday preceding Thanksgiving Day until Noon on the Monday following Thanksgiving Day.
- **Christmas Day**: From Noon on the preceding day until Noon on the following day, except as indicated below.

If the Holiday occurs on a Friday or Saturday: From Noon on the preceding Thursday to Noon on the following Monday.

If the Holiday occurs on a Sunday or Monday: From Noon on the preceding Friday to Noon on the following Tuesday.

Section 108.04—Determination and Extension of Contract Time Limit of the Specifications is amended to replace the second paragraph with the following:

> With a fixed date contract when contract execution is not within 60 calendar days after the opening of bids, or when the Contractor is unable to commence work because of any failure of the Department, or when the Contractor is delayed because of the fault of the Department, the Contractor will be given an extension of time based on the number of days delayed beyond the 60 calendar days. No time extension will be allowed for a delay in the date of contract execution when the delay is the fault of the Contractor.

Section 108.04(a) **Fixed Date** of the Specifications is amended to add the following after the first paragraph as currently written:

> If the Contract identifies a contract-specific Notice to Proceed date and the Contract is not executed by that date, the Contractor will receive an extension of time equal to the number of days between the contract-specific Notice to Proceed date and the eventual date of contract execution. If the Notice to Proceed date is selected by the Contractor and after prior approval the Engineer directs the Contractor not to begin work on that date, the Contractor will receive an extension of time equal to the number of days between the Contractor's selected Notice to Proceed date and the eventual date the Engineer informs the Contractor that he may commence the work.

Section 108.07—Default of Contract of the Specifications is amended to replace condition (a) with the following:

(a) fails to begin the work under the Contract within 10 calendar days after the Contractor's selected Notice to Proceed date, or within 10 calendar days after a contract specific Notice to Proceed date indicated in the Contract, except as otherwise permitted by specific contract language or the provisions of Section 105.01 or Section 108.02 of the Specifications.

SECTION 109—MEASUREMENT AND PAYMENT

Section 109.01(a)**—Measurement by Weight** is amended to replace the first paragraph and second paragraph including subparagraphs 1-4 with the following:

(a) **Measurement by Weight:** Materials that are measured or proportioned by weight shall be weighted on accurate scales as specified in this Section. When material is paid for on a tonnage basis, personnel performing the weighing shall be certified by the Department and shall be bonded to the Commonwealth of Virginia in the amount of $10,000 for the faithful observance and performance of the duties of the weighperson required herein. The bond shall be executed on a form having the exact wording as the Weighpersons Surety Bond Form furnished by the Department and shall be submitted to the Department prior to the furnishing of the tonnage material.

The Contractor shall have the weighperson perform the following:

1. Furnish a signed weigh ticket for each load that shows the date, load number, plant name, size and type of material, project number, schedule or purchase order number, and the weights specified herein.

2. Maintain sufficient documentation so that the accumulative tonnage and distribution of each lot of material, by contract, can be readily identified.

3. Submit by the end of the next working day a summary of the number of loads and total weights for each type of material by contract.

Section 109.01(a)**—Measurement by Weight** is also amended to delete the third paragraph.

Section 109.01(d)4 **Asphalt** is amended to replace the "formula…used in computing the volume of asphalt at temperatures other than 60 degrees F" with the following:

$$V^1 = V \times [1 - K(T - 60)]$$

Section 109.08(b)**—Payment to Sub-Contractors** of the Specifications is amended to replace the second paragraph with the following:

Payment to Sub-Contractors shall be in accordance with the provisions of §2.2-4354 of the *Highway Laws of Virginia:*

The Contractor shall take one of the following two actions within 7 days after receipt of payment from the Department for the subcontractor's portion of the work as shown on the monthly progress estimate:

1. Pay the subcontractor for the proportionate share of the total payment received from the agency attributable to the work performed by the subcontractor under that contract; or

2. Notify the Department and subcontractor, in writing, of his intention to withhold all or a part of the subcontractor's payment with the reason for nonpayment.

The Contractor shall be obligated to pay interest in the amount 1 (one) percent per month on all amounts owed by the Contractor to the subcontractor that remain unpaid after 7 days following receipt by the contractor of payment from the Department for work performed by the subcontractor, except amounts withheld as allowed in section 2. 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 with respect to each lower tier subcontractor.

Section 109.09—Payment For Material On Hand of the Specifications is replaced with the following:

When requested in writing by the Contractor, payment allowances may be made for material secured for use on the project. Such material payments will be for only those actual quantities identified in the contract, approved work orders, or otherwise **authorized and** documented **by the Engineer** as required to complete the project and shall be in accordance with the following terms and conditions:

(a) **Structural Steel or Reinforcing Steel:** An allowance of 100 percent of the cost to the Contractor for structural steel **or reinforcing steel** materials secured for fabrication not to exceed 60 percent of the contract price may be made when such material is delivered to the fabricator and has been adequately identified for exclusive use on the project. **The provisions of this section for steel reinforcement will only apply where the quantity of steel reinforcement is identified as a separate and distinct bid item for payment.** An allowance of 100 percent of the cost to the Contractor for superstructure units and reinforcing steel, not to exceed 90 percent of the contract price, may be made when fabrication is complete. Prior to the granting of such allowances, the materials and fabricated units shall have been tested or certified and found acceptable to the Department and shall have been stored in accordance with the requirements specified herein. Allowances will be based on invoices, bills, or the estimated value as approved by the Engineer and will be subject to the retainage requirements of Section 109.08 of the Specifications. **For the purposes of this section fabrication is defined as any manufacturing process such as bending, forming, welding, cutting or coating with paint or anti-corrosive materials which alters, converts, or changes raw material for its use in the permanent finished work.**

(b) **Other Materials**: For aggregate, pipe, guardrail, signs and sign assemblies, and other nonperishable material, an allowance of 100 percent of the cost to the Contractor for materials, not to exceed 90 percent of the contract price, may be made when such material is delivered **to the project** and stockpiled or stored in accordance with the requirements specified herein. Prior to the granting of such allowances, the material shall have been tested and found acceptable to the Department. Allowances

will be based on invoices, bills, or the estimated value of the material as approved by the Engineer and will be subject to the retainage provisions of Section 109.08 of the Specifications.

(c) **Excluded Items:** No allowance will be made for fuels, form lumber, falsework, temporary structures, or other work that will not become an integral part of the finished construction. **Additionally, no allowance will be made for perishable material such as cement, seed, plants, or fertilizer.**

(d) **Storage:** Material for which payment allowance is requested shall be stored in an approved manner in areas where damage is not likely to occur. If any of the stored materials are lost or become damaged, the Contractor shall repair or replace them **at no additional cost to the Department**. **Repair or replacement of such material will not be considered the basis for any extension of contract time.** If payment allowance has been made prior to such damage or loss, the amount so allowed or a proportionate part thereof will be deducted from the next progress estimate payment and withheld until satisfactory repairs or replacement has been made.

When it is determined to be impractical to store materials within the limits of the project, the Engineer may approve storage on private property or, for structural units and reinforcing steel, on the manufacturer's or fabricator's yard. Requests for payment allowance for such **stored** material shall be accompanied by a release from the owner or tenant of such property or yard agreeing to permit the removal of the materials from the property without cost to the Commonwealth.

(e) **Materials Inventory**: If the Contractor requests a payment allowance for properly stored material, he shall submit a certified and itemized inventory statement to the Engineer no earlier than five days and no later than two days prior to the progress estimate date. The statement shall be submitted on forms furnished by the Department and shall be accompanied by **supplier's or manufacturer's** invoices or other documents that will verify the material's cost. Following the initial submission, the Contractor shall submit to the Engineer a monthly-certified update of the itemized inventory statement within the same time frame. The updated inventory statement shall show additional materials received and stored with invoices or other documents and shall list materials removed from storage since the last certified inventory statement, with appropriate cost data reflecting the change in the inventory. If the Contractor fails to submit the monthly-certified update within the specified time frame, the Engineer will deduct the full amount of the previous statement from the progress estimate.

At the conclusion of the project, the cost of material remaining in storage for which payment allowance has been made will be deducted from the progress estimate.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SUPPLEMENTAL SECTION 704—PAVEMENT MARKINGS AND MARKERS

SECTION 704—PAVEMENT MARKINGS AND MARKERS of the Specifications is amended as follows:

TABLE VII-1 PAVEMENT MARKINGS is replaced with the following:

TABLE VII-1
Pavement Markings

Type	Class	Name	Surface Temp. at Time of Application	Film Thickness (mils)	Pavement Surface	Application Limitations
A		Traffic paint	50°F+	15 ± 1 when wet	AC HCC	May be applied directly after paving operations
B	I	Thermoplastic Alkyd	50°F+	90 ± 5 when set	AC	May be applied directly after paving operations
	I	Thermoplastic Hydrocarbon	50°F+	90 ± 5 when set	AC	Do not apply less than 30 days after paving operations
	II	Preformed Thermoplastic	50°F+	120-130	AC HCC	Manufacturer's recommendations
	III	Epoxy resin	50°F+	20 ± 1 when wet	AC HCC	Pavement surface needs to be at least 1 day old
	IV	Plastic-backed preformed Tape	(Note 1)	60 - 90	AC HCC	Manufacturer's recommendations
	VI	Profiled preformed Tape	(Note 1)	(Note 1)	AC HCC	Manufacturer's recommendations
	VII	Polyurea	(Note 1)	20 ± 1 when wet	AC HCC	Manufacturer's recommendations
D	I & II	Removable tape	(Note 1)	(Note 1)	AC HCC	Construction zone pavement marking
E		Removable Black tape (Non-Reflective)	(Note 1)	(Note 1)	AC	Construction zone pavement marking for covering existing markings
F	I & II	Temporary markings	(Note 1)	40 max	AC HCC	Construction zone pavement marking

Note 1: In accordance with manufacturer's recommendation.

(**c100ai03-**0112) **GENERAL PROJECT REQUIREMENTS, SUPPLEMENTAL SPECIFICATIONS (SSs), SPECIAL PROVISIONS (SPs) AND SPECIAL PROVISION COPIED NOTES (SPCNs)**

This project shall be constructed in accordance with: the plans; the *Virginia Department of Transportation Road and Bridge Specifications*, dated 2007; the *Virginia Department of Transportation Road and Bridge Standards*, dated 2008; the 2011 edition of the *Virginia Work Area Protection Manual*; the 2009 edition of the *MUTCD* and the current *Virginia Supplement to the MUTCD;* and the Supplemental Specifications, Special Provisions and Special Provision Copied Notes in this contract.

Special Provision Copied Notes in this contract are designated with "(SPCN)" after the date.

The information enclosed in parenthesis "()" at the left of each Special Provision Copied Note in this contract is file reference information for Department use only. The information in the upper left corner above the title of each Supplemental Specification and Special Provision in this contract is file reference information for Department use only.

The Department has identified the system of measurement to be used on this particular project as imperial. Any imperial unit of measure in this contract with an accompanying expression in a metric unit shall be referred to hereinafter as a "dual unit" measurement. Such a "dual unit" measurement is typically expressed first in the imperial unit followed immediately to the right by the metric unit in parenthesis "()" or brackets "[]" where parenthesis is used in the sentence to convey other information. Where a "dual unit" of measure appears in this project, only the imperial unit shall apply. The accompanying metric unit shown is not to be considered interchangeable and mathematically convertible to the imperial unit and shall not be used as an alternate or conflicting measurement.

12-1-11 (SPCN)

VIRGINIA DEPARTMENT OF TRANSPORTATION
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SUPPLEMENTAL SECTION 217—HYDRAULIC CEMENT CONCRETE

SECTION 217—HYDRAULIC CEMENT CONCRETE of the Specifications is amended as follows:

Section 217.02(a) **Cementitious Materials** is replaced with the following:

Cementitious materials shall be a blend of mineral admixtures and Portland cement or a blended cement. In overlay concretes, expansive hydraulic cement is permitted in lieu of Portland cement. Portland cement (Types I, II, III) blended cements (Type IP, Type IS) or expansive cement (Type K) shall comply with Section 214 of the Specifications. Flyash, ground granulated iron blast-furnace slag (GGBFS), silica fume or metakaolin shall conform to Section 215 of the Specifications. As a portion of the cementitious material, Table 1 lists the minimum percents of specific pozzolans required by mass of the cementitious material depending on the alkali content of the cement. Any other mineral admixture or any other amount or combination of mineral admixtures may be used if approved by the Engineer. As a portion of the cementitious material, the fly ash content shall not exceed 30 percent for Class F, the ground granulated blast-furnace slag content shall not exceed 50 percent and the silica fume content shall not exceed 10 percent unless approved by the Engineer. Class C Flyash or other pozzolans may be used provided the contractor demonstrates that the percent usage of Class C Flyash or other pozzolans have a maximum expansion of 0.15% according to ASTM C227 at 56 days using borosilicate glass as aggregate. Blended cements require no further pozzolan additions to meet minimum pozzolan content to compensate for the alkali-silica reaction.

Up to 7 percent silica fume may be added to all combinations of cementitious materials to reduce early permeability without approval by the Engineer. Other silica fume additions must be approved by the Engineer.

Table 1 – Minimum percent pozzolan required by mass of cementitious material as a portion of the total cementious materials and are based upon the alkali content of the cement.

	Total Alkalies of Cement is less than or equal to 0.75%	Total Alkalies of Cement is greater than 0.75% and less than or equal to 1.0%
Class F Flyash	20%	25%
GGBF Slag	40%	50%
Silica Fume	7%	10%
Metakaolin	7%	10%

TABLE II–17 Requirements for Hydraulic Cement Concrete is replaced with the following:

TABLE II-17
Requirements for Hydraulic Cement Concrete

Class of Concrete	Design Min. Laboratory Compressive Strength at 28 Days (f'c) (psi)	Aggregate Size No. [6]	Design Max. Laboratory Permeability at 28 Days (Coulombs)[5]	Design Max. Laboratory Permeability at 28 days - Over tidal water (Coulombs)[5]	Nominal Max. Aggregate Size (in)	Min. Grade Aggregate	Min. Cementitious Content (lb./cu yd)	Max. Water /Cementitious Mat. (lb. Water/lb. Cement)	Consistency (in of slump)	Air Content (percent)[1]
A5 Prestressed and other special designs [2]	5,000 or as specified on the plans	57 or 68	1,500	1,500	1	A	635	0.40	0-4	4 1/2 ± 1 1/2
A4 General	4,000	56 or 57	2,500	2,000	1	A	635	0.45	2-4	61/2 ± 1 1/2
A4 Post & rails	4,000	7,8 or 78	2,500	2,000	0.5	A	635	0.45	2-5	7± 2
A3 General	3,000	56 or 57	3,500	2,000	1	A	588	0.49	1-5	6± 2
A3a Paving	3,000	56 or 57	3,500	3,500	1	A	564	0.49	0-3	6± 2
A3b Paving	3,000	357	3,500	3,500	2	A	N. A	0.49	0-3	6± 2
B2 Massive or lightly Reinforced	2,200	57	N.A.	N.A.	1	B	494	0.58	0-4	4± 2
C1 Massive Unreinforced	1,500	57	N.A.	N.A.	1	B	423	0.71	0-3	4± 2
T3 Tremie seal	3,000	56 or 57	N.A.	N.A.	1	A	635	0.49	3-6	4± 2
Latex hydraulic cement concrete overlay [3]	3,500	7,8 or 78	1,500	1,500	0.5	A	658	0.40	4-6	5± 2
Silica fume, silica fume /Class F Fly Ash or silica fume/slag concrete overlay [4]	5000	7,8 or 78	1,500	1,500	0.5	A	658	0.40	4-7	6± 2
Class F Fly Ash or slag overlay	4000	7,8 or 78	1,500	1,500	0.5	A	658	0.40	4-7	6± 2

(See next page for notes on TABLE II-17).

(See next page for notes on TABLE II-17).

---------- (TABLE II-17 Notes) ----------

[1] When a high-range water reducer is used, the upper limit for entrained air may be increased by 1% and the slump shall not exceed 7 inches.

[2] When Class A5 concrete is used as the finishing bridge deck riding surface, or when it is to be covered with asphalt concrete with or without waterproofing, the air content shall be 5 1/2 ± 1 1/2 percent.

[3] The latex modifier content shall be 3.5 gallons per bag of cement. Slump shall be measured approximately 4.5 minutes after discharge from the mixer.

[4] Silica fume with a minimum of 7% by weight of cementitious material; silica fume with a range of 2.5-5 % shall be combined with Class F Fly Ash in range of 15-20% and minimum cement of 77.5% by weight of cementitious material; silica fume with a range of 2.5-5% shall be combined with Ground Granulated Blast Furnace Slag in the range of 30-35% and a minimum cement of 67.5% by weight of cementitious material.

[5] The permeability testing does not apply to small bridges identified on the bridge plans and to concrete structures and incidental concrete as described in Sections 219, 232, 302, 415, 502, 504, 506 and 519. Curing and testing of test cylinders for permeability will be in accordance with VTM 112.

[6] The contractor may use different aggregate sizes or a combination of sizes to increase the coarse aggregate content of the concrete as approved by the Engineer. The maximum size of the coarse aggregate shall not exceed 2.5 inches.

Note: With the approval of the Engineer, the Contractor may substitute a higher class of concrete for that specified at the Contractor's expense.

Section 217.02(b) **Formulated latex modifier** is amended by adding the following:

For latex-modified concrete, Type I, Type II, Type III or Type K, cement shall be used without mineral admixtures.

Section 217.04(a)4. **Admixtures** is replaced with the following:

4. **Admixtures** shall be dispensed and used according to the manufacturer's recommendations. They shall be added within a limit of accuracy of 3 percent, by means of an approved, graduated, transparent, measuring device before they are introduced into the mixer. If more than one admixture is to be used, they shall be released in sequence rather than in the same instant. Once established, the sequence of dispensing admixtures shall not be altered. However, when the amount of admixture required to give the specified results deviates appreciably from the manufacturer's recommended dosage, use of the material shall be discontinued.

Section 217.05—Equipment is amended to replace the first paragraph with the following:

Equipment and tools necessary for handling materials and performing all parts of the work will be approved by the Engineer and must be in accordance with one of the following procedures:

1. having a current National Ready Mix Concrete Association Plant and Truck Certification, or

2. having a Department approved self-certification program in-place prior to the production of concrete for the Department.

Failure to comply with one or the other of these procedures will result in the concrete production being unapproved and work will not be allowed to proceed.

Section 217.05(a) **Batching Equipment** is amended to replace the second paragraph with the following:

Scales used for weighing aggregates and cement shall be approved and sealed in accordance with the requirements of Section 109 of the Specifications.

Section 217.05—Equipment is amended to add the following:

(d) **High Performance Volumetric Mixers (HPVMs):** The Contractor may produce the specified class of hydraulic cement concrete in Table II-17 in accordance with Section 217.02(a) of the Specifications provided that the manufacturer's equipment meets the tolerance requirements of Section 217.04(a) of the Specifications and has a stamped plate from the Volumetric Mixers Manufacturers Bureau stating that the equipment conforms to the requirements in ASTM C685.

The hydraulic cement concrete shall be mixed at the point of delivery by a combination of materials transport and mixer unit conforming to the following:

1. The unit shall be equipped with calibrated proportioning devices for each ingredient added to the concrete mix. The unit shall be equipped with a working recording meter that is visible at all times and furnishes a ticket printout with the calibrated measurement of the mix being produced. If at anytime the mixer fails to discharge a uniform mix, production of concrete shall halt until any problems are corrected.

2. Each unit shall have a metal plate(s) attached in a prominent place by the manufacturer on which the following are plainly marked: the gross volume of the transportation unit in terms of mixed concrete, the discharge speed and the mass calibrated constant of the machine in terms of volume.

3. HPVMs shall be calibrated by a Department approved testing agency in accordance with the manufacturer's recommendations at an interval of every 6 months or a maximum production of 2500 cubic yards, whichever occurs first prior to use on the project. The yield shall be maintained within a tolerance of ±1 percent and verified using a minimum 2 cubic feet container every 500 cubic yards or a minimum once per week.

4. The three cubic feet initially discharged from the truck shall be discarded and not used for concrete placement. Acceptance of the specified class of concrete shall comply with Section 217.08 of the Specifications except that the sample secured for acceptance testing will be taken after four cubic feet is discharged from the delivery vehicle. During discharge, the consistency as determined by ASTM C143 on representative samples taken from the mixer discharge at random intervals shall not vary more than 1 inch. Acceptance tests shall be performed on each load. If test data demonstrates that consistency of concrete properties are being achieved, the Engineer may reduce testing requirements.

5. The HPVM shall be operated by a person who is a certified operator by the HPVM manufacturer. Any equipment adjustments made during the on-site production of concrete shall be done under the direct on-site supervision of the producer's VDOT Concrete Plant and Field Certified Technician.

Each load of HPVM produced concrete shall be accompanied by a Form TL-28 signed by the producer's VDOT Certified Concrete Plant Technician or a designated company representative working under the direct on-site supervision of the producer's VDOT Concrete Plant and Field Certified Technician. The form shall be delivered to the Inspector at the site of the work. Loads that do not carry such information or do not arrive in satisfactory condition shall not be used.

Section 217.07—Proportioning Concrete Mixtures is amended to replace the first paragraph with the following:

The Contractor is responsible for having a Certified Concrete Plant Technician available during batching operations, and a Certified Concrete Field Technician shall be present during placing operations.

Section 217.07—Proportioning Concrete Mixtures is amended to delete the third paragraph beginning with "**A Certified Concrete Batcher**".

Section 217.08—Acceptance is replaced with the following:

(a) **Air Consistency Tests:** Air and consistency tests will be performed by the Department prior to discharge of concrete into the forms to ensure that specification requirements are consistently being complied with for each class of concrete. The sample secured for the tests shall be taken after at least two cubic feet of concrete has been discharged from the delivery vehicle. The two cubic feet discharged is not to be used as part of the test sample. Any deviation from sampling and testing procedures must be approved by the Engineer. The Contractor shall provide a receptacle conforming to the requirements of ASTM C31, Section 5.9, for the Department's use in obtaining the sample. If either determination yields a result that is outside of the allowable range for air content or consistence, the following procedure will be used:

1. The Engineer will immediately perform a recheck determination. If the results confirm the original test results, the load will be rejected.

2. The Contractor's representative will be immediately informed of the test results.

3. The Contractor's representative shall notify the producer of the test results through a pre-established means of communication.

The Engineer may perform any additional tests deemed necessary and reject all remaining material that fails the tests.

Entrained air content will be determined in accordance with the requirements of ASTM C231 or ASTM C173. Acceptance or rejection will be based on the results obtained from these tests.

In general, a mixture that contains the minimum amount of water consistent with the required workability shall be used. Consistency will be determined in accordance with the requirements of ASTM C143. Adding cement to loads previously rejected for excessive water content or consistency will not be permitted.

(b) **Strength Tests:** The 28-day compressive strengths (f'_c) specified in Table II-17 are the strengths used in the design calculations. The Engineer will verify design strengths by tests made during the progress of the work in accordance with the requirements of ASTM C31 (Standard Practice for Making and Curing Concrete Test Specimens in the Field) and ASTM C39 (Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens) with the exception that the fresh concrete sample used for testing is to be secured after at least two cubic feet has been discharged from the delivery vehicle. The two cubic feet discharged is not to be used as part of the test sample. Any deviation from sampling and testing procedures must be pre-approved by the Engineer. The use of ASTM C42 (Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete) will be at the Engineer's discretion. If the 28-day design compressive strength (f'c) test results do not conform to the strength requirements specified in Table II-17, immediate steps shall be taken to adjust the mixture design. In addition, the Engineer may require removal of or corrective measures be applied to any concrete that does not meet the requirements of Table II-17. If the concrete cylinder strength, $f'_{cyl,}$ is less than the specified compressive strength found in Table II-17, the criteria in Table II-17A shall apply:

Table II – 17A Price Reduction or Action Taken due to f'_{cyl} not meeting the specification value f'_c listed in Table II-17

Condition	Concrete is a Pay Item	Concrete is Not a Pay Item
f'_{cyl} is greater than or equal to 98% f'_c	A	A
f'_{cyl} is greater than or equal to 90% f'_c and less than 98% f'_c	B	C
f'_{cyl} is less than 90% f'_c	D	D
f'_{cyl} is not available due to the Contractor's inappropriate handling and storage of specimens in accordance with ASTM C31	D	D

f'_c is the 28-day design compressive strength found in Table II-17.

f'_{cyl} is the actual average tested strength of the standard-cured concrete cylinder made and tested in accordance with ASTM C31 and ASTM C39.

A = full payment

B = pay reduction = $[((f'_c - f'_{cyl})/f'_c)$ x contract unit price for concrete per yd^3 x number of yds^3 the concrete represents] or $500, whichever is greater.

C = pay reduction = $[((f'_c - f'_{cyl})/f'_c)$ x 5 x Contractor's invoice price for concrete per yd^3 x number of yds^3 the concrete represents] or $500, whichever is greater.

D = The Contractor shall submit an investigative plan stamped by a Virginia-licensed Professional Engineer outlining how the Contractor shall demonstrate that the in-place concrete meets the structural strength requirements of the design. For barriers, parapets, railings, etc., no reduction in concrete strength below $0.9f'_c$ shall be allowed. For all other applications, the investigative plan must be approved by the Department's Engineer prior to the execution of the investigation. All costs associated with this investigation shall be borne by the Contractor. After the investigation is completed, a report shall be submitted to the Engineer showing the results of the analysis, testing and conclusions of the Virginia-licensed Professional Engineer and recommendations for action proposed by the Contractor to be taken with the concrete that did not meet the strength requirements. The Department retains all rights to determine if the action proposed with regard to the concrete in question is acceptable. If the Department concurs with the proposed action and the concrete meets the structural strength requirements of the design and remains in place, any price reduction will be taken by Method B if the concrete is a pay item or Method C if the concrete is not a pay item. If the concrete does not meet the structural requirements of the design, the concrete shall be removed and replaced at no cost to the Department. The maximum penalty assessed for low strength concrete left in place will be 10% as specified in Table II-17A not including the cost of the investigation and any corrective measures taken by the Contractor.

No calculated penalty less than $500 will be assessed. The Contractor shall have the right to remove and replace concrete failing to meet specifications at the Contractor's cost.

Before concrete is placed, the Contractor shall provide a storage chamber at his expense for temporary storage of the Department's concrete cylinders. The contractor shall be responsible for maintaining the chamber such that the concrete test cylinders are kept in a continuously moist

condition and within a temperature range of 60 degrees F to 80 degrees F. The chamber shall be equipped with a continuously recording thermometer accurate to ± 2 degrees F for the duration of concrete cylinder curing. The chamber shall be located in an area where the test cylinders will not be subject to vibration and shall be of sufficient size or number to store, without crowding or wedging, the required number of test cylinders as determined by the Contractor based on his plan of operations. Location of the chamber is subject to approval by the Engineer.

When use of high-early-strength hydraulic cement concrete is required, it shall conform to the requirements specified in Table II–17 except that the 28-day strength shall be obtained in 7 days. Up to 800 pounds per cubic yard of Type I, Type II or Type III cement may be used to produce high-early-strength concrete.

(c) **Concrete Temperature** shall be measured in accordance with the requirements of ASTM C1064.

(d) **Quality Assurance** for Low Permeability Concrete**:**

General:

At least two trial batches, using job materials, with permissible combination of cementitious materials shall be prepared, and test specimens shall be cast by the Contractor and tested by the Department for permeability and strength at least a month before the field application. The permeability samples shall be cylindrical specimens with a 4-inch diameter and at least 4-inches in length. Cylinders will be tested at 28 days in accordance with VTM 112. The test value shall be the result of the average values of tests on two specimens from each batch. Permeability values obtained from trial batches shall be 500 coulombs below the maximum values specified in Table II-17 of the Specifications to be acceptable.

Acceptance Tests:

For each set of cylinders made for compressive strength tests, two additional cylinders shall be made for the permeability test. The Department will be responsible for making and testing all permeability test specimens.

If the average permeability test result is equal to or less than the value for the specified class of concrete in Table II-17, then full payment will be made for the lot the average permeability test result represents. However, if the average permeability test result exceeds the coulomb value in Table II-17, payment for that lot of concrete shall be reduced by 0.005 percent for each coulomb above the coulomb value in Table II-17 multiplied by the bid item cost of the concrete times the number of cubic yards or cubic meters of concrete in the lot. The reduction in price will not exceed 5 percent of the bid price of the concrete. Any concrete with a coulomb value that exceeds the maximum required in Table II-17 by 1000 coulomb will be rejected. However, bridge deck concrete with any coulomb value exceeding the maximum required by over 1000 coulomb may be accepted by the Engineer at 95 percent of the bid price if the concrete in question has the required strength and meets other specification requirements, and the Contractor applies, at his own expense, an approved epoxy concrete overlay to the top of the entire deck. In such case deck grooving will not be required. Epoxy overlays over latex overlays will not be permitted. The adjustment to the roadway grade shall be made as required by the Engineer at the Contractor's expense.

Similarly, concrete in abutments and pier caps with coulomb value exceeding the maximum required in Table II-17, by more than 1000 coulomb may be accepted at 95 percent of the bid price if it has the required strength and meets other specification requirements, and the Contractor applies at his own expense, one coat of Type EP-3B and one coat of EP-3T in conformance with the requirements of Section 243.02 of the Specifications, on top of the pier cap or abutment seat.

Section 217.09(b) **Ready Mixed Concrete** is amended to replace the second paragraph with the following:

Each load of transit or shrink-mixed concrete shall be accompanied by Form TL-28 signed by the VDOT Certified Concrete Field Technician or a designated company representative working under the direction of the VDOT Certified Concrete Field Technician. The form shall be delivered to the Inspector at the site of the work. Loads that do not carry such information or that do not arrive in satisfactory condition shall not be used.

Section 217.09(b) **Ready-Mixed Concrete** is amended to replace the fourth paragraph and the table with the following:

Each batch of concrete shall be delivered to the site of work and discharged within 90 minutes of the time the cement is introduced into the mixture unless approved otherwise by the Engineer.

Section 217.09(b)1. **Transit mixing** is amended to replace the first paragraph with the following:

1. **Transit mixing:** Concrete shall be mixed in a truck mixer. Mixing shall begin immediately after all ingredients are in the mixer and shall continue for at least 70 revolutions of the drum or blades at the rate of at least 14 but no more than 20 revolutions per minute.

VIRGINIA DEPARTMENT OF TRANSPORTATION
2007 ROAD AND BRIDGE SUPPLEMENTAL SPECIFICATIONS

SUPPLEMENTAL SECTION 247—REFLECTIVE SHEETING

SECTION 247—REFLECTIVE SHEETING of the Specifications is completely replaced with the following:

247.01—Description

This specification covers reflective sheeting used on traffic control devices to provide a retroreflective surface or message. The color of the reflective sheeting shall be as specified in the Contract Documents. Reflective sheeting shall be certified in accordance with the requirements of Section 106.06 of the Specifications.

247.02—Detail Requirements

Reflective sheeting shall be selected from the Department's Approved Products list. Reflective sheeting products are included on the Approved Products List only after the Department determines conformance to the Specifications and the manufacturer has supplied written information indicating conformance to the warranty requirements of Section 247.03 of the Specifications where required. Determination of conformance will include, but not be limited to, the evaluation of test data from AASHTO's National Transportation Product Evaluation Program (NTPEP) or other Department-approved facilities except as noted. When color test data (Chromaticity and Luminance Factor - Y%) provided by NTPEP or other Department-approved facilities are evaluated, color must have been maintained within the color specification limits for the full duration of the outdoor weathering test. The sheeting and any applied coatings such as inks, overlay films, other coatings, shall be weather resistant in accordance with ASTM D4956 after being tested by AASHTO, NTPEP or other Department approved facilities except as noted.

(a) **Reflective sheeting used on permanent signs (except those addressed in Section b), on object markers, nose of guardrails, permanent impact attenuators (except sand barrels), standard road edge delineators, special road edge delineators, barrier delineators, guardrail delineators, interstate road edge delineators, chevron panels, bridge end panel signs (VW-13), and railroad advance warning signs (including any supplemental plaques) vertical panels (Group 2 channelizing devices), traffic gates, Automatic Flagger Assistance Device (AFAD) gate arms, and the "STOP" side of sign paddles (hand signalizing device)** shall conform to the requirements of ASTM D4956 for a Type IX material and, except for the "STOP" side of sign paddles, shall be warranted in accordance with Section 247.03 Sheeting Warranty Class I of the Specifications.

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 1 and 1A (non-fluorescent colors) and Tables 3 and 3A (fluorescent colors). In Table 1A, the values for daytime luminance factor (**Y**%) shall be based on the colors for a Type IV, VII, and VIII sheeting.

The minimum maintained coefficient of retroreflection of the sheeting after 3 years on the test deck shall conform to the requirements of ASTM D4956.

1. **Reflective sheeting used on the following signs** shall be Fluorescent Yellow-Green conforming to the requirements of ASTM D4956 for a Type IX material and shall be warranted in accordance with Section 247.03, Sheeting Warranty Class I of the Specifications.

- **Bicycle Crossing sign (W11-1) including supplemental plaques**
- **Pedestrian Crossing sign (W11-2) including supplemental plaques**
- **Playground sign (W15-1) including supplemental plaques**
- **DEAF CHILD AREA sign including supplemental plaques**

- **WATCH FOR CHILDREN sign including supplemental plaques**
- **School Signing consisting of the following:**
  —School Crossing sign (S1-1)
  —School Bus Stop Ahead sign (S3-1)
  —SCHOOL plaque (S4-3)
  —School Portion of the School Speed Limit sign (S5-1)
  —Supplemental plaques used with these signs

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 3 and 3A.

The minimum maintained coefficient of retroreflection of the sheeting after 3 years on the test deck shall conform to the requirements of ASTM D4956.

(b) **Reflective sheeting used on permanent recreational and cultural interest area guidance signs, and for the hand symbol/DON'T WALK and numerals on permanent educational pedestrian signal signs (R10-3b thru R10-3e)** shall conform to the requirements of ASTM D4956 for a Type III material and shall be warranted in accordance with Section 247.03, Sheeting Warranty Class I of the Specifications.

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 1 and 1A.

The minimum maintained coefficient of retroreflection of the sheeting after 3 years on the test deck shall conform to the requirements of ASTM D4956.

(c) **Reflective sheeting used to delineate the trailer's back frame of Portable Changeable Message Signs (PCMS), Automatic Flagger Assistance Device (AFAD) gate arm, arrow boards and portable lights** shall conform to the requirements of 49 CFR 571.108 for a Grade DOT-C2 truck conspicuity marking. References to ASTM specifications therein shall be interpreted to mean the latest version of the specification at the time of advertisement regardless of the date indicated in the reference.

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 1 and 1A.

This reflective sheeting is not required to be tested by NTPEP.

(d) **Reflective sheeting used on Type III barricades** shall conform to the following:

Minimum Coefficient of Retroreflection R_A
(R_A =Candelas per foot-candle per square foot)

Observation Angle (^{o})	Entrance Angle (^{o})	White	Orange
0.2	–4	400	200
0.2	+30	200	80
0.5	–4	300	100
0.5	+30	100	40
1.0	–4	50	25
1.0	+30	15	10

Color and Luminance Factor (Y%) shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 1 and 1A, for a Type IV Sheeting.

Impact Resistance shall conform to the requirements of ASTM D4956.

The minimum maintained coefficient of retroreflection of the sheeting after one year on the test deck shall be at least 50 percent of the minimum coefficient of retroreflection values specified.

(e) **Reflective sheeting used on orange construction and maintenance activity signs, barrier vertical panels installed on concrete traffic barrier service, rear panel of truck-mounted attenuators, temporary impact attenuators (except temporary sand barrels), and the "SLOW" side of sign paddles** shall conform to the requirements of ASTM D4956 for a Type IX, Fluorescent Orange material (with the following retroreflection exception):

Minimum Coefficient of Retroreflection R_A
(R_A =Candelas per foot-candle per square foot)

Observation Angle (^{o})	Entrance Angle (^{o})	Fluorescent Orange
0.2	–4	140
0.2	+30	90
0.2	+40	24
0.5	–4	90
0.5	+30	50
0.5	+40	15
1.0	–4	10
1.0	+30	5
1.0	+40	3

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 3 and 3A.

The minimum maintained coefficient of retroreflection of the sheeting after one year on the test deck shall be at least 50 percent of the minimum coefficient of retroreflection values specified.

(f) **Reflective sheeting used on tubular delineators, drums and temporary sand barrels** shall conform to the following:

1. **Reflective sheeting used on tubular delineators and drums** shall conform requirements of ASTM D4956 including supplementary requirement S2 for a Type III reboundable material. Color shall conform to the requirements of Tables 1 and 1A of the USDOT specification as contained in the Appendix to 23 CFR, Part 655, Subpart F except the minimum daytime luminance factor (Y%) for white shall be 25 when used on tubular delineators and drums. The following supplementary table shall apply for tubular delineators and drums:

Minimum Coefficient of Retroreflection R_A
(Candelas per foot-candle per square foot)
(High Intensity)

Observation Angle (^{o})	Entrance Angle (^{o})	White	Orange
0.2	+50	75	25
0.5	+50	35	10

Reflective sheeting used on tubular delineators is not required to be tested by NTPEP.

2. **Reflective sheeting used on temporary sand barrels** shall be a fluorescent orange prismatic lens reboundable sheeting conforming to the following:

Color shall conform to the requirements of Tables 3 and 3A of the USDOT specification as contained in the Appendix to 23 CFR, Part 655, Subpart F.

Minimum Coefficient of Retroreflection R_A
(Candelas per foot-candle per square foot)
(High Intensity)

Observation Angle (^{o})	Entrance Angle (^{o})	Fluorescent Orange
0.2	-4	200
0.2	+30	120
0.2	+50	40
0.5	-4	80
0.5	+30	50
0.5	+50	30

Minimum maintained coefficient of retroreflection of the sheeting after one year on the test deck shall be at least 50 percent of the minimum coefficient of retroreflection values indicated above.

Reflective sheeting shall conform to the supplementary requirement S2 of ASTM D4956.

Please note: Beginning July 1, 2012 reflective sheeting used on Drums, Temporary Sand Barrels and Tubular delineators for all projects shall conform to the requirements of ASTM D4956 including supplementary requirement S2 for a Type III reboundable material with the following retroreflection exception as shown in the chart below:

Minimum Coefficient of Retroreflection R_A
(R_A =Candelas per foot-candle per square foot)
(Prismatic Lens)

Observation Angle (^{o})	Entrance Angle (^{o})	White	Fluorescent Orange
0.2	-4	400	175
0.2	+30	200	100
0.2	+40	135	60
0.2	+45	120	40
0.5	-4	150	70
0.5	+30	50	30
0.5	+40	45	25
0.5	+45	40	20

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 1 and 1A (non-fluorescent colors) and Table 3 and 3A (fluorescent colors).

The minimum maintained coefficient of retroreflection of the sheeting after one year on the test deck shall be at least 50 percent of the minimum coefficient of retroreflection specified.

(g) **Reflective sheeting used on Permanent Sand Barrels and on Cones** shall conform to the requirements of ASTM D4956 including supplementary requirement S2 for a Type III reboundable material. The following supplementary table shall also apply for cones:

Minimum Coefficient of Retroreflection R_A
(R_A =Candelas per foot-candle per square foot)
(High Intensity)

Observation Angle (°)	Entrance Angle (°)	White
0.2	+50	60
0.5	+50	35

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 1 and 1A.

The maintained coefficient of retroreflection of the sheeting after one year on the test deck shall be at least 50 percent of the minimum coefficient of retroreflection specified for permanent sand barrel sheeting.

Reflective sheeting for cones is not required to be tested by NTPEP.

(h) **Reflective sheeting used on Retroreflective Rollup Signs** shall conform to the following:

Minimum Coefficient of Retroreflection R_A
(R_A =Candelas per foot-candle per square foot)
(Prismatic Lens)

Observation Angle (°)	Entrance Angle (°)	White	Fluorescent Orange	Fluorescent Pink
0.2	–4	500	200	200
0.2	+30	200	80	100
0.5	-4	225	90	100
0.5	+30	85	35	35
1.0	-4	20	10	10
1.0	+30	15	8	10
1.5	-4	5	3	2
1.5	+30	4	1.5	2

Color shall conform to the requirements of 23 CFR, Part 655, Subpart F, Appendix Tables 1 and 1A for white, and Appendix Tables 3 and 3A for fluorescent colors.

Reflective sheeting for retroreflective rollup signs is not required to be tested by NTPEP.

247.03—Warranty Requirements

The reflective or retroreflective sheeting manufacturer shall provide the following warranty to the Department for the respective types of sheeting furnished as specified herein:

Class I Warranty: 10-year warranty with 7 years being 100 percent full replacement covering all material and labor costs associated with fabrication and installation of the sign or device and the final 3 years being 100 percent sheeting replacement cost.

The minimum values of retroreflectivity maintained during the warranty period shall be the same as those required for the maintained coefficient of retroreflection values as indicated herein, or where not indicated, shall be in accordance with those specified in ASTM D4956.

Loss of colorfastness is considered to have occurred if the color of the sheeting is not within the color specification limits in 23 CFR, Part 655, Subpart F, Appendix during the full duration of the warranty period.

Warranty period shall begin on the date of fabrication and shall be documented as follows:

For warranty requirements, each permanent sign shall be labeled on the reverse in a location not to be obscured by sign supports or backing hardware, showing 1.) Month and year the sign was fabricated, marked via punch-out numerals, 2.) Sheeting Manufacturer's name or logo and product designation or number, and 3.) Sign fabricator's name or logo. Labels shall be made of a self adhesive, permanent weather resistant material and shall be a minimum 4" by 4" in size. Label may be made from permanent sign material provided the finished label meets all other aspects required for warranty documentation.

Where the information required for the label is not furnished by punched-out numerals, it shall be supplied by permanent means, such as sign ink, capable of resisting weathering so as to be legible for the full duration of the warranty period.

Prior to applying the label, the area shall be thoroughly cleaned to ensure proper adhesion.

CITY OF NORFOLK
LOCALLY ADMINISTERED
FEDERALLY FUNDED PROJECTS
PROJECT TECHNICAL SPECIFICATIONS

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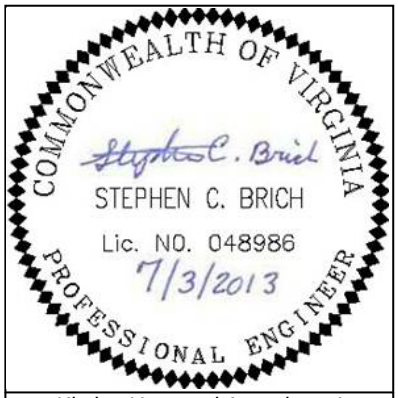

Kimley-Horn and Associates,Inc.
Virginia Beach, Virginia
Traffic Engineer

SECTION 238 – ELECTRIAL SERVICE

VDOT Road and Bridge Specifications, 2007 Edition, shall be followed unless otherwise amended or supplemented with the specifications contained herein. Where conflicts occur, the specifications contained herein shall prevail.

238.02 – Detail Requirements

238.02(a) – **Metal Conduit and Fitting** of the Specifications is amended to include the following:

Provide riser clamps and/or straps to attached proposed riser conduit to existing utility poles. Clamps and/or straps shall be of sufficient size to restrain the conduit against the utility pole and be spaced no more than 5 feet apart. Conduit clamps and/or straps and any required hardware, tools, equipment, and labor to install the riser shall be considered incidental.

238.02(d) – **PE Conduit** of the Specifications is amended to include the following:

Provide HDPE conduit with an outer diameter to minimum wall thickness ratio that complies with ASTM D 3035, Standard Dimension Ratio (SDR) 13.6. Provide conduit that meets UL Standard 651B *Continuous Length HDPE Conduit*.

Provide conduit that meets the following:

ASTM D 638	Tensile Strength – 3,000 psi, min; Elongation – 400 percent, min
ASTM D 1238	Melt Index – 0.4 maximum
ASTM D 1505	Density – (0.941-0.955g/cc)
ASTM D 1693	Condition B – 20 percent failure, maximum
ASTM D 2444	Impact – NEMA Standards Publication Number TC7
ASTM D 3350	Cell Classification – 334420 or 344420

Ensure HDPE conduit is resistant to benzene, calcium chloride, ethyl alcohol, fuel oil, gasoline, lubricating oil, potassium chloride, sodium chloride, sodium nitrate, and transformer oil, and is protected against degradation due to oxidation and general corrosion. Furnish conduit with a coefficient of friction of 0.09 or less in accordance with Telcordia GR-356.

Furnish factory lubricated, low friction, coilable, conduit constructed of HDPE. Furnish conduit with nominal diameter as required. Provide conduit with smooth outer wall and ribbed inner wall. Ensure conduit is capable of being coiled on reels in continuous lengths, transported, stored outdoors, and subsequently uncoiled for installation without affecting its properties or

performance.

Furnish conduit that is suitable for underground use in an ambient temperature range of -30 to 130 degrees F without degradation of material properties.

SECTION 504 – SIDEWALKS, STEPS AND HANDRAILS

VDOT Road and Bridge Specifications, 2007 Edition, shall be followed unless otherwise amended or supplemented with the specifications contained herein. Where conflicts occur, the specifications contained herein shall prevail.

504.04 – Measurement and Payment

Hydraulic Cement Concrete will be measured in square yards of finished 4 inch deep concrete surface, to include sidewalk, raised median islands, and pedestrian refuges, complete-in-place, and will be paid for at the contract unit price per square yard. The contract unit price per square yard shall also include all removal and disposal of existing concrete sections and associated materials, removal and/or replacement of curb or curb and gutter, seeding/fertilizing, sodding, cut, fill, grading, saw cutting (to a minimum depth of 3 inches unless otherwise specified), adjustments to the elevations of junction boxes, manhole covers, and other utilities such that they are flush with the finished sidewalk grade, additional required subgrade materials, removal of existing materials, and any other items as directed by the Engineer. Each structure located within the limits of the sidewalk having an area greater than 1 square yard will be excluded in computing the square yards of sidewalk.

Price shall also include compaction of soil, fill material and bedding material. Compaction of soil shall meet maximum density requirements, in accordance with ASTM D-1557. Under sidewalks, compact top 12 inches of subgrade and each layer of fill or backfill material at 95 percent maximum density. Fill or backfill material shall be placed in lifts no greater than six inches.

Brick Pavers will not be measured for separate payment, but shall be considered incidental to the cost of concrete items measured under Section 504, and shall include all labor, tools, materials and equipment, and other incidentals to properly remove, salvage, and reinstall the existing brick pavers on appropriate bedding as required to accommodate the proposed improvements as indicated on the plans. Any unused salvaged brick pavers not to be reinstalled shall be returned to the City of Norfolk Traffic Operations Center at 4505 Patent Road (441-5818) upon completion of the signal work. Pavers delivered to the City shall be placed on pallets and wrapped to prevent damage during delivery. Any damaged pavers are to be replaced in kind at the Contractor's expense. Packaging and delivery of salvaged materials will be considered incidental.

Bedding Material – Delete in its entirety and replace with the following:

Bedding Material will not be measured for separate payment, but shall be considered incidental to the cost of concrete items measured under Section 504.

Sidewalk Ramp will be measured in units of each type of ramp furnished and installed and will be paid for at the contract unit price per each. The contract unit price shall include all removal, disposal, replacement, and/or installation of concrete sections, curb, curb and gutter, and associated materials, removal and salvage and/or reinstallation of brick pavers (see **Brick Pavers** above), seeding/fertilizing, sodding, cut, fill, grading, and saw cutting. Unit price shall also include furnishing and installing truncated dome VDOT standard CG-12 detectable warning surface. The depth of concrete shall be 7 inches for the entire ramp area. The type of VDOT standard sidewalk ramp shall be installed in accordance with the information and details provided in the latest approved version of the VDOT Road and Bridge Standards. Where sufficient space to install the ramp is not available, the Contractor shall submit a shop drawing of the proposed ramp solution that meets or exceeds ADA requirements to the Engineer for review and approval at least 14 days prior to construction. Any required adjustments to the elevation of junction boxes, manhole covers, and other utilities such that they are flush with the finished ramp grade, additional required subgrade materials, removal of existing materials, and any other items as directed by the Engineer shall be considered incidental to the unit price for sidewalk ramps.

Price shall also include compaction of soil, fill material and bedding material. Compaction of soil shall meet maximum density requirements, in accordance with ASTM D-1557. Under sidewalk ramps, compact top 12 inches of subgrade and each layer of fill or backfill material at 95 percent maximum density. Fill or backfill material shall be placed in lifts no greater than six inches.

++ END OF SECTION ++

SECTION 510 – RELOCATING OR MODIFYING EXISTING MISCELLANEOUS ITEMS

VDOT Road and Bridge Specifications, 2007 Edition, shall be followed unless otherwise amended or supplemented with the specifications contained herein. Where conflicts occur, the specifications contained herein shall prevail.

510.03 – Procedures:

Removal of Existing Traffic Control Equipment and Supports

This section specifies general requirements for the removal of existing traffic equipment including electrical and electronic equipment, supporting hardware and electrical wiring, conduit and dismantling of sign structures or other support elements specified and required to clear the areas of concern for new installations.

The removal of existing equipment by the Contractor shall include salvaging, careful handling; transporting and protecting such equipment and materials designated for removal or dismantling in the contract Plans and specifications.

1) Ownership

   The equipment removed shall remain the property of the City unless otherwise stated in the Contract Documents or directed by the Engineer.

2) General Removal Operations

   Where the removals require excavation, the excavated areas (unless to be used as areas for other installations) shall be backfilled, compacted and leveled, so as to form a smooth contour, uniform in density and surface cove with adjacent ground areas.

   Where the removal operations require the removal or disturbance of overlying pavement, curb, grass or sidewalk, such pavement, etcetera shall be removed in a workmanlike manner and subsequently replaced in kind (or equivalent) in accordance with these Specifications.

   Electronic equipment to be removed shall be removed, handled and transported with all due care. Any damage to such equipment caused by negligence of the Contractor's operations shall be corrected at his expense regardless of whether the damage occurs before or after removal of the equipment. Removal of electronic equipment shall include, where noted on the Plans, the removal and salvage of existing CCTV camera and associated equipment to the Traffic Operations Division Center.

The removal of all electronic equipment shall include removal of all attaching devices and all other devices and auxiliaries related to the electronic unit, which are not required to remain in place for use with replacing equipment.

All removals shall be in such a manner that damage or disturbance will not occur to adjacent property, utilities, or other equipment.

Where existing functioning installations are to be replaced by new installations, the existing installations are not to be removed until the new installations are in place and operating or the Contractor has provided Engineer-approved temporary traffic control or as specified under the provisions of the Specifications or the Special Provisions.

3) Specific Removal Operations

Removal and Dismantling of Poles and Pedestals:

The removal of poles and pedestals shall include the removal of their foundations and any pole keys or dead men, guying apparatus and other accessories or attachments thereto as may be encountered.

The removal process of poles and pedestals shall be accomplished in such a manner as not to result in a safety hazard to motorists or adjacent property and such dismantling process shall be approved in advance by the Engineer.

Where permitted by the Engineer only partial removal of the foundation may be required, in which case any protrusions, such as conduit, anchor bolts or reinforcing steel, shall be cut at least two (2) feet below final grade. Unless specified on the Plans, the Contractor shall not remove or disturb utility poles located within the right-of-way.

Relocate Existing Fiber Optic Cable

As noted on the contract Plans, the Contractor shall relocate existing fiber optic cable to provide communications to the proposed traffic signal cabinet. The Contractor shall confirm the proper working order of existing fiber optic cable and notify the Engineer of any malfunction or damage to the cable. Testing procedures shall be performed in accordance with Section 711. Contractor shall coordinate with the Engineer 48 hours in advance of fiber optic cable relocation to arrange for the proper disconnect and removal of fiber optic cable from the existing traffic signal cabinet.

For aerial spans, fiber optic cable shall be removed up to the location at which the cable is proposed to transition underground through a new riser (see Section 711 for measurement and payment of the communications cable riser). A guy assembly shall be installed as indicated on the Plans to stabilize the existing pole where the cable transitions from the aerial span into the proposed riser. The Contractor should exercise extreme caution when pulling the fiber optic cable through the proposed riser and conduits to avoid bending the cable beyond the allowable tolerances. Route the cable as indicated on the Plans to the proposed traffic signal cabinet.

For underground cable, fiber optic cable shall be removed up to the nearest existing junction box at which point it will be installed in new conduits into the proposed traffic signal cabinet. The Contractor should exercise extreme caution when pulling the fiber optic cable through the proposed conduits to avoid bending the cable beyond the allowable tolerances. Route the cable as indicated on the Plans to the proposed traffic signal cabinet.

Modify Existing Sign Post (Black Finish)

When specified on the Plans, the Contractor shall modify the existing sign post by applying a black finish paint coat to all surfaces of the post to match Federal Standard 595B Color Number 17038. Prior to applying the finish coat, the Contractor shall remove all existing signs and hardware and clean the existing post surface of any debris using an approved cleaning material. Apply a minimum two (2) coats to the post or as otherwise directed by the Engineer to provide a consistent finish. Reattach signs with existing hardware in the same vertical position unless otherwise directed by the Engineer or as specified in the Plans. Contractor to submit paint finish specifications to the Engineer for review and approval prior to application.

Modify Existing Sign Panel (Black Finish)

When specified on the Plans, the Contractor shall modify the existing sign panel by applying a black finish paint coat to the back surface of the sign provided the sign does not have a legend on both faces of the sign panel. The finish coat shall be painted to match Federal Standard 595B Color Number 17038. Prior to applying the finish coat, the Contractor shall the clean surface of any debris using an approved cleaning material. Contractor shall notify the Engineer of any existing markings or defects to the sign legend prior to modifying the sign panel. The Contractor shall be responsible for the replacement of the sign panel if any damage is caused to the sign legend. Apply a minimum two (2) coats to the post or as otherwise directed by the Engineer to provide a consistent finish. Reattach signs with existing hardware in the same vertical position unless otherwise directed by the Engineer or as specified in the Plans. Contractor to submit paint finish specifications to the Engineer for review and approval prior to application.

Remove Existing Pavement

As noted on the contract Plans, the Contractor shall sawcut, demolish, and remove existing pavement sections and install new pavement per City of Norfolk Pavement Section Detail HS-301. No separate measurement and payment will be made for saw cutting, demolition, removal, and disposal of pavement sections and shall be considered incidental to new pavement section materials.

Modify Signal Pole Foundation

When specified on the Plans, the Contractor shall modify the proposed signal pole foundation to remove existing obstructions, materials, and abandoned entities that conflict with the proposed design. Existing facilities identified as abandoned, including conduits, piping, fittings, and junctions shall be selectively removed to a point six (6) inches beyond the limits of the proposed foundation. Conduits, piping, and/or junctions that remain shall be abandoned in place, capped, and sealed with an approved material. Contractor shall submit shop drawings of abandoned facility removal, along with cut sheets of the cap and seal mechanism and procedure, for review and approval by the Engineer 14 days in advance of proposed foundation excavation. Where existing timber material lies within the proposed signal pole foundation as specified on the Plans, the Contractor shall selectively cut and remove the timber to accommodate the proposed design. Only timber material within the limits of the foundation shall be cut and removed. If additional materials are encountered, the Contractor shall submit shop drawings of the proposed means and method to remove additional conflicts for review and approval by the Engineer 14 days in advance of proposed foundation excavation.

510.04 – Measurement and Payment – Add the following to the end of the first paragraph:

This price shall also include all saw cutting associated with items to be removed.

Removal of Existing Traffic Control Equipment and Supports - Intersection: Removal of Existing Traffic Control Equipment and Supports will be measured and paid for as a LUMP SUM (LS) per intersection. The lump sum price includes but is not limited to the removal and disposal or removal and salvage of junction boxes (that conflict with the proposed design), span wire, mast arm (or portion thereof as required in the Plans), signal poles, pedestal poles, signal heads, pedestrian signals, pushbuttons, emergency vehicle preemption devices, detection cameras, strain poles, down guys, pole/mast-arm/ground mounted signs, cabling, mounting hardware, foundations to within 24” of adjacent grade, controller cabinets and all their contents. Separate payment for mast arm modifications (including saw cutting of existing arm and installing approved cap and screw assembly), guy assembly removal and/or relocation, landscape repair,

seeding/fertilizing, or sodding will not be made under this item and is considered incidental. Payment for concrete repair will be made according to Section 504 of the VDOT Road and Bridge Specifications and these Special Provisions.

Remove Existing Junction Box: Remove Existing Junction will be measured in units of EACH (EA). The unit price shall include all labor, tools, and equipment for complete removal of junction box, and shall be full compensation for removal and disposal. The unit price shall also include restoration of disturbed area to match existing grade, surface cover, and surrounding conditions.

Modify Existing Water Meter Valve: Modify Existing Water Mater Valve will be measured in units of EACH (EA). The unit price shall include all labor, tools, pipe, hardware, and equipment for the complete adjustment and/or relocation of a water meter valve, complete-in-place. The unit price shall also include demolition, removal, testing, and replacement and/or restoration of disturbed area to match existing grade, surrounding conditions, and/or proposed conditions. Contractor shall perform water meter valve testing procedures pursuant to the VDOT Road and Bridge Specifications Section 520.04 to verify proper working operation of the water meter valve, free of any leakage or other deficiencies, in the presence of the Engineer.

Remove and Relocate Existing Sign Panel: Remove and Relocate Existing Sign Panel will be measured in units of EACH (EA). The unit price shall include all labor, tools, materials and equipment, and shall be full compensation for proper removal and relocation. No separate measurement or payment will be made for additional hardware required to install the sign panel on the proposed mounting surface.

Remove Existing Sign Post: Remove Existing Sign Post will be measured in units of EACH (EA). The unit price shall include all labor, tools, materials and equipment, and shall be full compensation for proper removal and disposal of existing sign post, anchor sleeve, post base, and existing post foundation. The unit price shall also include restoration of disturbed area to match existing grade, surface cover, and surrounding conditions.

Remove Existing Sign Panel and Post: Remove Existing Sign Panel and Post will be measured in units of EACH (EA) complete assembly removed and disposed. The unit price shall include all labor, tools, materials and equipment, and shall be full compensation for proper removal and disposal of existing sign panel, post, anchor sleeve, post base, and existing post foundation assembly. The unit price shall also include restoration of disturbed area to match existing grade, surface cover, and surrounding conditions.

Relocate Existing Fiber Optic Cable: Relocate Existing Fiber Optic Cable will be measured and paid for as a LUMP SUM (LS). The unit price shall include all labor, tools, materials and equipment, testing, and shall be full compensation for

proper removal and installation. No separate measurement and payment will be made for any guy assemblies and associated labor, tools, materials, hardware, and equipment required to stabilize the pole as indicated on the Plans. The Contractor is responsible for the replacement of any fiber optic cable damaged during construction at his own expense. Payment shall also include any necessary coordination with City staff to complete the integration of the fiber optic cable with the traffic signal cabinet and controller.

Modify Existing Sign Post (Black Finish): Modify existing sign post will be measured and paid for per each (EA) sign post. The unit price shall include all labor, tools, materials and equipment, and shall be full compensation for proper application of the finish paint. No separate measurement and payment will be made for removal and reattachment of existing signs or application of more than two (2) coats of paint.

Modify Existing Sign Panel (Black Finish): Modify existing sign panel will be measured and paid for per square yard (SY) of sign panel. The unit price shall include all labor, tools, materials and equipment, and shall be full compensation for proper application of the finish paint. No separate measurement and payment will be made for removal and reattachment of existing signs or application of more than two (2) coats of paint. Contractor shall be responsible for replacement of sign panel if the legend of the existing sign is rendered illegible as a result of the application of the paint finish.

Modify Signal Pole Foundation (Intersection): Modify signal pole foundation will be measured and paid for each (EA) intersection where foundation modifications are required. The unit price shall include all labor, tools, materials and equipment, and shall be full compensation for complete excavation of existing conflicts within the proposed signal pole foundation. Final acceptance will be made upon approval of the foundation excavation by the Engineer or their representative.

++ END OF SECTION ++

SECTION 512 - MAINTAINING TRAFFIC

The work specified in this section consists of maintaining traffic within the limits of the project for the duration of the construction period, including any temporary suspensions of the work and shall conform to VDOT Road and Bridge Specifications Sections 2007, the latest version of the Virginia Work Area Protection Manual, and the 2009 MUTCD with the following additions.

512.03 – Procedures

(a) Signs – add the following:

All temporary construction signs must have two orange flags attached to the back of the sign.

Fluorescent prismatic lens sheeting (Diamond Grade) shall be used on all orange construction and maintenance activity signs, barrier delineators, guardrail delineators and barrier vertical panels installed in the public right-of-way.

The Contractor will be required to install "Signal Ahead" warning signs (W3-3) in advance of new traffic signal installations, in accordance with MUTCD guidelines, even when visibility distance is satisfactory.

(h) Temporary Signalization – replace the last paragraph with the following:

Portable traffic control signals conforming to the requirements of Section 512.03(h)2 may be used when authorized by the Engineer and where indicated in the plans. When portable traffic control signals are used in lieu of flagger service, the portable traffic control signals will be considered incidental to maintaining traffic.

Add the following after 512.03 (q):

(r) Maintenance of Traffic Plan

The Contractor shall present his Maintenance of Traffic Plan at the pre-construction conference. The Maintenance of Traffic Plan shall be in written form and include a minimum of four (4) full size sets of plan sheets which indicate the type and location of all signs, lights, barricades, pavement striping and barriers to be used for the safe passage of pedestrians and vehicular traffic through the project and for the protection of the workers. The Plan shall indicate conditions and setups for each phase of the Contractor's activities.

When the project plans include or specify a specific Maintenance of Traffic Plan, alternate proposals will be considered by the Engineer when they are

found to be equal to or better than the plan specified. The Contractor shall be responsible for all work zone signing, delineation, pavement markings, and any other traffic control devices necessary to perform the work in accordance with these specifications or as directed by the Engineer. The Contractor shall erect, maintain, secure and move all traffic control devices in the project limits and any detour signs needed for the project. Upon completion of the work, the Contractor shall immediately remove all such temporary traffic control devices.

In no cases will the Contractor begin work until the Maintenance of Traffic Plan has been approved in writing by the Engineer. Modifications to the Maintenance of Traffic Plan shall also be approved in writing. Except in an emergency, no changes to the approved plan will be allowed until approval to change such plan has been received from the Engineer.

The Contractor shall be responsible for performing daily inspections, including weekends and holidays, with inspections at night, of the installations. The project personnel will be advised of the schedule of these inspections and be given the opportunity to join in the inspection as is deemed necessary.

The Contractor will not be permitted to store material used for construction or erection of traffic control signs or signals on the pavement or shoulder if the street is open to public traffic. All materials shall be stored in such a manner that they will not be on the ground or come in contact with surface runoff (e.g., on pallets).

(s) Number of Traffic Lanes

Except as otherwise specified herein, on the plans, or in the special provisions, the Contractor shall maintain one lane of traffic in each direction. Two lanes of traffic in each direction shall be maintained where necessary to avoid undue traffic congestion. Unless otherwise specified, the effective width of each lane used for maintenance of traffic shall be at least as wide as the traffic lanes existing in the area prior to commencement of construction. Traffic control and warning devices shall not encroach on lanes used for maintenance of traffic.

The Contractor may be allowed to restrict traffic to one-way operation with written permission from the Engineer for short periods of time provided that adequate means of traffic control are in effect, certified flaggers are available and traffic is not unreasonably delayed.

The Contractor shall observe and obey all local and State laws, ordinances, regulations and permits in relation to the obstruction of streets and highways,

keeping passageways open and detecting traffic. All roadway pavement cuts and sawcuts must be made between the hours of 9:00 a.m. and 3:00 p.m. All lanes shall be kept open to traffic at all other times. If steel plates are required or directed by the Engineer, they shall be provided by the Contractor. By special review the Contractor, at this request, may work from 6:30 p.m. to 5:00 a.m. in non-residential areas.

(t) Maintaining Existing and Temporary Electrical Systems:

Existing electrical systems (traffic signal, ramp metering, highway and street lighting, flashing beacon and sign illumination), or approved temporary replacements thereof, shall be kept in effective operation for the benefit of the traveling public during the progress of the work, except when shutdown is permitted, to allow for alterations or final removal of the systems. The traffic signal shutdowns shall be limited to periods during normal working hours, or shall be as specified in the special provisions.

The Contractor shall respond to emergency calls (between 4:00 PM and 8:00 AM) within 30 minutes of initial call from the Emergency Center or from the Traffic Operations Center. If the Contractor cannot, then the City will respond and charge the Contractor for time, material and equipment costs. This requirement shall be effective from once the Contractor alters the existing traffic signal equipment or alignment to when the final acceptance letter has been received. The Contractor can elect to negotiate a maintenance fee with the City forces prior to the pre-construction meeting.

The local traffic enforcement agency shall be notified prior to any operational shutdown of a traffic signal.

Where an existing system or temporary system is being modified, work not shown on the plans or specified in the special provisions and which is considered by the Engineer as necessary to keep all or any part of the system in effective operation will be paid for as extra work.

Where damage is caused by the Contractor's operations, the Contractor shall, at his expense, repair or replace damaged facilities promptly in accordance with these specifications. Should the Contractor fail to perform the required repairs or replacements, the cost of performing such repairs or replacements will be deducted from any moneys due or to become due the Contractor.

The exact location of existing conduit runs and pull boxes shall be ascertained by the Contractor before using equipment that may damage such facilities or interfere with any system.

Where roadways are to remain open to traffic and existing lighting systems are to be modified, the lighting systems shall remain in operation and the final connection to the modified circuit shall be made so that the modified circuit will be in operation by nightfall of the same day.

Temporary electrical installations shall be kept in effective operation until the temporary installations are no longer required for the traveling public.

(u) Scheduling of Work

Highway lighting and traffic signals shall not be placed in operation, including flashing operation, prior to commencement of the functional test period (minimum of 48 hours) unless ordered otherwise by the Engineer.

Conductors shall not be pulled into conduit until pull boxes are set to grade, crushed rock slumps installed, mortar placed around conduit, concrete bottom of pull boxes placed, and metallic conduit bonded.

(v) Serving Utility Companies

The Contractor shall be responsible for all negotiations with and between the utility companies. The Contractor shall assume all charges and make all necessary arrangements with the power company for the required electrical services necessary for the energizing of the traffic signal installations. The Contractor shall comply with the utility company regulations.

(w) Tests/Final Acceptance:

During all tests and final inspection, the City representative of the equipment/material manufacturer shall be present.Acceptance of the completed project shall be based upon the following requirements and shall not be considered final until thirty (30) days of trouble-free operation (no service calls, manual resets, etc.) after the final inspection has elapsed. The trial period shall begin after any problems have been rectified that were noted during the final inspection. In the event any portion of the signal system is replaced or repaired, that portion of the signal system shall be subjected to a thirty (30) day demonstration period.

512.04 – Measurement and Payment

Add the following:

Maintaining Traffic: Maintaining Traffic will be measured and paid as a single LUMP SUM (LS) item. The unit price shall include flagger service, police officer, construction signs, portable changeable message signs, electronic arrows, channelizing devices, pavement markings, temporary traffic control signal(s),

truck mounted attenuators, and all other required labor, tools, materials, equipment, and personnel necessary to provide proper maintenance of traffic as described in Section 512 and as directed by the Engineer. No separate measurement or payment will be made for any additional items not explicitly listed above required to provide proper maintenance of traffic.

++ END OF SECTION ++

SECTION 513 - MOBILIZATION

VDOT Road and Bridge Specifications, 2007 Edition, shall be followed unless otherwise amended or supplemented with the specifications contained herein. Where conflicts occur, the specifications contained herein shall prevail.

513.02 – Measurement and Payment

Replace Section 513.02 – Measurement and Payment with the following:

Mobilization and demobilization shall not be measured and paid for separately; it shall be considered incidental to other pay items.

++ END OF SECTION ++

SECTION 700 – GENERAL TRAFFIC CONTROL DEVICES

VDOT Road and Bridge Specifications, 2007 Edition, shall be followed unless otherwise amended or supplemented with the specifications contained herein. Where conflicts occur, the specifications contained herein shall prevail.

700.02– Material – is amended as follows**:**

(e) **Electrical Items** is to be amended to include the following:

Provide junction box covers with standard *Traffic* logos, pull slots, and stainless steel pins. Tracer wire shall meet the requirements of #8 AWG stranded bare copper conductor cables.
Furnish and install riser assemblies with clamp-on, heat shrink tubing, galvanized pole attachment fittings, and all necessary hardware.
Provide rigid metallic conduit for risers as called for in these Project Special Provisions.
Provide Tyco™ (Raychem™) part number 066193-000 or equivalent heat shrink tubing for the installation of fiber-optic or coaxial cable in new risers.

(i) 4. **Sign Post** - replace with the following:

1) Sign Post shall be metal break-away 2 ½ - inch square tube post. The post shall be rolled or formed sections of the dimensions specified. All sharp corners shall be rounded and rough or burred parts shall be smoothly dressed.

The 2 ½ - inch square tube posts shall be 10-gauge steel conforming to the ASTM A570, Grade 50 for steel post. Steel post shall be galvanized in accordance with AASHTO M-120, followed by a chromate conversion coating and a clear organic polymer topcoat. Both the interior and the exterior of the post shall be galvanized. Manufactured by Allied Tube and Conduit, Inc. or approved equal.

Sign post design shall conform to the requirements of the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals* (latest approved edition).

The hardware posts and anchors shall be designed and installed in compliance with the manufacturer's installation guidelines to the FHWA breakaway standards.

When specified on the plans, the post shall be powder coated black to match Federal Standard 595B Color Number 17038. The finish coating shall be a six stage chemical treatment for an electrostatic applied fusion bonded polyester powder coating. The polyester protective coating shall be one coat (minimum 4 mils dry film thickness or in accordance with manufacturer's specifications), and heat curable, thermosetting powdered coating. The polyester coating shall be

checked for continuity using 67-1/2 volt wet sponge detector to check for holidays, pinholes and discontinuities. Coating shall be checked and certified.

2) The 2 ½ - inch square tube posts shall have bolt holes that are pre-punched. The holes shall be 7/16-inch in diameter on 1-inch centers on all four sides down the entire length of the post. Field punched holes will not be permitted.

3) The length shall be as necessary for the type and location of installation. The ends of the post shall be tampered for easy installation.

Add the following after (l):

(m) Anchor Base - Shall be 30-inch section of 12-gauge square tubing installed per manufacturer specifications for the post size specified on the plans including use of Corner Bolt fasteners, manufactured by Allied Tube and Conduit, Inc. or approved equal.

(n) Anchor Sleeve – Shall meet manufacturer specifications for stabilization anchor sleeve, manufactured by Allied Tube and Conduit, Inc. or approved equal.

(o) Slip Base – Shall meet manufacturer specifications for slip base, manufactured by Xcessories Squared or approved equal.

(p) Concrete Footing – Footing shall be concrete Class A3. Sign post footing size shall be minimum 1 feet wide by 2 feet deep.

700.04 – Procedures is to be amended to include the following:

Comply with the Article 700.04 of the Standard Specifications except as noted herein:

Install the junction boxes flush with finished grade. Do not install sealant compound between junction boxes and covers. All final junction box locations in sidewalk, sidewalk ramps, or pavers shall be approved by the Engineer.

At locations where an existing junction box is removed and replaced by a new junction box, the Contractor shall remove the junction box with minimal disruption to the surface of the surrounding area. If a junction box is located within a sidewalk, the Contractor shall remove only one section of sidewalk unless otherwise approved by the Engineer. The Contractor shall seal the existing conduit, protect any existing cables, and replace any surface materials in kind. The junction box should be disposed of by the Contractor in a manner approved by the Engineer.

At certain locations shown in the Plans, reuse existing junction boxes is called out. Precaution shall be taken to prevent damage to the existing conduit or cables. At locations where a new junction box or new conduit is to be connected to an existing junction box, use method to enter existing junction box as approved by the Engineer. Do not damage existing junction box or existing junction box contents. Junction boxes or

cable damaged shall be replaced, or repaired with the approval of the Engineer, at the Contractor's expense.

The Contractor shall field locate and install each junction box that is located in existing sidewalk, such that no more than one (1) section of sidewalk will require replacement at each proposed junction box location. Additional damaged sections of sidewalk shall be repaired/replaced at the Contractor's expense. The locations of all proposed junction boxes are to be field verified by the Engineer prior to installation.

The Contractor shall field locate and install each junction box that is located in brick pavers or within existing/proposed sidewalk, such that the collar of the junction box is flush with brick pavers or concrete. Brick pavers removed and not reused shall be turned over to the City. Any pavers damaged by the contractor shall be replaced at the Contractor's expense. The locations of all proposed junction boxes are to be field verified by the Engineer prior to installation.

The Contractor shall obtain approval for final cabinet foundation locations from the Engineer before pouring the concrete base. Locate new cabinets so as not to obstruct sight distance of vehicles turning on red or create any ADA violations or pedestrian conflicts.

Silicone sealant must be installed around the entire perimeter of the cabinet base and around any conduit penetration to the cabinet.

At locations where sidewalk, decorative brick pavers, or surface treatments or landscaping treatments are removed or damaged as part of the cabinet foundation modification, replace and restore to pre-construction condition using same material.

Do not install foundations over uncompacted fill or muck.

700.05 – Measurement and Payment – replace the following**:**

Sign Posts – replace entire paragraph with the following:

Furnish and Install Sign Post**:** will be measured and paid for in units of linear feet of sign post for the size and finish specified. This price shall include post, top cap and clamps, anchor sleeve, anchor base, slip base, powder coat black finish (when called for on the plans), concrete footing, as well as all labor, tools, equipment, and incidentals necessary to complete the installation. This price does not include sign panel.

Add the following to the end:

Anchor Base:

Furnish and Install Anchor Base: will be considered incidental and will not be measured and paid for separately.

Anchor Sleeve:

Furnish and Install Anchor Sleeve: will be considered incidental and will not be measured and paid for separately.

Slip Base:

Furnish and Install Slip Base: will be considered incidental and will not be measured and paid for separately.

Concrete Footing:

Furnish and Install Concrete Footing: will be considered incidental and will not be measured and paid for separately.

Junction Box:

Furnish and Install Junction Box *(type)*: will be measured and paid for in units of Each (EA) for the junction box specified on the plans. This price shall include all materials, labor, tools, equipment and incidentals necessary to complete the installation.

Electrical Service:

Electrical Service: will be measured and paid for in units of EACH (EA) for the type of service required. This price shall include the installation of required electrical service conductors to the point of service hookup on Dominion Virginia Power (DVP) poles or junction boxes. The Contractor shall coordinate with the Engineer for establishing electrical service when the signal is ready for activation. No separate measurement and payment will be made for electrical service risers on existing poles, meter poles, switches, disconnects, or any other required materials, tools, hardware, labor, and equipment necessary to install and provide electrical service according to the specified type of electrical service.

+ + END OF SECTION + +

SECTION 701 –TRAFFIC SIGNS

VDOT Road and Bridge Specifications, 2007 Edition, shall be followed unless otherwise amended or supplemented with the specifications contained herein. Where conflicts occur, the specifications contained herein shall prevail.

701.02 – Materials – Replace with the following**:**

Traffic Sign:

l) Sign Face – Face material shall conform to VDOT Section 247 (Reflective Sheeting) and be 3M™ Diamond Grade™ DG^3 Reflective Sheeting Series 4000 material or equal for all signs.

2) Aluminum Blank - shall conform to VDOT Section 701.

3) Sign Backing – When specified on the plans, the back of the sign blank shall have colored sheeting applied. The pressure sensitive Black color sheet shall be #7725-12, manufactured by 3M™ Product or equal.

4) LED Blankout Sign – When specified on the plans, the Contractor shall furnish LED blankout signs that conform to the latest version of the MUTCD for size, color, and graphical depiction. The LED blankout sign shall be enclosed in a non-corrosive, aluminum, NEMA 3R rated enclosure with a powder coat black finish, operate with automatic dimming to adjust to ambient light levels, and be furnished with a sun visor.

5) Ground Mounted Installation: shall conform to VDOT Std. SSP-VA and include the following materials:

a. Posts - shall conform to Section 700 of these specifications.

b. Anchor Sleeve - shall conform to Section 700 of these specifications.

c. Anchor Base - shall conform to Section 700 of these specifications.

d. Slip Base - shall conform to Section 700 of these specifications.

e. Concrete Footing - shall conform to Section 700 of these specifications.

f. Banding Hardware – For banding applications, C – BRACKET shall utilize “SIGN FIX”, PART # BC12118UNC. Banding material shall be “BANDIT” - ¾” X 100 FT. ROLL - 0.030 STAINLESS STEEL, PART # C20699, with “BANDIT’” EAR – LOKT…PART # C25699 or approved equal. When color post is required, all hardware shall be powder coated conforming to Section 700 of these specifications.

g. Universal Channel Clamp - MACM – 120 ALUMINUM 12FT SECTION MEDIUM EXTRUDED CHANNEL MFG. BY SIGN FIX UNIVERSAL CHANNEL CLAMP…PART # UCC0004 or approved equal. When color posts are required, all hardware shall be powder coated conforming to Section 700 of these specifications.

h. Bracing – Shall be 6061-T6 aluminum alloy and have 2-inch mounting surface x 7/8-inch depth x 1/8-inch nominal wall thickness, punched with 7/32-inch diameter holes on 6-inch centers along centerline of 2-inch mounting surface. Sign cluster layout shall conform to MUTCD guidelines.

i. Fastener - Drive rivets shall be utilized to fasten the signs to the post. Plastic nylon washer shall be placed between the sign face and rivet head.

j. Wooden Utility Pole Installations – Signs mounted to wood poles shall utilize 3½-inch galvanized metal lag screws with nylon washer placed between the sign face and screw head.

k. Sign & Sign Post Inventory ID Label Installation – A sign inventory identification label shall be provided by the City to the Contractor. The self-adhesive label shall be applied to the back of each sign and each post, and noted on the Daily Work Log (see Section 100 – General Requirements).

6) Mast Arm Installation: Sign assemblies installed on mast arms shall utilize Pelco overhead sign bracket AB-0128-A-L mounting kits or equal approved by the Engineer. Sign assembly brackets shall be made of aluminum pipe not smaller than 1½ inches in diameter with suitable sockets at each end.

a. Metro Street Name Sign: assemblies installed on mast arms shall be installed per the detail drawing of these specifications in the Appendix.

7) LED Blankout Sign Installation: LED blankout signs shall be installed on mast arms (unless otherwise specified) using Pelco overhead sign bracket AB-0128-A-L mounting kits or equal approved by the Engineer. Sign assembly brackets shall be made of aluminum pipe not smaller than 1½ inches in diameter with suitable sockets at each end.

701.03 – Procedures – Add the following after (d)**:**

(e) Vertical distance between the bottom of the lowest sign on a sign post and the ground line is a minimum of 5 feet above non-traversable areas (e.g. median, gore area); otherwise, the minimum mounting height is 7 feet as measured to the lowest sign on a sign post.

701.04 – Measurement and Payment – Delete and replace with the following**:**

Traffic Signs:

Furnish and Install Traffic Sign will be measured and paid for in units of Square Feet (SF) of sign panel for the ground-mounted types specified on the plans. This price shall include fabrication of sign face, aluminum blank, colored sign backing (when called for on the plans), sign layout (if sign cluster), hardware, clamps, bracing, ID labels and fasteners, as well as all labor, tools, equipment and incidentals necessary to complete the installation. This price does not include sign post, anchor base, anchor sleeve, slip base or concrete footing. Sign cluster layout shall conform to MUTCD guidelines and sign cluster detail shall be submitted to the City of Norfolk for approval prior to installation.

Furnish and Install Traffic Sign Assembly (Mast Arm Installation) will be measured and paid for in units of Square Feet (SF) of sign panel. Traffic sign assemblies that are mast arm installations shall include furnishing, installing, and fabricating the sign face, tools, equipment, mounting brackets, hardware, aluminum blank, labor, tools, equipment and incidentals necessary for a complete and accepted mast arm installation of traffic sign assembly.

Furnish and Install LED Blankout Sign Assembly will be measured and paid per each (EA) blankout sign assembly furnished, installed, and accepted. The blankout sign assembly shall include furnishing and installing an approved LED blankout sign fixture of the correct size and MUTCD compliant sign display, mounting brackets, hardware, labor, tools, equipment, and incidentals necessary for a complete and accepted installation of the LED blankout sign assembly.

+ + END OF SECTION + +

SECTION 703 – NORFOLK TRAFFIC CONTROLLER ASSEMBLY

Section 703 – Traffic Signals of the VDOT Road and Bridge Specifications, 2007 Edition, shall be deleted in its entirety and replaced with the specifications contained herein.

703.01-Description

This work shall consist of furnishing and installing traffic signal equipment in accordance with these specifications and as shown on the plans or as directed by the Engineer.

703.02-Equipment

A. Type 170 Traffic Controller Assembly:

The purpose of this specification is to describe the minimum acceptable design and operating requirements for solid state, two through eight-phase controller assembly. All equipment furnished herein shall be in accordance with the Traffic Signal Control Equipment Specifications, as published by the latest State of California Business, Transportation and Housing Agency; Department of Transportation and all current Addendum for the Model 170E controller unit and the following Special Provisions. In case of conflict, these Special Provisions shall take precedence over all other specifications. All Traffic Controller Assembly equipment must be listed in the State of California "Qualified Product List, Controller Assemblies for Model 170 Traffic Controller" dated February 2012. The qualified product list is located under http://www.dot.ca.gov/hq/traffops/elecsys/reports/QPL%20February%2022,%202012.pdf. The controller and cabinet rack must be manufactured by the same manufacturer.

1. These special provisions define the work and materials necessary to provide traffic signal control equipment for the City of Norfolk.

2. This procurement is intended to provide the City with the Model 170 System and its various components including all hardware.

3. Each Traffic Controller Assembly to be furnished shall consist of all necessary quantities from the following items, or as specified per bid document:

Item	336S Cabinet	332/332S Cabinet
Traffic Signal Controller –**w/6802 CPU**	1	1
PROM Module	1	1
Fiber Optic Modem/ Transceiver	1	1
Model 336S or Model 332/332S Base Mounted Cabinet Assembly	1	1
Base Extension	1	1
Load Relay	12	12/16
DC Isolator	4	4

Item	336S Cabinet	332/332S Cabinet
Loop Detector	4 – 2CH	14 – 2CH
C2 Connector	1	1
Conflict Monitor	1	1
Flash Relay	2	2
Flash Transfer Relay	4	4
Power Supply	1	1
PDA #2 Power Supply	1	1
Fiber Optic Interconnect Center	1	1
Emergency Priority System Optical Detector	2 – 2CH	2 – 2CH
Video Detection Video Processor Board	2 – 2CH	2 – 2CH

4. To assure full and complete utilization of all equipment furnished, the Successful Bidder shall provide support services and materials, which shall include, but not be limited to, furnishing complete equipment documentation, warranties, and training.

B. Enclosed Equipment:

1. Related Specifications and Standards

All equipment furnished shall be new and shall conform to the plans, Special Provisions, Specifications, and to the applicable requirements of the Underwriter's Laboratory Incorporated (UL), the Electronics Industries Association (EIA), the National Electric Code (NEC), the American Society for Testing and Materials (ASTM), the American National Standards Institute (ANSI), and the applicable standards, specifications, and regulations of the City of Norfolk.

2. PROM Module

PROM module shall be furnished and installed with each assembly and compatible with the City of Norfolk's ATMS computerized traffic control system.

a. DESCRIPTION:

The 412 Memory Module meets all applicable Caltrans and Transportation Electrical Equipment Specification (TEES) dated March 2009 specifications. The CALTRAN's TEES are located under:
http://www.dot.ca.gov/hq/traffops/elecsys/TEES.htm
It can be installed in a Model 170E Controller with a 6800 CPU. The selection of CPU type is made by a slide switch on the PROM.

6800 CPU Board: The PROM Module to be used with 6800 CPU Board must be 412F module. Its use is transparent to the user by allowing the same software to be run without modification. All IC sockets shall be MIL-S-83734, and shall be machined not stamped. The IC sockets shall

have an inner contact of gold, over nickel-plated beryllium copper. The outer sleeve shall be gold, over nickel-plated, or tin over copper-plated brass. The sockets shall have an Underwriters Laboratory rating of 94V-0. The sockets shall be AUGAT-500 or approved equal.

b. FEATURES:

Access to serial data from front panel.

CPU- Selector Slide Switch
A two-position slide switch bridges the address mismatch between the 68HC11 and 6800 CPUs. A 4K block of RAM memory designed for up/down-loading of timing parameters has to reside at different addresses for the 6800 and HC11 processors: $7000-$7FFF for the 6800 and $6000-$6FFF for the 68HC11. Selecting the appropriate switch position places the timing parameters in the same 4K block of RAM on the PROM. This allows the user to save timing parameters from a 6800-based controller and download them to a 170E/68HC11 controller.

Memory Addressing & Bank Switching
When 64K of EPROM is to be accessed on an external PROM, a 27C010 (128Kx8) EPROM must be installed on the Module. The address decoders are programmed to detect specific addresses and will do a software bank switch to the selected high or low bank. The CPU board hardware bank switch and the PROM software bank switch functions are independent and will not interfere with each other.

Two memory sockets are provided:

- 28-pin socket for a 32Kx8 RAM chip.
- 32-pin socket for a 32Kx8 or a 128x8 EPROM chip.

The RAM is made non-volatile by an on-chip battery with power supervisory circuit.

COM4 Communications Port
The PROM module brings out the lines from the C40 serial communications port in the back of the 170 controller to the DB9 connector on the front panel, thereby facilitating physical access. All control lines are user configurable using plug-in jumpers to adapt to any configuration within the RS-232 standard.

Memory Map Address Ranges

EPROM address	BANK
$18000-$18FFFF	HIGH
$08000-$08FFFF	LOW

RAM address	SW1Switch Position
$1000-$6FFF	68HC11
$1000-$4FFF	6800
$7000-$7FFF	6800

Bank Selection:

$FFF0	Sets Bank line Low (Write only)
$FFF1	Sets Bank line High (Write only)
$FFFE	Sets Bank line High (Read or Write)

SW1 Switch Position	RAM Address Block Select
6800	$7000-$7FFF
68HC11	$600-$6FF

Power Requirement:
Active State: 80mA at +12VDC
Inactive State: 4mA at +12VDC

Circuit Board:
Dimensions: 5”H x 10.375”W x 0.063” thick
Material: NEMA F-4 glass cloth, solder mask both sides, component silkscreen.
Protection: Humidity-resistant, ultraviolet-traceable conformal coating.
Contacts: Gold-plated edge connector contacts

Front Panel
Dimensions: 1.5”W x 5.0”H, 0.125” thick.
Panel Material: Aluminum, chem.-sealed
Insertion Devices: Handle, plus device to prevent incorrect insertion.

Physical
Weight: 10 oz (280 g)
Operating Temp.: -35°F to +165°F

Warranty
The PROM Module must be warranted against defects in materials and workmanship for a period of two (2) years from date of original shipment.

3. 170 E Controller

Controller shall be configured such that the program firmware and operating data resides on and operates from the specified PROM card.

All IC sockets shall be MIL-S-83734, and shall be machined not stamped. The IC sockets shall have an inner contact of gold, over nickel-plated beryllium copper. The outer sleeve shall be gold, over nickel plated, or tin over copper plated brass. The sockets shall have an Underwriters Laboratory rating of 94V-0. The sockets shall be AUGAT-500 or approved equal.

4. Conflict Monitor

See Section 703.02 E.

5. Fiber Optic Interconnect Center

See Section 711.

6. Emergency Priority System Optical Detector

See Section 810.

7. Video Detection Video Processor Board

See Section 820.

C. Cabinet, Model 336S:

1. General

The cabinet assembly shall be a model 336S cabinet, with all components as described in the specifications.

2. Cabinet Finish

TYPE A. The cabinet shall have a standard aluminum finish if not specified on plans or special provisions.

TYPE C Black

Painted finishes shall conform to the requirements as specified in the contract plans and specifications according to the following:

a. All components, nuts, bolts, screws shall have shop painted finish coat.

b. The color shall be City of Norfolk “Black”, Color Number FS 27038, Federal Standard 595B.

c. The finish coating shall be a six stage chemical treatment for an electrostatic applied fusion bonded polyester powder coating. The polyester protective coating shall be one coat, minimum 4 mils thick, and heat curable, thermosetting powdered coating.

d. The polyester coating shall be checked for continuity using 67-1/2 volt wet sponge detector to check for holidays, pinholes and discontinuities. Coating shall be checked and certified.

3. Cabinet Door Locks and Lifting Rings

The cabinet shall have door locks (Corbin Norfolk B4R97849 lock) and lifting eyes attached to the side of cabinet.

4. Cabinet Light

Each cabinet shall include two (2) fluorescent lighting fixture (one front, one back) mounted horizontally inside the top portion of the cabinet. The fixtures shall include a cool white lamp, lamp cover and shall be operated by a normal power factor UL listed ballast. A door-actuated switch shall be installed to turn on the applicable cabinet light when the front door or back door is opened.

5. Cabinet Fans

Two (2) cabinet muffin fans wired in parallel with one (1) thermostat specification of fan to meet TEES spec with the addition of second fan.

6. C2 Connector Cable: Controller to Transceiver

C2 Connector shall meet the following requirements for workmanship and material:

a. DB25-RS232 Transceiver Connector End

1) Metal Shell DB25 Male Connector
2) Cable – shielded 22 gauge wire; 10-conductor cable; pins soldered to wires.

b. Controller Connector End

1) Metal Shell CATRANS C2 Male connector
2) Cable – shielded 22 gauge wire; 10 conductor, pins soldered to wires

c. Cable

Cable must be encased from connector to connector with a solid weather-resistant jacket.

7. No Mercury Contactor Relays

CALTRAN's TEES dated March 2009 line 3.5.4 states that: FAILED State Output Circuits An electro-mechanical relay shall be provided to switch an output circuit during a FAILED state. The relay coil shall be energized in a NON FAILED State. The relay contacts shall be rated for a minimum of 3 amperes at 120 VAC and 100,000 operations. Contact opening/closing time shall be 30 ms or less. This specification is amended to state that the relay is not required to be electro-mechanical but must not be of the mercury contactor type.

8. Surge Protection for Control Equipment

Each cabinet shall be provided with devices to protect the control equipment from surges and over voltages.

9. AC Service Inputs

Each controller cabinet shall be provided with a hybrid type power line surge protection device. The protector shall be mounted on the bottom right hand side of the cabinet. Approximately 5" left of main service block and centered between the bottom of the input file and the bottom of the rack chassis. The protector shall include the following features and functions:

10. AC Service Surge Arrestor

a. General

Peak Surge Current: 80 kA per phase; 40 kA mode

Description: Series wired, terminal strip connected, multi-stage hybrid Active Tracking Network **(ATN)** sine wave tracking surge protective device with remote alarm capability and 2 pair (RJ14) telecommunication circuit protection

Warranty: Ten-Year Free Replacement

Unit Listing: Recognized components under UL1449 Second Edition, UL1283, Telecommunications circuit UL497A, CSA

Manufacturer Qualifications: ISO 9001:1994 Quality System Certification BSI FM 30833

b. Mechanical

Enclosure: ABS Plastic UL94-5VA

Connection: Wire clamping box terminals on 30 Amp models; Stud-lugs on 60 Amp models

Weight: 30 Amp Models ~ 2lb (9kg); 60 Amp Models ~ 3 lb (1.5 kg)

Operating Temperature: 40° F (-40° C) TO $+140^{o}$ F ($+60^{o}$ C)

c. Electrical / Performance

Application: Dedicated 120 Vrms 1 AC power circuits operating at <60 Amps, protecting all types of traffic signal cabinets (both NEMA and 170 types), school flashers, hazard beacons, preemption systems, and variable message signs

Protection Modes: All mode: l-N (normal mode), L-G (common mode)

Input Power Frequency: 47-64 Hz (AC)

Response Time: AC – Active <1 nanosecond

Maximum EMI/RFI Attenuation – Mil-Std-220

1 kHz	**10 kHz**	**100 kHz**	**1MHz**	**10 MHz**	**Maximum Attenuation Frequency**
3.0dB	**21 dB**	**38 dB**	**36 dB**	**15dB**	**47 dB @ MHZ**

Maximum Continuous Operating Current: 30 Amps or 60 Amps
Diagnostics: AC only, Form C (N/O, N/C) Dry Relay (volt Free) contacts rated at 1 AMP @ 30 VDC, .5 AMP@ 125 VAC

Short Circuit Current Rating: 200 k AIC with 30 AMP or 60 Amp Class R Fuse

d. Telecom Electrical / Performance

Application: Modular jacks are: RJ11 (1 pair) or RJ14 (2pair). Compatible with standard voice grade lines including ISDN
Protection Modes: All mode: Normal/Transverse – tip to ring, Common/Longitudinal – tip to ring & ring to ground

Frequency Range: 0-16 MHz
Series Resistance: ~ 10 ohms
Data Rate: <1.6 Mbps
UL Listing: UL497A
Continuous Current Maximum: 100 mA
Pairs Protected: (1-4) (203)
Response Time: <1 nanosecond
EMI/RFI Attenuation: 3dB point 17 MHz, max attenuation 39 dB @ 38 MHz
Maximum Continuous Operating Voltage: 127 Vrms tip to ring, tip & ring ground

Available Models	**Maximum Continuous Operating Voltage (VRMS)**	**ANSI/IEEE C62.41-1991 Measured Limiting Voltage***				**ULSVR**
		L-N L-G, N-G	L-N L-G, N-G	L-N L-G, N-G	L-N L-G, N-G	L-N L-G, N-G
		A1 Ring Wave 2kV, 67 A 180 Phs Angle	**A1 Ring Wave 2 kV, 67 A 90 Phs Angle**	**B3/C1 Impulse Wave 6 kV, 3kA 90 Phs Angle**	**C3 Impulse Wave 20 kV, 10 kA 90 Phs Angle**	**UL 1499-2 Suppressed Voltage Ratings**
Tracker -2 (60 A)	150 150, 150	30 80, 40	190 240, 50	420 450, 430	520 660, 560	400 400, 400

*Test environment: Positive polarity. Tested with AC power applied. All units tested at terminals, time base = 1 ms, All Measurements referenced from zero volts per NEMA lS-1

Telecom	**Maximum Continuous Operating Voltage (Vrms)**	**IEC 801-5 10 x 700 ps Telecommunications Wave From***			
		500 V 25 ohm	**1000 V 25 ohm**	**2000 V 25 ohm**	**4000 V 25 ohm**
		L-G L-L	L-G L-L	L-G L-L	L-F L-L
RJ-14	127 V	170 170	170 170	170 170	170 170

11. Remote Detector Input (As required by Plan Sheets)

Each remote detector input line shall be protected as it enters the cabinet with a surge protection device that meets or exceeds the following requirements:

a. The unit shall be a 3-electrode gas tube type of surge arrester.

b. The striking voltage shall be 300-500 VDC with a minimum holder over voltage of 155 VDC.

c. The unit shall be a three terminal device, one of which shall be connected to ground, the other two shall be connected across each input respectively.

d. The unit shall have the following minimum requirements:

- Impulse Breakdown: less than 100v in less than 1.1 microsecond at 10 KV/usec.
- Impulse Breakdown Balance: 0.01 microsecond (or less) difference at 10 KV/usec impulse.
- Energy Application: withstands 20 amp AC for 1 sec applied 10 times at 3 minute intervals on either section.
- Current Rating: 40,000 amp (8/20 impulse)
- Capacitance: 6 picofarads, line to ground

12. Inductive Loop Detector Inputs

a. Each inductive loop detector channel input (minimum of 16 channels) shall be protected by an external surge protection device, mounted on a separate fold down detector panel, meeting or exceeding the following requirements:

b. The unit shall be a three-terminal device, two of which shall be connected across the signal inputs of the detector. The third terminal shall be connected to chassis ground to protect against common mode damage.

c. The unit shall instantly clamp differential mode surges (induced voltage across the loop detector input terminals) via a semi conductor array. The array shall be designed to appear as a very low capacitance to the detector.

d. The unit shall clamp common mode surges (induced voltage between the loop leads and ground) via solid state clamping devices.

e. The unit shall have the following minimum requirements:

- Peak Surge Current (six times)
- Differential Mode.....400 Amps (8x20us)
- Common Mode.....5000 Amps (8x20us)
- Estimated Occurrences...500 @ 200 Amps
- Response Time.....40 ns

- Input Capacitance.....35 pf typical
- Temperature.....- 40° C to + 85° C
- Mounting.....No. 10-32 x 3/8" Bolt
- Clamp Voltage .....@ 400 Amps
- Diff. Mode.....30 volts max @ 1000 Amps
- Comm. mode.....30 volts max.

13. Red Monitor Harness

A connector and terminal assembly designated as P20 (Magnum P/N 722120 or equivalent) for monitoring the absence of red shall be an integral part of the output file. The connector shall terminate and be compatible with the cable and connector of a Type 170 conflict monitor unit (CMU), capable of monitoring the absence of red. The pin assignments of the P20 connector and terminal assembly shall be provided with the cabinet plans. The P20 connector shall be physically alike to the cable and connector of a Type 170 CMU to prevent the absence of red cable connector from being inserted into the P20 connector 180 degrees out of alignment. Programming of the unused red channels shall be accomplished via a Molex jumper. These jumpers shall cause 110 VAC to be applied to any and all unused red monitoring channels. The jumpers and their respective attachment points shall be part of the output file. The red monitor harness must be connected to the conflict monitor and to the P20 connector. P20 circuit board jumpers must be set according to intersection configuration.

14. Police Panel

In addition to the Flash/Automatic switch a Manual Control switch and a hard wired police push button (Switchcraft Type 921K) with a minimum 6 foot length cord shall also be furnished.

The panel shall have a minimum depth of 2.25 inches. No miniature switches will be allowed. All switches must be clearly labeled.

There shall be **NO** Signal On/Off switch installed within the Police Panel.

15. Input File

Shall be City of Norfolk Standards as per Figure 1 "Input File City of Norfolk Standard 336S Cabinet".

16. Output File

The output file shall be hand wired. No printed circuit boards will be allowed.

17. Shelf Drawer

Shelf drawer assembly per the New York Specification (*California/NewYork Type 170, Traffic Signal Controller System – Hardware Specification, U.S. Department of Transportation, Publication FHWA – IP – 78 – 16, Dec 1978*) with non-slip surface and side stop latch shall be furnished. **See item #24 below for more requirements.**

18. Connector C1 Wiring Harness

The C1 connector shall be fully wired with all unused wires clearly labeled and terminated on a spare terminal block for future applications (spare terminal block 'TB-X' approximately 10 inches from the bottom rear left side of the cabinet).

19. C5 Connector

A C5 Connector shall be furnished fully wired with remaining pins for future use.

20. Extension Base

A twelve inch (12") base extension shall be provided to extend the height of the cabinet when the cabinet is installed on a foundation.

21. Adapter Base

When stipulated on the plans, a twelve inch (12") high "M" base adapter base shall be provided to extend the height of the cabinet when the cabinet is installed on an existing NEMA cabinet foundation.

22. Ground Buss

All ground busses shall be pressure contact.

24. PC Interface Port and Cable

An interface port and cable shall be installed in the Shelf Drawer to permit a computer or similar device to communicate with the 170 Controller. The PC to 170 interface cable shall be furnished with the Shelf Drawer which plugs into the C40 connector in the rear of the controller. A DB9 plug shall be mounted to the front face of the Shelf Drawer allowing connection to a computer without opening the drawer and long enough to allow the drawer to slide out completely. The cable shall be made to prohibit it from binding or crimping on other devices in the cabinet. Below is a diagram of the pin out arrangement.

B9 **FEMALE** CONNECTOR C2 MALE CONNECTOR

2 (Rx in) ---------- D (Tx out)

3 (Tx out) ---------- F (Rx in)

5 (GND) ---------- H (GND)

25. 120 VAC Receptacles (non-GCFI)

Each controller cabinet shall be provided with a power strip consisting of eight (8) 15A-125V; 2-Pole, 3-Wire receptacles. The power strip shall be mounted so not to interfere with the input/output drop down back panels. The strip can be mounted (bolted/ or with mounting screws) either on the left or right of the rear of the cabinet where it will not interfere with existing terminal blocks. The power strip shall be wired directly, un-fused, from the AC service input terminal block.

FIGURE 1 - CITY OF NORFOLK
STANDARD MODEL 336S CABINET
INPUT FILE

g 1 56 E, CT	g 2 39 E, CT	g 3 58 E, CT	g 4 41 E, CT	g 5 55 E, CT	g 6 40 E, CT	g 7 57 E, CT	g 8 42 E, CT	RR1 51	EVA 71	EVB 72	2 PED 67	6 PED 68	FLH
2 Call 47	g 2 43 E, CT	4 Call 49	g 4 45 E, CT	6 Call 48	g 6 44 E, CT	8 Call 50	g 8 46 E, CT	RR2 52	EVC 73	EVP 74	4 PED 69	8 PED 70	STOP TIME
1	2	3	4	5	6	7	8	9	10	11	12	13	14

LEGEND
g - Phase
56 - Connector C1 Pin
E - Extension
SYS - System Sensor
CT - Count
SF - Special Function
FLH - Flash Sense
RR - Railroad Pre-emption
EV - Emergency Vehicle
PED - Pedestrian Push Button

D. Cabinet, Model 332

1. General

The Cabinet Assembly shall be a Model 332 cabinet, with all components as described in the Specifications.

2. Cabinet Finish: same as 336S Cabinet

3. Cabinet Door Locks and Lifting Rings: same as 336S Cabinet

4. Cabinet Light: same as 336S Cabinet

5. Cabinet Fans: same as 336S Cabinet

6. C2 Connector: same as 336S Cabinet

7. No Mercury Contactor Relays: same as 336S Cabinet

8. Surge Protection for Control Equipment: same as 336S Cabinet

9. AC Service Inputs: same as 336S Cabinet

10. Remote Detector Input (As required on Plan Sheets): same as 336S Cabinet

11. Inductive Loop Detector Inputs: same as 336S Cabinet

12. Red Monitor Harness: same as 336S Cabinet

13. Police Panel: same as 336S Cabinet

14. Input File

a. Shall be City of Norfolk Standards as per Figure 2 "Input File City of Norfolk Standard 332 Cabinet". The file shall have a full complement of eighteen 2-Channel detectors and five 242 DC and three 252 AC isolators.

FIGURE 2 - CITY OF NORFOLK
STANDARD MODEL 332 CABINET
INPUT FILE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
U "I"	g1	g 2 E, CT	g 2 E, CT	2 Call	g 3	g 4 E, CT	g 4 E, CT	4 Call	g 1 E, CT	N/A	N/A	PED g 2	PED g 6	FLH
L	E, CT	g 2 E, CT	g 2 E		E, CT	g 4 E, CT	g 4 E		g 3 E, CT	N/A	Interval Advance 53	PED g 4	PED g 8	STOP TIME
U "J"	g 5	g 6 E, CT	g 6 E, CT	6 Call	g 7	g 8 E, CT	g 8 E, CT	8 Call	g 5 E, CT	N/A	Manual Control Enable 54	EVA	EVB	RR1
L	E, CT	g 6 E, CT	g 6 E		E, CT	g 8 E, CT	g 8 E		g 7 E, CT	N/A	N/A	EVC	EVD	RR2

LEGEND

SYS - System Sensor
FLH - Flash Sense
E- Extension
g - Phase
CT - Count
PED - Pedestrian Push button
RR - Railroad Pre-Emption
EV - Emergency Vehicle
N/A - Not Assigned
SF - Special Function

15. Output File

The output file shall be hand wired. No printed circuit boards will be allowed.

16. Shelf Drawer: same as 336S Cabinet

17. PC Interface Port and Cable: same as 336S Cabinet

18. Connector C1 Wiring Harness: same as 336S Cabinet

19. Ground Buss: same as 336S Cabinet

20. Cabinet Identification: same as 336S Cabinet

21. 120 VAC Receptacles (non-GCFI): same as 336S Cabinet

22. Extension Base

A twelve inch (12”) base extension shall be provided to extend the height of the cabinet when the cabinet is installed on a foundation.

23. Adapter Base

When stipulated on the plans, a twelve inch (12") high "P" base adapter base shall be provided to extend the height of the cabinet when the cabinet is installed on an existing NEMA cabinet a foundation.

E. Cabinet, Model 332S

1. General

The Cabinet Assembly shall be a Model 332S cabinet, with all components as described in the Specifications.

2. Cabinet Finish: same as 336S Cabinet

3. Cabinet Door Locks and Lifting Rings: same as 336S Cabinet

4. Cabinet Light: same as 336S Cabinet

5. Cabinet Fans: same as 336S Cabinet

6. C2 Connector: same as 336S Cabinet

7. No Mercury Contactor Relays: same as 336S Cabinet

8. Surge Protection for Control Equipment: same as 336S Cabinet

9. AC Service Inputs: same as 336S Cabinet

10. Remote Detector Input (As required on Plan Sheets): same as 336S Cabinet

11. Inductive Loop Detector Inputs: same as 336S Cabinet

12. Red Monitor Harness: same as 336S Cabinet

13. Police Panel: same as 336S Cabinet

14. Input File

    a. Shall be City of Norfolk Standards as per Figure 2 "Input File City of Norfolk Standard 332 Cabinet". The file shall have a full complement of eighteen 2-Channel detectors and five 242 DC and three 252 AC isolators.

15. Output File

    The output file shall be hand wired. No printed circuit boards will be allowed.

16. Auxiliary Output File

    The auxiliary 4 position overlap output file shall be hand wired. No printed circuit boards will be allowed.

17. Shelf Drawer: same as 336S Cabinet

18. PC Interface Port and Cable: same as 336S Cabinet

19. Connector C1 Wiring Harness: same as 336S Cabinet

20. Ground Buss: same as 336S Cabinet

21. Cabinet Identification: same as 336S Cabinet

22. 120 VAC Receptacles (non-GCFI): same as 336S Cabinet

23. Extension Base

    A twelve inch (12”) base extension shall be provided to extend the height of the cabinet when the cabinet is installed on a foundation.

24. Adapter Base

When stipulated on the plans, a twelve inch (12") high "P" base adapter base shall be provided to extend the height of the cabinet when the cabinet is installed on an existing NEMA cabinet a foundation.

F. Model 2010ECLip Enhanced Conflict Monitor

Must be fully compatible with the City of Norfolk Automatic Traffic Management System (ATMS). All local communications software necessary for the monitor must be provided at no additional charge. The interface cabling shall be provided with the monitor.

1. General

This specification sets forth the minimum requirements for a rack-mountable, sixteen channel, solid-state 2010 Signal Monitor for a Type 170 / 179 / 2070 Traffic Cabinet Assembly. At a minimum, the Signal Monitor shall comply with all specifications outlined in Chapter 4 of the California Traffic Signal Control Equipment Specifications, January 1989. Where differences occur, this specification shall govern. The manufacturer of the unit shall be listed on the current California Department of Transportation (Caltrans) Qualified Products List (QPL) and the Transportation Electrical Equipment Specifications (TEES) for signal monitors.

The Signal Monitor shall be capable of monitoring sixteen channels consisting of a Green input, a Yellow input, and a Red input for each channel. The unit shall also include the enhanced monitoring functions described in Section 2, diagnostic display functions described in Section 3, event logging functions described in Section 4, communications functions described in Section 5, and hardware functions described in Section 6.

2. Monitor Functions

All fault timing shall be computed for each channel individually except for Conflict faults.

a. Conflict Monitoring

The Signal Monitor shall be able to detect the presence of conflicting green or yellow signal voltages on the AC field terminals between two or more non-compatible channels. A Conflict fault (CONFLICT) shall be a latching fault.

i. Conflict Recognition Time

The Signal Monitor shall trigger when voltages on any conflicting channels are present for more than 500 ms. The Signal Monitor shall not trigger when voltages on any conflicting channels are present for less than 200 ms. Conflicting signals sensed for more than 200 ms and less than 500 ms may or may not trigger the unit.

b. 24VDC Monitoring VDC

The Signal Monitor shall be able to detect that the cabinet +24 Vdc supply has fallen below 18 Vdc. A 24VDC failure (VDC FAIL) shall be a latching fault.

i. 24VDC Recognition Time

The Signal Monitor shall trigger when the voltage on the +24V input is below 18 Vdc for more than 500 ms. The Signal Monitor shall not trigger when the voltage on the +24V input is below 18 Vdc for less than 200 ms. A voltage level of +22 Vdc shall be required to prevent the unit from triggering.

c. Controller Watchdog Monitoring

The Signal Monitor shall trigger when the Watchdog input does not toggle within the programmed time period (WDT ERROR). The unit shall remain latched in the fault state until reset by the Reset button, an External Reset input command, or AC Line voltage restoring from a AC Line Brownout event (see 2.4). A reset resulting from an AC Line Brownout event shall not clear the WDT ERROR LED.

i. Controller Watchdog Latch Option

A programming option shall set the Watchdog monitoring function to a latching mode. Only a reset from the Reset button or External Reset input shall clear a Watchdog fault. An AC Line brownout condition will not reset the fault.

ii. Controller Watchdog Recognition Time

A programming option shall set the maximum Watchdog recognition time to 1000 ±100 ms or 1500 ±100 ms.

iii. Controller Watchdog Enable Switch

An internal switch shall be provided to disable the Watchdog monitoring function. The switch shall be mounted on the PCB and be clearly labeled "WD ENABLE - ON...OFF". Placement of the switch

in the OFF position shall cause monitoring of the Watchdog to be inhibited.

iv. WDT ERROR LED Control

The WDT ERROR LED shall illuminate when the unit has been triggered by a Watchdog fault. It shall only be cleared by a reset command from the front panel Reset switch or External Reset input. If the Watchdog monitoring function is inhibited due to the Watchdog Enable switch, the WDT ERROR LED shall flash at a 0.5 Hz rate.

d. AC Line Monitoring

i. AC Line Brownout Recognition

The Signal Monitor shall be able to detect that the AC Line has fallen below 98 ±2 Vac for greater than 400 ±50 ms. This shall force the output Relay to the de-energized "fault" state, enable the Stop-Time output, and cause the AC POWER LED to flash at a 2 Hz rate. The unit shall maintain this state until the AC Line voltage rises above 103 ±2 Vac for greater than 400 ±50 ms. A jumper option shall be provided which will change the AC Brownout dropout level to 92 ±2 Vac and the restore level to 98 ±2 Vac.

ii. AC Line Power-up and Brownout Delay Time

When the AC Line is greater than 103 ±2 volts after power-up or Brownout restore, the Signal Monitor shall hold the Output Relay in the de-energized "fault" state and enable the Stop-Time output, for a period of not less than 6.0 ±0.5 seconds and not greater than 10.0 ±0.5 seconds. This flash interval shall be terminated after at least 6.0 ±0.5 seconds if the Signal Monitor has detected at least five transitions of the Watchdog input. If the Signal Monitor does not detect five transitions of the Watchdog input before 10.0 ±0.5 seconds the Signal Monitor shall go to the fault state. During this interval the AC POWER LED shall flash at a 4 Hz rate.

e. Red Fail Monitoring

The Signal Monitor shall be able to detect the absence of an active voltage on the green and yellow and red field signal inputs of a channel. Red Fail fault (RED FAIL) shall be a latching fault. The Red Fail monitoring function shall be enabled for all channels except when the Red Enable input is not active, or pin #EE is active, or Special Function #1 input is active, or Special Function #2 input is active.

i. Red Fail Recognition Time

The Signal Monitor shall trigger when an active voltage on one of the three inputs of a channel are absent for more than 1500 ms. The Signal Monitor shall not trigger when an active voltage on one of the three inputs of a channel are absent for less than 1200 ms. Channels without proper voltages sensed for more than 1200 ms and less than 1500 ms may or may not trigger the unit. An option switch (RF 2010) shall be provided which will change the fault recognition time to between 700 ms and 1000 ms.

ii. Red Interface Cable Fault

A programming option shall be provided such that operating without the Red Interface cable installed shall cause the Signal Monitor to enter the fault mode causing the Output relay contacts to close and enabling the Stop-Time output to the controller. To indicate this fault mode the Red Fail indicator shall be illuminated with all fault channel indicators Off.

Any Red Fail preemption control to the monitor shall use the Special Function inputs #1 or #2.

f. Dual Indication Monitoring

The Signal Monitor shall be able to detect the presence of active voltage on the green and yellow, green and red, or yellow and red field signal inputs of a channel. GYR Dual Indication fault (DUAL IND) shall be a latching fault. This function shall be enabled on a per channel basis using dip switches mounted on the PCB labeled "CH1" through "CH16". The GYR Dual Indication monitoring function shall be enabled for all selected channels except when the Red Enable input is not active or pin #EE is active.

i. GY Dual Indication Monitoring

The Signal Monitor shall be able to detect the presence of active voltage on the green and yellow field signal inputs of a channel. GY Dual Indication fault (DUAL IND) shall be a latching fault. This function shall be enabled with a dip switch on the PCB labeled "GY ENABLE". When the switch is in the ON position, all channels shall be monitored for simultaneous active green and yellow inputs on a channel. When selected by the GY ENABLE switch, the GY Dual Indication monitoring function shall be disabled when pin #EE is active.

ii. Dual Indication Recognition Time

The Signal Monitor shall trigger when multiple inputs are active on a channel for more than 500 ms. The Signal Monitor shall not trigger when multiple inputs are active on a channel for less than 250 ms. Channels with multiple voltages active for more than 250 ms and less than 500 ms may or may not trigger the unit.

g. Sequence (Short or Absent Yellow) Monitoring

The Signal Monitor shall be able to detect that a channel has not provided an adequate Yellow Clearance interval during a green to yellow to red sequence. A Sequence failure (SEQUENCE) shall be a latching fault. This function shall be enabled on a per channel basis using dip switches mounted on the PCB labeled "CH1" through "CH16". The Sequence monitoring function shall be enabled for all selected channels except when the Red Enable input is not active or pin #EE is active.

i. Sequence Recognition Time

The minimum Yellow Clearance interval may be modified by switches mounted on the PCB labeled "YEL TIME 1", "YEL TIME 2", and "YEL TIME 3". The Yellow Clearance interval shall be 2.7 seconds plus 0.2 seconds times the binary sum of the three switches. The minimum Yellow Clearance interval shall therefore have a range of 2.7 seconds to 4.1 seconds, $\pm$ 0.1 seconds.

h. Recurrent Pulse Detection (RP Detect)

The Signal Monitor shall detect Conflict, Red Fail, and Dual Indication faults that result from intermittent or flickering field signal inputs. These recurring pulses shall result in a latching fault with the RP DETECT indicator illuminated along with the resulting Conflict, Red Fail, or Dual Indication indicator. An option switch shall be provided to disable the RP detect function.

i. Configuration Change Monitoring

On power-up, reset, and periodically during operation, the Signal Monitor shall compare the current configuration settings with the previously stored value. If the settings have changed, the Signal Monitor shall automatically log the new setting. These settings shall include the permissive diode matrix, all switches, all jumpers, and the Watchdog Enable switch.

A programming option shall be provided such that any change in the configuration parameters shall cause the Signal Monitor to enter the fault mode causing the Output relay contacts to close and enabling the Stop-Time output to

the controller. To indicate this fault mode the PCA indicator shall flash at a 4 Hz rate. Depressing the Reset button for 5 full seconds shall be required to clear this fault and log the new configuration parameters.

If the programming option is not selected, the unit shall not set the fault mode but will still log the configuration change.

j. Program Card Ajar

When the Programming Card is removed or not seated properly, the Signal Monitor shall force the Output Relay to the de-energized "fault" state, enable the Stop-Time output, and illuminate the PCA LED. A reset command from the front panel Reset switch or External Reset input shall be required once the Program Card is in place.

k. Exit Flash

When the Signal Monitor exits the flash state (Output relay de-energized) as a result of a Reset command or AC Line brownout restore, the Stop Time output shall go to the inactive state 250 $\pm$ 50 ms before the Output relay transfers to the energized state. This transition will provide an early indication to the Controller Unit that the cabinet will transfer from flash to signal operation.

3. Display Functions

It shall be possible to view the active channels for each individual color (GYR) during operation and when latched in a fault state. When the Signal Monitor is latched in a fault state it shall also be possible to view the active channels for each individual color and fault status for each channel for the current fault and the two previous faults.

a. Previous Fault GYR Display

When the Signal Monitor has been triggered by a fault the channel status display will alternate between the channels which were involved in the fault (fault status) for 2 seconds, and the field signals active at the time of the fault for 6 seconds. The channels involved in the fault will flash their respective Green, Yellow, and Red indicators simultaneously at a 4 Hz rate for the 2 second interval.

The two previous faults may also be displayed individually. This status is not reset by an AC Line power interruption. To enter this display mode remove the Program Card. The sequence is as follows:

Reset	**Event**	**PCA LED**	**Fault Status LEDs**	**Channel Status LEDs**
---	#1	Single	Flash Current Fault Status (newest)	Current Field Status

#1	#2	Double Flash	Event #2 Fault Status	Event #2 Field Status
#2	#3	Triple Flash	Event #3 Fault Status (oldest)	Event #3 Field Status (repeats back to top)

4. Event Logging Functions

The Signal Monitor shall be capable of storing in non-volatile memory a minimum of 100 events. Each event shall be marked with the time and date of the event. These events shall consist of fault events, AC Line events, reset events, and configuration change events. A graphical means of displaying the signal states of all field inputs for 30 seconds prior to a fault trigger event shall also be provided. The capability to assign a four digit identification number to the unit shall be provided. The event logs shall be uploaded to a PC using the serial port of the Signal Monitor and software provided **at no cost** by the manufacturer.

Each event log report shall contain the following information:

- Monitor ID#: a four digit (0000-9999) ID number assigned to the monitor.
- Time and Date: time and date of occurrence.
- Event Number: identifies the record number in the log. Event #1 is the most recent event.

a. Monitor Status Report (CS)

The Current Status report shall contain the following information:

i. Fault Type: the fault type description.
ii. Field Status: the current GYR field status and field RMS voltages if the monitor is not in the fault state, or the latched field status and field RMS voltages and fault channel status at the time of the fault.
iii. Cabinet Temperature: the current temperature if the monitor is not in the fault state, or the latched temperature at the time of the fault.
iv. AC Line Voltage: the current AC Line voltage if the monitor is not in the fault state, or the AC Line voltage at the time of the fault.
v. Control Input Status: the current state and RMS voltages of the Red Enable input, EE input, and Special Function #1 and #2 inputs if the monitor is not in the fault state, or the status latched at the time of the fault.

b. Previous Fault Log (PF)

The Previous Fault log shall contain the following information:

i. Fault Type: the fault type description.
ii. Field Status: the latched field status with RMS voltages, and fault channel status at the time of the fault.

iii. Cabinet Temperature: the latched temperature at the time of the fault.
iv. AC Line Voltage: the AC Line voltage at the time of the fault.
v. Control Input Status: the latched state of the Red Enable input, EE input, and Special Function #1 and #2 inputs at the time of the fault.

c. AC Line Event Log (AC)

The AC Line log shall contain the following information:

i. Event Type: describes the type of AC Line event that occurred.

ii. Power-up - AC on, monitor performed a cold start

1. Interrupt - AC Line < Brownout level
2. Restore - AC restored from brown-out or interruption (AC Off), no cold start

iii. AC Line Voltage: the AC Line voltage at the time of the event.

d. Monitor Reset Log (MR)

The Monitor Reset log shall contain the following information:

i. The monitor was reset from a fault by the front panel Reset button or External Reset input.

e. Configuration Change Log (CF)

The Configuration Change log shall contain the following information:

i. Program Card Matrix: the permissive programming for each channel.
ii. Yellow Disable Jumpers: the Yellow Disable programming for each channel.
iii. Dual/Sequence Switches: the switch programming for each channel.
iv. Option Switches: RF 2010, RP Disable, GY Enable, SF1 Polarity, Sequence Timing, Minimum Flash Enable, Configuration Fault Enable, Red Cable Fault enable, AC Brownout timing.
v. Watchdog Programming: Watchdog Enable, Watchdog Latch, and Watchdog timing.
vi. Configuration CRC: A unique CRC value which is based on the configuration of items #a though #e above.
vii. The log shall also indicate which items have been changed since the last log entry.

f. Signal Sequence Log

A log shall be provided that graphically displays all field signal states for up to 30 seconds prior to the current fault trigger event. The resolution of the display shall be at least 50 milliseconds.

5. Communications Functions

a. Controller Unit Communications

The Signal Monitor shall be compatible with the Command/Response protocol of BI Tran Systems Inc. Model 233 Software. The unit shall support command types 02 and 07.

b. Personal Computer Communications

The manufacturer shall provide software to access the Signal Monitor status and event logs described in Section 4. This software shall operate with Microsoft Windows9x™ or WindowsNT™.

6. Hardware

a. Red Monitoring

i. Red Field Inputs

The Signal Monitor shall be capable of monitoring sixteen Red field signals. A Red input shall be sensed active when the input voltage exceeds 70 Vrms. A Red input shall be sensed not active when the input voltage is less than 50 Vrms. A Red input may or may not be sensed active when the input voltage is between 50 Vrms and 70 Vrms.

ii. Red Enable Input

The Red Enable input shall provide an AC input to the unit which shall enable Red Monitoring, Dual Indication Monitoring, and Sequence monitoring when the input is sensed active.

The Red Enable input shall be sensed active when the input voltage exceeds 70 Vrms. The Red Enable input shall be sensed not active when the input voltage is less than 50 Vrms. The Red Enable input may or may not be sensed active when the input voltage is between 50 Vrms and 70 Vrms.

iii. Special Function Preemption Inputs

The Special Function Preemption inputs #1 and #2 shall provide an AC input to the unit which shall disable only Red Fail Monitoring (Lack of Output) when either input is sensed active.

A Special Function input shall be sensed active when the input voltage exceeds 70 Vrms. A Special Function input shall be sensed not active when the input voltage is less than 50 Vrms. A Special Function input may or may not be sensed active when the input voltage is between 50 Vrms and 70 Vrms.

A PCB mounted switch shall provide the option to invert the active status of the Special Function #1 input. When the switch is in the ON position, the Special Function #1 input shall be sensed not active when the input voltage exceeds 70 Vrms. The Special Function #1 input shall be sensed active when the input voltage is less than 50 Vrms. The Special Function #1 input may or may not be sensed active when the input voltage is between 50 Vrms and 70 Vrms.

iv. Red Interface Connector

This connector provides the required inputs for the unit to monitor the Red field signal outputs. It shall be a 3M #3428-5302 type or equivalent and be polarized to insure proper mating with the cable. Ejector latches shall be included to facilitate removal and prevent the cable from inadvertently disconnecting. The unit shall function as a standard 210 Signal Monitor when the cable is disconnected. The pin assignments shall be as shown in Table 1.

PIN	FUNCTION	PIN	FUNCTION
1	CHANNEL 15 RED	11	CHANNEL 9 RED
2	CHANNEL 16 RED	12	CHANNEL 8 RED
3	CHANNEL 14 RED	13	CHANNEL 7 RED
4	CHASSIS GROUND*	14	CHANNEL 6 RED
5	CHANNEL 13 RED	15	CHANNEL 5 RED
6	SPECIAL FUNCTION #2	16	CHANNEL 4 RED
7	CHANNEL 12 RED	17	CHANNEL 3 RED
8	SPECIAL FUNCTION #1	18	CHANNEL 2 RED
9	CHANNEL 10 RED	19	CHANNEL 1 RED
10	CHANNEL 11 RED	20	RED ENABLE

*A jumper option shall be provided to allow the connection of Pin #4 to be made with Chassis Ground.

b. Front Panel

The front panel shall be constructed of sheet aluminum with a minimum thickness of 0.090", and shall be finished with an anodized coating. The model information shall be permanently displayed on the front surface.

i. Indicators

All display indicators shall be mounted on the front panel of the Signal Monitor and shall be water clear, T-1 package, Super Bright type LEDs. All fault LEDs shall be red except the AC POWER indicator which shall be green. A separate Red, Yellow, and Green indicator shall be provided for each channel. The indicators shall be labeled and provide the information as follows:

a) AC POWER: The AC POWER indicator shall flash at a rate of 2 Hz when the unit has detected a low voltage condition as described in Section 2.4. The AC POWER indicator shall flash at a rate of 4 Hz during the minimum flash interval as described in Section 2.4.2. It shall illuminate when the AC Line voltage level is restored above the brownout level. The indicator shall extinguish when the AC Line voltage is less than 80 Vac.

b) VDC FAILED: The VDC FAILED indicator shall illuminate when a 24VDC fault condition is detected. This indicator remains extinguished if the monitor has not been triggered by a 24VDC fault.

c) WDT ERROR: The WDT ERROR indicator shall illuminate when a controller Watchdog fault is detected. If the WD ENABLE switch on the monitor is placed in the OFF position to disable Watchdog monitoring, or the AC Line voltage is below the Watchdog disable level, the WDT ERROR indicator shall flash ON once every 2 seconds.

d) CONFLICT: The CONFLICT indicator shall illuminate when a conflicting proceed signal fault is detected.

e) DIAGNOSTIC: The DIAGNOSTIC indicator shall illuminate when one of the following faults are detected: Internal Watchdog fault, Memory Test fault, or Internal power supply fault. This indicator is intended to inform the service technician of a monitor hardware or firmware failure.

f) RED FAIL: The RED FAIL indicator shall illuminate when an absence of signal is detected on a channel(s). If the Red Enable input is not active, or a Special Function input is active, or the EE input is

active the RED FAIL indicator shall flash ON once every two seconds.

g) DUAL IND: The DUAL IND indicator shall illuminate when a GY-Dual or GYR-Dual Indication fault is detected on a channel(s).

h) SEQUENCE: The SEQUENCE indicator shall illuminate when the minimum Yellow Clearance time has not been met on a channel(s).

i) PCA: The PCA indicator shall illuminate if the Program Card is absent or not properly seated.

If the unit is in the Diagnostic Display mode, the PCA indicator shall flash ON (once, twice, or three times) to indicate the fault event number being displayed. See Section 3.

j) RP DETECT: The RP DETECT indicator shall illuminate when the unit has detected a Conflict, Red Fail, or Dual Indication fault as a result of recurring pulse field inputs.

k) CHANNEL STATUS: During normal operation the 48 Channel Status indicators shall display all active signals (Red, Green, and Yellow).

In the fault mode the Channel Status indicators shall display all signals active at the time of the fault for six seconds and then indicate the channels involved in the fault for 2 seconds.

ii. Front Panel Control

RESET Button: A momentary SPST Control switch labeled RESET shall be provided on the unit front panel to reset the monitor circuitry to a non-failed state. The switch shall be positioned on the front panel such that the switch can be operated while gripping the front panel handle. A reset command issued from either the front panel button or External Reset input shall be a one-time reset input to prevent the unit from constant reset due to a switch failure or constant external input, and shall cause all LED indicators to illuminate for 300 ms.

The Reset button also provides control of the Diagnostic Display mode. For a complete description of Diagnostic Display operation see Section 3.

iii. Serial Communications Connector

This connector shall be used to provide EIA-232 serial communications. It shall be an AMP 9721A or equivalent 9 pin metal shell D subminiature type with female contacts. Pin assignments shall be as shown in Table 2.

PIN	FUNCTION
1	DCD*
2	TX DATA
3	RX DATA
4	DTR (Data Terminal Ready)
5	SIGNAL GROUND
6	DSR
7	DSR*
8	CTS*
9	NC

*Jumper options shall be provided to allow the connection of Pin #4 to be made with Pin #7, and the connection of Pin #8 to be made with Pin #1.

c. Electronics

i. RMS Voltage Sampling

High speed sampling techniques shall be used to determine the true RMS value of the AC field inputs. Each AC input shall be sampled at least 32 times per cycle. The RMS voltage measurement shall be insensitive to phase, frequency, and waveform distortion.

ii. Internal MPU Watchdog

A microprocessor shall be used for all timing and control functions. Continuing operation of the microprocessor shall be verified by an independent monitor circuit, which shall force the Output Relay to the de-energized "fault" state, enable the Stop-Time output, and illuminate the DIAGNOSTIC indicator if a pulse is not received from the microprocessor within 300 ms.

If the microprocessor should resume operation, the Signal Monitor shall continue to operate. This monitoring circuit shall also be configurable to latch in the fault state. Once triggered, the unit shall require a power-up cycle to reset the circuit.

iii. Sockets

In the interest of reliability, only the PROM memory device for the microprocessor firmware shall be socket mounted. The PROM memory socket shall be a precision screw machine type socket with a gold contact finish providing a reliable gas tight seal. Low insertion force sockets or sockets with "wiper" type contacts shall not be acceptable.

iv. Internal Power Supply

A built-in, high-efficiency switching power supply shall generate all required internal voltages. All supply voltages shall be regulated. Failure of the internal power supply to provide proper operating voltages shall force the output Relay to the de-energized "fault" state, enable the Stop-Time output, and illuminate the DIAGNOSTIC indicator. A user replaceable slow blow fuse shall be provided for the AC Line input. The unit shall be operational over the AC Line voltage range of 75 Vac to 135 Vac.

v. EIA-232 Interface

The EIA-232 port interface electronics shall be electrically isolated from all monitor electronics except chassis ground.

vi. Configuration Parameters

User-programmed configuration settings shall be selected using PCB mounted switches or jumpers. Designs requiring a Personal Computer (PC) to program or verify the configuration parameters are not acceptable. User-programmed configuration settings which are transferred to memory shall be stored in a programmable read-only memory (PROM or EPROM). Designs using a battery to maintain configuration data shall not be acceptable.

vii. Field Terminal Inputs

All 120 Vac field terminal inputs shall provide an input impedance of 150K $\pm$50K ohms and be terminated with a discrete resistor having a power dissipation rating of 0.5 Watts or greater and a voltage rating exceeding 350 volts.

viii. Component Specifications

All electrical components used in the Signal Monitor shall be rated by the component manufacturer to operate beyond the full unit operating temperature range of -34°C to +74°C.

ix. Printed Circuit Boards

All printed circuit boards shall meet the requirements of the latest California Traffic Signal Control Equipment Specifications plus the following requirements to enhance reliability:

1) All plated-through holes and exposed circuit traces shall be plated with solder.
2) Both sides of the printed circuit board shall be covered with a solder mask material.
3) The circuit reference designation for all components and the polarity of all capacitors and diodes shall be clearly marked adjacent to the component. Pin #1 for all integrated circuit packages shall be designated on both sides of all printed circuit boards.
4) All electrical mating surfaces shall be gold plated.
5) All printed circuit board assemblies shall be coated on both sides with a clear moisture-proof and fungus-proof sealant.
6) All components and wire harnesses shall be mounted to the PCB using plated holes. "Piggy back" connections or jumper wires shall not be acceptable.

G. Loop Detector

Inductive loop detectors shall conform to Section 765. Pre-formed loop detectors shall conform to Section 895.

H. Internal 170 Ethernet Module

The Internal 170 Ethernet Module shall conform to Section 735.

I. The Fiber Optic Media Converters

The Fiber Optic Media Converters shall conform to Section 830.

J. Layer 2 Ethernet Switch

The Layer 2 Ethernet Switch shall conform to Section 835.

703.03 - Documentation

The City shall be provided with the following:

- Cabinet drawing *

- Job specifications (City of Norfolk Section 703) pertinent to the installation
- Intersection drawing *
- Phasing diagram *
- Loop detector locations *
- Typical Wiring Diagram (input and output files) *
- Cabinet test results
- Conflict Monitor test results
- Controller test results
- All equipment manuals for equipment listed in 703.02.B. Enclosed Equipment

* Provide AUTOCAD 2000 drawings file on electronic media

703.04 - Statement of Warranty and Compliance

In these specifications, whenever a specific design or construction has been specified, it is intended to establish a standard of performance, and any design or construction giving strictly equivalent performance may be considered, provided that the vendor brings such exceptions to the attention of the Traffic Engineer in writing, at the time of bid submittal.

Each vendor shall include in his proposal all warrants and/or guarantees with respect to materials, parts, workmanship, or performance which are included for equipment covered by this specification.

The vendor shall ship only complete controller/cabinet assemblies with complete documentation included. Substandard controller/cabinet assemblies will not be accepted and will be returned to the vendor after the Contractor has notified the vendor both by telephone and by letter. Within seven (7) days after the vendor first receives notice of rejection of a shipment, the vendor shall remove the shipment, the Contractor will forward the shipment to the vendor by common carrier at the vendor's expense and risk.

703.05 - Warranty

Prior to installation and intersection cut-on, the equipment will be fully tested using industry standard testing and diagnostic software. The contractor shall coordinate with the Division of Transportation project representative to schedule the testing. Any equipment that fails these tests will not be approved for installation by the contractor. The following equipment shall be subject to testing:

- Controller
- Cabinet Assembly
- Conflict Monitor
- Load Relays
- Vehicle Detectors
- PROM Module

Each cabinet and controller component shall have a 90-day field burn-in period after the approved testing has been completed. Any controller or controller component failing to meet the specifications or which has repeated malfunctions within 90 days of installation shall be subject to replacement of the defective unit or complete controller at no cost to the City (or to refund of the purchase price of the controller, at the discretion of the City). The full one-year warranty shall be applicable on all replacement controllers and modules. Continued failure and repeated malfunctions of any controller mode shall be cause to remove that model from the list of acceptable models for future purchasing.

703.06 - Installation

1. The controller assembly shall be securely bolted to a prepared foundation of specified size (See Details of Cabinet foundation). The bolt pattern shall match the bolt pattern of the cabinet.

2. The front door of the controller cabinet shall open in the direction which will permit maintenance personnel to view the intersection.

3. The complete assembly shall be effectively weatherproof.

4. Each assembly shall be effectively grounded using a #8 copper wire attached to the cabinet by a stainless steel bolt and to the ground rod by a square head clamp.

5. The red monitor harness must be connected to the conflict monitor and to the P20 connector. P20 circuit board jumpers must be set according to intersection configuration.

6. Grouting around the base foundation shall be with "no-shrink" grout.

7. Installation procedure in all cases shall be those as recommended by National Electrical Code.

8. The contractor shall furnish an as built wiring mark-up of the Input and Output Files.

703.07 – Measurement and Payment

Traffic Controller Assembly:

Method of Measurement: Traffic Controller Assembly will be measured in units of Each (EA).

Basis of Payment: the unit price per Traffic Controller Assembly shall be based on the following work tasks.

Furnish and Install: The unit price to furnish and install a Traffic Controller Assembly (Type 170, cabinet type, finish type) shall include the traffic controller, cabinet, base

adapter, PROM module, internal 170 Ethernet card, fiber optic media converter, Layer 2 Ethernet Switch, Model 2010ECLip Enhanced Conflict Monitor, loop detectors, splice tray, harnesses as required, switch packs, DC isolators, AC isolators, flash transfer relays, power supply, power distributor, flasher as specified herein Section 703 of these specifications, tools, equipment, labor, incidental fittings necessary to mount the controller cabinet, and training of personnel (if applicable) will be considered full compensation of this work task. Any landscaping materials, including plants, shrubs, or other vegetation, damaged during the installation of the proposed traffic controller assembly that is not otherwise called for removal in the Plans shall be replaced in kind at the expense of the Contractor. Contractor to coordinate with the Department of Parks and Forestry to determine proper planting application and refer to City of Norfolk Specifications Section 329300 for landscaping requirements and procedures.

++ END OF SECTION ++

SECTION 704 – PAVEMENT MARKINGS AND MARKERS

VDOT Road and Bridge Specifications, 2007 Edition, shall be followed unless otherwise amended or supplemented with the specifications contained herein. Where conflicts occur, the specifications contained herein shall prevail.

704.04 – Measurement and Payment of the Specifications is amended by the following:

> **Ty.B Cl.I Pave Mark. Yield Bar:** Ty.B Cl.I Pave Mark. Yield Bar will be measured in units of LINEAR FEET (LF). Yield bar markings shall be triangular in shape, oriented with the top point of the triangular marking opposite the direction of travel and the base perpendicular to the adjacent face of curb. Marking dimensions shall be 2 feet across the base of the marking, 3 feet in height, with a 1 foot space between adjacent markings. Measurement of pavement markings will be taken from the leftmost edge of the first marking to the rightmost edge of the last marking. This price shall include the pavement marking material, surface preparation, quality control tests, daily log, guarding devices, primer/adhesive, eradication of existing pavement markings and glass beads.

++ END OF SECTION ++

SECTION 706 - TRAFFIC SIGNAL HEAD ASSEMBLY

706.01 – Description

The work under this section shall consist only of furnishing and installing Traffic Control Signal Heads of the number and type of sections indicated on the Contract Drawings at the locations shown on the contract drawings, or as directed by the Engineer in conformance with these specifications. The work specified in this Section shall override all traffic signal head assembly references in the 2007 VDOT Road and Bridge Specifications Section 703 – Traffic Signals.

706.02 - Signal Head

A. Signal heads shall be dust-tight and meet the requirements of current ITE specification "A Standard for Vehicular Traffic Control Signal Heads".

B. Housing: The housing of each section shall be a one-piece corrosion resistant aluminum alloy diecasting. The housing shall have a symmetrical concept which will allow either right or left handed door opening. All hardware shall be stainless steel.

C. Door: Shall be die-cast of silicon aluminum with an opening of sufficient diameter to accommodate the lens. One side of the door at the top and bottom there shall be a hinge so as to ensure perfect alignment of the door. On the opposite side of the door there shall be a locking device to secure even gasket pressure. Hinge pins and locking device shall be stainless steel.

D. Visors: Shall be detachable and shall be of the cut-away type.

E. Lamps/Lens: Shall be in accordance with Section 709.

F. Terminals: Each signal head shall be provided with a terminal block having sufficient screw type terminals to terminate all field conductors and lamp conductors independently with separate screws.

G. Painting: The color of all exterior surfaces of each signal head shall be painted Federal Black in color.

706.03 - Mounting Requirements

A. The standard traffic signal head assembly shall be mounted in accordance with the following type of mounting installation as called for on the plans.

B. Mast Arm Installation: Signal heads installed on mast arms shall utilize Astro-Bracket AB-l02 and AB-l09 mounting kits or approved equal. (See VDOT Standard SM-3).

C. Signal head housing shall be jointed at top and bottom by brackets made of aluminum pipe not smaller than l l/2 inches in diameter with suitable sockets at each end to form complete signals of the specified number of sections. Unused ends of the sockets shall be closed with ornamental cap screws. Each signal body shall be jointed to the socket by a ripple through the end plate. Joints shall be rendered weatherproof and dust-tight by a suitable combination of lead and steel washers.

D. Side Mount Installation (VDOT Standard SM-3 or SMB-3): The brackets shall be drilled and tapped with stainless steel nuts and bolts or painted to match the pole color. Signals shall be installed on the back side of the pole.

706.04 - Installation

This section specifies the requirements for the installation of traffic signal head assemblies.

A. The various components that describe a traffic signal head assembly shall be completely pre-assembled with the appropriate number of sections, faces, and lamps prior to installation of the site unless otherwise directed by the Engineer.

B. The locations of the installed signals as shown on the plans are to be considered as sufficiently flexible as to allow for unanticipated field conditions at the site. There shall not be less than eight (8) feet between lines drawn perpendicular to any two (2) adjacent signal faces providing indications to the same approach. Where a signal face controls a specific lane or lanes or approach, its transverse position and alignment shall be unmistakably in line with the path of that movement.

C. Vehicular signals shall be pointed in the direction of the approaching traffic they are to control and the center of the light beam shall be directed toward a point approximately l50 feet in advance of the stop line and in the center of the usually traveled traffic approach.

D. Unless directed otherwise by the Engineer for unusual circumstances at the site, traffic signals placed over the roadway shall be so installed as to provide a vertical clearance of not less than l7 feet and not more than l9 feet. Such clearance shall be measured for each span directly under the most critical signal assembly for that span. Signal assemblies on each span shall be placed as near as practical at the same elevation as the critical signal assembly.

The lowest point on pedestal-mounted and side-mounted signal heads shall be l2 feet above finished grade at the point of their installation.

E. Where the installation of the traffic signal head is not done as a last operation in the installation of the overall signal improvements, they shall be concealed by approved coverings. The signals shall be put into operation within 30 days after hanging the signals.

F. All mounting assembly members shall be either plumb or level symmetrically arranged and securely assembled. Construction shall be such as to permit all conductors to be concealed.

The mounting assemblies shall be watertight and free to sharp edges or protrusions which might damage conductor insulation, and conform to Section 706.04 of this specification for the specified mounting type.

G. Wiring - It shall be the contractor's responsibility to connect the proper signal cable that meets the requirements of VDOT Specification Section 238, to the terminals in each signal head in order to provide the proper signal indication display when the cables are connected to the controller. A separate ground circuit shall be wired and returned to the controller cabinet from each vehicular movement as shown on the plans.

H. Weep holes – a minimum of three 1/8" holes shall be drilled in the bottom of each traffic signal assembly.

706.07 – Measurement and Payment

Traffic Signal Head Assembly

A. Method of Measurement: Traffic signal assembly will be measured in units of EACH (EA) per type.

B. Basis of Payment: the contract unit price per signal assembly shall be based on the following work tasks:

1) Furnish and Install: The unit price to furnish and install a standard traffic signal head assembly shall consist of a traffic signal head that conforms to 706.02, Item (a) of this specification, hardware as required in Section 706.03, tools, equipment, labor and incidentals necessary for a complete and accepted installation in accordance with Section 706 of this specification. Mounting brackets and LED Traffic Signal Lamps, outlined in Section 709 of this specification, will not be paid for separately. Payment shall include all necessary coordination with the Engineer for proper alignment and orientation of signal heads. Should the signal heads be installed without prior coordination with the Engineer, the Contractor shall be required to make any required adjustments as directed by the Engineer at no additional cost.

Mounting Brackets

A. Method of Measurement: Mounting brackets will be considered incidental to the cost of the traffic signal head assembly and will not be measured or paid for separately.

++ END OF SECTION ++

SECTION 707 - PEDESTRIAN SIGNAL ASSEMBLY

707.01 - Description

The work under this section shall consist of furnishing, installing Pedestrian Signal Heads of the type specified including all necessary fittings and mounting hardware at the locations and in accordance with the details shown on the Contract Drawings or as ordered by the Engineer.

All pedestrian heads shall be furnished by the Contractor

707.02 - Equipment

A. **Pedestrian Signal Heads**: All pedestrian signal heads shall be type SP-8 18” x 16” LED aluminum pedestrian signals.

Pedestrian signal heads shall meet the requirements of the current ITE specification.

The signal shall clearly display the International Symbol messages "Don't Walk" in Portland Orange and "Walk" in Lunar White. Symbols must be “filled-in” LED, not outlined.

All exposed fittings, screws and fasteners shall be stainless steel. All interior screws, fasteners and metal parts shall be stainless steel or non-corrodible metal.

Finish: Shall be painted Federal Black in color.

707.03 - Installation

Pedestrian Signals shall be installed in accordance with the Section 707 of these specifications in an acceptable and workmanlike manner conforming to the details shown in the Contract Drawings, these Specifications, or as ordered by the Engineer.

707.04 – Mounting Requirements

Pedestrian Signals shall be mounted with the bottom of the lower signal unit not less than 8 feet or more than l0 feet above the sidewalk level and shall be placed in the line of vision of pedestrians using the crosswalk to which the signals apply.

The "DON'T WALK" indication shall be directly to the left of the "WALK" indication. Pedestrian signal indications may be mounted separately or on the same support with vehicular signal indications. When mounted with vehicular signal indications, there shall be a physical separation between the two signal groupings, with pedestrian indications below the vehicular indication.

The Solar Screen visor is inserted through the back side of the door. The visor overlaps the door by 1/2 inch and is sealed when the door is closed to prevent light from escaping between the visor and the door.

Whenever a traffic signal is placed on flashing operation, all pedestrian signal indications associated therewith shall be extinguished automatically.

The final mounting of the signal shall be such as to maintain a 24-inch clearance between the face of the visor and the face of the curb.

Side mount installations shall be in accordance with Section 706.03. All hardware is to be painted Federal Black in color.

Each pedestrian signal face shall be aimed to provide maximum visibility at the beginning of the controlled crossing.

During construction and until the installation is placed in operation, all pedestrian signal faces shall be hooded. The hooding material shall be securely fastened so it will not be disturbed by normal inclement weather.

707.05 – Measurement and Payment

Method of Measurement - Pedestrian signal assembly will be measured in units of each SP-8 type assembly that conforms to Section 707 of this specification.

Basis of Payment - The contract unit price per assembly shall be based on the following work tasks.

A. **Furnish and Install**: The unit price to furnish and install a standard pedestrian signal assembly shall consist of a pedestrian traffic signal head that conforms to Section 707 of this specification and shall include all hardware as required in Section 706, tools, equipment, labor and incidentals necessary for a complete and accepted installation in accordance with Section 707 of this specification.

++ END OF SECTION ++

SECTION 709 - LIGHT EMITTING DIODE (LED) TRAFFIC SIGNAL LAMP

709.01 – Description

Each vehicle signal face indication shall utilize an Incandescent Look light-emitting diode (LED) unit in accordance with the latest issue of the ITE Standard. The normal failure of one LED shall not deactivate any other LED. The electronic circuitry shall maintain proper operation with the existing load switches and conflict monitor in the control cabinet.

709.02 – Equipment

A. LED Design shall be in accordance with the following:

1. No more than 2% of total light output shall be lost if one LED fails.
2. The drive current for each individual LED shall not exceed 25mADC.
3. The signal display shall have a wavelength between 500nm to 650nm.
4. The signal intensity shall be in the range of 400 to 500 candelas with a narrow distribution. The horizontal viewing angle shall be between 7° and 30°.

B. Electrical Design shall be in accordance with the following:

1. Operating Voltage shall be between 80 to 135 Volts AC. New signal output at the operating temperature shall not fall below 80% intensity requirements over the operating voltage range.
2. Do not use any fused field wiring.
3. Operating Temperature shall be between -40°C to $+75^{o}$C ambient temperature. The new signal output at nominal voltage conditions shall not fall below 80% of intensity requirements over the operating temperature range.
4. Power consumption shall be 20 watts $\pm$2 watts.

709.03 - Warranty

The signal output at nominal operating voltage and temperature conditions shall not fall below 75% of intensity requirements before 5 years of field operation (date of installation).

709.04 - Installation

The signal should be installed, directed and veiled in accordance with published instructions and the engineer's visibility requirement. Each section of the signal should be masked with prescribed materials in an acceptable and workmanlike manner.

Installation shall be made rigid and conform to the installation requirements of Section 709.

709.05 – Measurement and Payment

Method of Measurement - The LED Traffic Signal Lamp will not be measured or paid for separately and shall be considered incidental to the cost of the traffic signal head assembly as called for in the plans and in Section 706 of this specification.

++ END OF SECTION ++

SECTION 710 - ADA PEDESTRIAN PUSHBUTTON ASSEMBLY

710.01 - Description

The work under this section shall consist of furnishing and installing American with Disabilities Act (ADA) approved pedestrian pushbutton assemblies and signs at the locations shown on the contract drawings or as ordered by the Engineer and in conformance with these specifications.

710.02 – Equipment

A. Advisory Sign: Shall be a 9” X l2” MUTCD Rl0-3b or 9” X 15” MUTCD R10-3e sign message, "Pushbutton for Walk Signal" with the appropriate directional arrow when required as directed.

B. Pushbutton:

1. Shall have a Latching LED indicator that illuminates when the pushbutton is activated and remains illuminated until the start of the walk cycle.
2. Shall be weatherproof and so constructed that any electrical shock under any weather conditions will not be transmitted.
3. Shall be vandal resistant with no moving parts.
4. Installations within the housing shall be so designated that they can be removed as units from the housing for the purpose of inspection and maintenance.
5. Push-button activation elements shall be entirely insulated from the housing and operating buttons.
6. Shall be pressure activated by means of a Piezo driven solid state switch.
7. Shall be capable of withstanding an impact from either a wood/metal rod and/or a hammer.
8. Shall provide an audible beep when the button is pressed and a distinctly different audible beep when the button is released.
9. Shall conform to the following construction and composition specifications:

   a. Body Material
      - Aluminum Powder Coated
      - Available Color options – Yellow, Green, Black, as identified in the design plans
      - Configurable for installation with PELCO’s SE-2000, SE-2039, SE-0267 bodies, or with pole mount identified below
      - Available with an optional second face that indicates (arrow) the direction of the walk phase

   b. Button Material
      - Standard - 316 Stainless Steel

- Arrow Button – anodized 6061 aluminum, nickel plated black powder coated on area surrounding arrow

c. LED
- Operating Mode – Latching, where the LED activates only during non-walk phases and stays on until the beginning of the walk phase
- Luminous Intensity – 0.3 Lux at 1 meter minimum. (Red)
- Viewing Angle – 155°

d. Piezo Driven Solid State Switch
- Operating Force – two (2) lbs Maximum
- Operating Temperature – -30°F to 165°F
- Operating Voltage – 18 VDC Nominal
- Operating Life – Greater than 300,000,000 operations
- Switch Hold Time – 11 seconds Minimum

e. Latching Pushbutton Control Unit
- Supports up to four (4) separate pedestrian phases
- Each pedestrian phase can accept up to five (5) pushbuttons
- When a button on a phase is activated the control unit illuminates (latches on) the LED on all pushbuttons assigned to that phase
- Accepts input from pedestrian pushbuttons that operate on 18VDC
- Monitors the pushbuttons and walk cycles
- Designed to be installed only in the traffic controller cabinet
- Operates under 115 VAC power

f. Beeper
- Sounds simultaneously with the LED illumination
- Different tones for press and release

C. Pole Mount Body

Body Material
- Aluminum Powder Coated
- Available Color options – Yellow, Green, Black, as identified in the design plans
- Stainless steel nuts inserted into pole mount body to accept Pedestrian Pushbutton mounting screws

The back of the housing shall be flat type to provide a rigid installation. Cable entry shall be through the back so that all wiring may be concealed with no external conduit required, except when indicated on the contract drawings.

D. Finish**:** The assembly shall be painted to match the color of the signal pole or be Federal Black in color.

710.03 - Installation

A pushbutton advisory sign (Rl0-3b or R10-3e) shall be attached to the pushbutton assembly which shall be attached securely to the post or pole as indicated on the contract drawings. The height of the button shall not be less than 3 ½ feet and no more than 4 feet above the sidewalk or curb. The pushbutton and sign shall be installed on the pole or post on the sidewalk side, parallel to the crosswalk for which the pushbutton controls, and shall be approved prior to drilling the required holes. Pushbutton cables from the field shall be terminated to the Latching Pushbutton Control Unit installed and fully hard-wired in the location specified by DOT within the traffic control cabinet. Installation shall be in accordance with VDOT standard PA-l or 2 and as indicated on plans and details.

710.04 – Measurement and Payment

Method of Measurement - Pedestrian Pushbutton assembly will be measured in units of Each (EA) per assembly. The contract unit price per assembly shall be based on the following work tasks.

Basis of Payment - The basis of the unit contract price shall vary according to the specified work tasks:

A. **Furnish and Install**: The unit price to furnish and install a Pedestrian Pushbutton Assembly shall consist of a pushbutton that conforms to Section 710 of this specification and shall include all required signs, hardware, tools, equipment, labor and incidentals necessary for a complete and accepted installation in accordance with Section 710 of this specification.

++ END OF SECTION ++

SECTION 711 - FIBER OPTIC CABLE

711.01 – Description

This work shall consist of furnishing, installing, auditing and testing fiber optic cable in accordance with these specifications or as directed by the Engineer. It includes all materials associated with fiber optic communications installation including splice closures, terminal closures, fan-out kits and fiber connectorized pigtails.

711.02 – Materials

1. General Description

The material to be provided is single mode fiber optic (SMFO) cable constructed in loose tube form, gel-filled and suitable for underground conduit or lashed aerial installation. The cable shall contain no metallic armor and all strength members shall be provided by a non-metallic, Kevlar and/or Aramide type material. The construction of the cable shall comply with the Rural Electric Administration (REA), REA-PE-90 specification and Bellcore GR-20-CORE, titled, "Generic Requirements for Optical Fiber and Fiber Optic Cable."

The fiber shall be provided in loose tubes that protect the fiber. Both loose tubes and fiber shall be color coded in accordance with Electronic Industries Association (EIA) / Telecommunications Industries Association (TIA) 598 Standard entitled, "Color Coding of Fiber Optic Cable". These shall be six (6) single mode fibers per loose tube. The cable shall be gel-filled preventing water intrusion and migration into the cable. The cable construction shall include provisions for easy removal of the protective cable sheath for access to fibers during termination.

2. Fiber Characteristics and Performance

All fiber provided shall be of a good commercial grade and shall be produced under ISO 9000 or Bellcore equivalent quality assurance standards. All fiber cable provided under this contract shall be from the same manufacturer using identical specifications and differing only within allowable manufacturing tolerances. The fiber shall, as a minimum, comply with the following:

- Cladding Diameter: 125 ± 1.0 µm
- Core-to-Cladding Offset: ≤0.8 µm
- Cladding Non-Circularity: ≤ 1.0%
- Coating-Cladding Concentricity: < 12 µm
- Coating Diameter: 245 ± 10 µm
- Attenuation Uniformity: No point discontinuity greater than 0.1 dB at either 1310 or 1550 nm
- Attenuation per FOTP 61: 1310 nm ≤ 0.35 dB/Km, 1550 nm ≤ 0.25 dB/Km

- Microbend Attenuation (1 turn, 32 mm dia.): ≤ 0.02 dB at 1550 nm
- Microbend Attenuation (100 turns, 75 mm dia.): ≤ 0.05 dB at 1300 nm
- Cutoff Wavelength: < 1260 nm
- Mode-Field Diameter: 9.3 ± 0.5 µm at 1310 nm, 10.5 ± 1.0 µm at 1550 nm
- Zero Dispersion Wavelength (λ o): 1300.0 nm ≤ λ o ≤ 1322.0 nm (± 1 nm)
- Zero Dispersion Slope (S0): ± 0.092 ps/(nm^2 x Km)
- Maximum Dispersion: ≤ 3.2 ps/(nm x Km) from 1285 nm to 1330 nm and < 18 ps/(nm x Km) at 1550 nm
- Fiber Polarization Mode Dispersion: ≤ 0.5 ps/Km
- Fiber Coating: dual layered, UV cured acrylate applied by the fiber manufacturer
- Coating Strip Force: ≥ 1.3 N and ≤ 8.0 N
- Color: Per EIA/TIA 598A; PERMANENT
- Proof Test: 0.7 Gpa
- Fiber Curl: ≥ 2 meters

AT&T patented depressed cladding fiber is acceptable with a mode field diameter of 8.8 µm at 1310 nm. However, should the Contractor select depressed cladding fiber versus matched cladding fiber, then all fiber installed shall be depressed cladding. The Contractor shall not mix matched and depressed cladding fibers in the project.

The change in attenuation at extreme operational temperatures for single-mode fibers shall not be greater than 0.20 dB/km at 1550 nm, with 80% of the measured values no greater than 0.10 dB/km at 1550 nm. The maximum dispersion shall ± 3.3 ps/(nm x km) for 1285 nm through 1330 and shall be ≤ 18 ps/(nm x km) at 1550 nm.

All fibers in the cable shall be usable and meet required specifications. All optical fibers shall be sufficiently free of surface imperfections and inclusion to meet the optical, mechanical, and environmental requirements to this specification. Each optical fiber shall consist of a doped Silica core surrounded by a concentric silica cladding.

The coating shall be a dual layered, UV cured acrylate applied by the fiber manufacturer. The coating shall be capable of being mechanically or chemically stripped without damaging the fiber.

The fiber manufacturer shall proof-test 100% of the optical fiber to a minimum load of 0.7 Gpa (100K psi). The manufacturer shall maintain a log of all test results which shall be submitted to the Engineer with the delivery of the cable.

The cable design shall have a life expectancy of thirty (30) years when installed to manufacturer's specifications and when not damaged through accidents and mishandling during maintenance.

3. Specifications for Outdoor Cable Construction

Optical fibers shall be placed inside a loose buffer tube. All buffer tubes shall contain six (6) color coded fibers. The fibers shall not adhere to the inside of the buffer tube. Each fiber shall be distinguishable by means of color coding according to the following:

1. Blue	3. Green	5. Slate
2. Orange	4. Brown	6. White

These colors shall meet TIA/EIA 598A, "Optical Fiber Cable Color Coding".

Buffer tubes containing fibers shall be color coded with distinct and recognizable colors according to the following:

1. Blue	3. Green	5. Slate
2. Orange	4. Brown	6. White

These colors shall meet TIA/EIA 598A, "Optical Fiber Cable Color Coding".

In buffer tubes containing multiple fibers, the colors shall be stable across the specified storage of -40°C to + 70°C and operating temperature range of -30°C to +70°C and not subject to fading or smearing onto each other or into the gel-filling material. Colors shall not cause fibers to stick together. Buffer tubes shall be kink resistant within the specified minimum bend radius. Fillers may be included in the cable core to lend symmetry to the cable cross-section where needed.

The central anti-buckling member shall consist of a glass reinforced plastic rod or Kevlar or equivalent. The purpose of the central member is to prevent buckling of the cable.

Each buffer tube shall be filled with a non-hygroscopic, non-nutritive to fungus, electrically non-conductive, homogenous gel. The gel shall be free from dirt and foreign matter. The gel shall be readily removable with conventional nontoxic solvents. Buffer tubes shall be stranded around a central member using the reverse oscillation, or "S-Z", stranding process.

The cable core shall contain a water-blocking material. The water-blocking material shall be non-nutritive to fungus, electrically non-conductive and homogenous. It shall also be free from dirt and foreign matter and shall be readily removable with conventional nontoxic solvents. Binders shall be applied with sufficient tension to secure the buffer tubes to the central member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-working and dielectric with low shrinkage.

The cable shall contain at least one ripcord under the sheath for easy sheath removal. Tensile strength shall be provided by a combination of high tensile strength dielectric yarns. The high tensile strength dielectric yarns shall be helically stranded evenly around the cable core.

The cable shall be all dielectric cables (with no armoring) and shall be sheathed with medium density polyethylene (MDPE). The minimum nominal jacket thickness shall be 0.06 inch. Jacketing material shall be applied directly over the tensile strength members and water-blocking material.

The polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus.

The jacket or sheath shall be free of holes, splits, and blisters. The cable jacket shall contain no metal elements and shall be of a consistent thickness. Cable jackets shall be marked with manufacturer's name, foot markings, year of manufacture, a telecommunication handset symbol, as required by Section 350G of the National Electrical Safety Code (NESC), and the words "Traffic Signal Cable". The actual length of the cable shall be within ±1% of the length markings. The marking shall be in contrasting color to the cable jacket. The height of the marking shall be approximately 0.10 inch. Markings shall be white or yellow and shall be permanent withstanding handling, pulling of cable and maintenance of the cable.

The maximum pulling tension shall be 600 lbs during installation (short-term) and 200 lbs long-term installed.

The shipping, storage, and operating temperature range of the cable shall be -40°C to +70° C. The installation temperature range of the cable shall be -30°C to +70°C.

Cable and fiber shall meet interface requirements as specified by Bellcore for single mode splicing equipment, splice closures, terminal closures, and connectors for single mode fiber.

The outside diameter of the cable shall not exceed the dimensions specified in the following table. The physical weight of the cable shall not exceed the weight specified. This weight applies to the non-metallic, dielectric cable as required by this specification.

Fiber Count versus Cable Size and Weight

No. of Fibers	No. of Tubes or Bundles	Fibers per Tube or Bundle	Cable Diameter mm, ±2 mm	Cable Weight (Kgm/Km ±5%)
12	2	6	12	112
24	4	6	12	112
48	8	6	13	147

72	12	6	13	147
96	16	6	13	180

The cable shall comply with the following:

A. When tested in accordance with Fiber Optic Test Procedure (FOTP)-3, "Procedure to Measure Temperature Cycling Effects on Optical Fibers, Optical Cable, and Other Passive Fiber Optic Components", the average change in attenuation at extreme operational temperatures (-40°C to +70°C) shall not exceed 0.05 dB/km at 1550 nm for single mode fiber. The magnitude of the maximum attenuation change of each individual fiber shall not be greater than 0.15 dB/km at 1550 nm.

   In addition, all fiber optic cable provided for this project shall be:

   - Of new production (produced within six (6) months of order date and warehoused by the manufacturer with lot number traceability to production and quality test dates). Any variance request must be submitted to the Engineer, for approval, prior to ordering or installing on any project executed by the City of Norfolk.

   - All cable provided shall be from a recognized U.S. manufacturer who is regularly engaged in the production of this material, which has proven fiber optic cable experience, and from which there is a high probability that the same cable and fiber will be available in the future to support future build-out of the system. No discontinued cable materials, cable not complying with manufacturer's quality standards (i.e. "seconds"), or residual from special cable production runs shall be utilized. Similarly, no left over cable previously shipped to other contract construction sites nor residual cable that the Contractor may have from other projects may be utilized. Only new, standard production fiber optic cable shall be installed on any project executed by the City of Norfolk.

B. When a one-meter static head or equivalent continuous pressure is applied at one end of a one-meter length of unaged cable for twenty-four (24) hours, no water shall leak through the open cable end. When a one meter static head or equivalent continuous pressure is applied at one end of a one meter length of aged cable for one hour, no water shall leak through the open cable end. The aging cycle is defined as exposing the cable to +85 ±2°C for one-hundred and sixty-eight (168) hours and two cycles of -40°C to +70°C with cable held at these temperatures for twenty-four (24) hours. At the end of this cycle, the cable will be decreased to +23 ±5°C and held for twenty-four (24) yours. The water penetration test is completed at the end of the twenty-four (24) hour hold. Testing shall be performed in accordance with the industry standard test, FOTP-82, "Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable".

C. When tested in accordance with FOTP-81, "Compound Flow (Drip) Test for Filled Fiber Optic Cable", the cable shall exhibit no flow (drip or leak) of filling and/or flooding material at +65°C.

D. The cable shall withstand a minimum compressive load of 250 lbs/inch for armored cables and 125 lbs/inch for non-armored cables applied uniformly over the length of the compression plate. The cable shall be tested in accordance with FOTP-41A, "Compressive Loading Resistance of Fiber Optic Cables", except that the load shall be applied at the rate of 0.12 inch to 0.8 inch per minute and maintained for ten (10) minutes. The magnitude of the attenuation change shall be within the repeatability of the measurement system for 90% of the test fibers. The remaining 10% of the fibers shall not experience an attenuation change greater than 0.1 dB at 1550 nm (SM). The average increase in attenuation for the fibers shall be ≤ 0.20 dB at 1300 nm (MM). The repeatability of the measurement system is typically ± 0.05 dB or less. No fibers shall exhibit a measurable change in attenuation after load removal.

E. When tested in accordance with FOTP-104, "Fiber Optic Cable Cyclic Flexing Test", the cable shall withstand twenty-five (25) mechanical flexing cycles at a rate of 30 ± 1 cycles per minute around a sheave diameter not greater than twenty (20) times the cable diameter. The magnitude of the attenuation change shall be within the repeatability of the measurement system for 90% of the test fibers. The remaining 10% of the fibers shall not experience an attenuation change greater than 0.1 dB at 1550 nm (SM). The repeatability of the measurement system is typically ± 0.05 dB or less. The average increase in attenuation for the fibers shall be 0.20 dB at 1300 nm (MM).

F. When tested in accordance with FOTP-25, "Repeated Impact Testing of Fiber Optic Cables and Cable Assemblies", the cable shall withstand 25 impact cycles. The magnitude of the attenuation change shall be within the repeatability of the measurement system for 90% of the test fibers. The remaining 10% of the fibers shall not experience an attenuation change greater than 0.1 dB at 1550 nm (SM). The repeatability of the measurement system is typically ± 0.05 dB or less. The average increase in attenuation for the fibers shall be ≤ 0.40 dB at 1300 nm (MM). The cable jacket shall not exhibit evidence of cracking or splitting at the completion of the test.

G. When tested in accordance with FOTP-33, "Fiber Optic Cable Tensile Loading and Bending Test", using a maximum mandrel and sheave diameter of 22 inch, the cable shall withstand a tensile load of 610 lbf applied for one hour (using "Test condition II" of the procedure). In addition, the cable sample, while subjected to a minimum load of 600 lbf, shall be able to withstand a twist of 360 degrees in a length of less than 9.9 feet. The magnitude of the attenuation change shall be within the repeatability of the measurement system for 90% of the test fibers. The remaining 10% of the fibers shall not experience an attenuation

change greater than 0.1 dB at 1550 nm (SM). The repeatability of the measurement system is typically ± 0.05 dB or less. The average increase in attenuation for the fibers shall be ≤ 0.40 dB at 1300 nm (MM). The cable shall not experience a measurable increase in attenuation when subjected to the rated residual tensile load, 200 lbf.

H. When tested in accordance with FOTP-85, "Fiber Optic Cable Twist Test", a length of cable no greater than 6.5 feet will withstand ten (10) cycles of mechanical twisting. The magnitude of the attenuation change will be within the repeatability of the measurement system for 90% of the test fibers. The remaining 10% of the fibers will not experience an attenuation change greater than 0.1 dB at 1550 nm. The repeatability of the measurement system is typically ± 0.05 dB or less. The average increase in attenuation for the fibers shall be ≤ 0.40 dB at 1300 nm (MM). The cable jacket will exhibit no cracking or splitting when observed under 5x magnification after completion of the test.

I. When tested in accordance with FOTP-61, the attenuation specifications herein shall be met.

J. When tested in accordance with FOTP-59, port discontinuities, as specified in these specifications and references, shall be met.

K. Mode field diameter shall be tested in accordance with FOTP-164 or 167. Cutoff wavelength may be tested in accordance with FOTP-169 or 170. Chromatic dispersion test shall be conducted in accordance with FOTP-175. All shall provide compliance verification of requirements of this specification.

L. Each cable shall be tested in accordance to FOTP-61 prior to shipping, upon arrival at the installation site and after installation. The Contractor shall furnish test records to the Engineer.

M. Product test and testing frequency of all cable parameters shall be in accordance with Bellcore GR-20, Section 3, "Product Qualification Requirements".

N. Results of the above tests shall be recorded in a log maintained by the manufacturer which shall be given to the Contractor and upon the delivery of the fiber. The Contractor shall submit the test results of the Engineer prior to installation of the fiber optic cable.

4. Drop Cable

At locations where aerial splice enclosures are to be provided to connect any devices or traffic signals to the City of Norfolk fiber optic communications network, the Contractor shall furnish drop cable assemblies. The purpose of the drop cable will be to provide communication circuits from a splice enclosure to communication devices in the equipment/controller cabinet. The drop cable will

contain at least eight (8) fiber optic fibers with connectors (four (4) for the local circuit and four (4) for spare circuits). The drop cable to be run from the splice enclosure, down the riser, into the cabinet shall conform to the fiber optic cable specifications in this section. The end of the drop cable to be spliced in the splice enclosure shall be fusion spliced as set forth herein. ST connectors shall be spliced onto the end of the cable that is to be run into the cabinet and connected to the communication device(s). The Contractor may furnish factory assembled drop cables or may make drop cable assemblies. Drop cable assemblies shall conform to the splice loss requirements of these Special Provisions. If factory assembled drop cables are provided, the Contractor shall take steps during installation of the drop cable to insure that neither the connectorized nor the un-connectorized ends of the cable are damaged.

5. Cable Length, Marking and Shipping Requirements

A. General Considerations of Packaging and Shipping:

The completed cable shall be packaged for shipment on reels following guidelines of Bellcore TR-TSY-000081.

Each end of the cable shall be securely fastened to the reel to prevent the cable from coming loose during transit. (Six (6) feet of cable length on each end of the cable shall be accessible for testing. Both ends of the cable shall be sealed to prevent the ingress of moisture.

Each cable reel shall have a durable weatherproof label or tag providing information as specified in this document. A shipping record shall also be included in a weatherproof envelope showing required information, including factory measured attenuation utilizing OTDR test technique.

The cable shall be in one continuous length per reel with no factory splices in the fiber. Each reel shall be marked to indicate the direction the reel should be rolled to prevent loosening of the cable.

Where lengths have been ordered that exceed capacity of the reel, minimum of 7.5 miles of single mode fiber per reel shall be provided. There shall be no splices occurring in the cable on a single reel. Where lengths are ordered which are less in total length than the capacity of a reel, then a lesser amount of cable shall be supplied on a reel without splices.

B. Information Accompanying the Reel:

The following information shall be securely attached to the reel as a weatherproof tag:

- Order Number

- Cable Construction (Dielectric, Light Armor, Heavy Armor)
- Job Number
- Type of Cable (Single Mode or Multimode)
- Factory Reel Number
- Cable Installation Application (Aerial/Lashed, Aerial Self-Supporting, Buried/Conduit or Direct Bury)
- Manufacturer's Cable Code
- Ship Date
- Number of Fibers in the Cable
- Manufacturer's Name
- Length of Cable
- Weight of Cable and Reel
- Beginning and Ending Length Markings

A copy of the transmission loss data (attenuation) and other test information shall be included underneath the thermal wrap or lagging. A shipping record shall also be included in a weatherproof envelope showing the above information and also including date of manufacture, cable characteristics, and other information.

The reel shall be permanently marked with reel number, size, weight, lifting/handling safety information, direction of rotation to prevent cable loosening, and other applicable data as required by the contract and shippers.

C. Thermal Wrap for Cable on Reel

A thermal-protective wraps shall be securely applied over the outer turns of the cable on each reel. The wrap shall be weather resistant and limit solar heating of the cable such that cable surface temperatures do not exceed 10°C above ambient temperature under solar radiation loading of 1000 watts per square meter in still air.

The wrap shall be labeled "Do Not Remove Wrap Until Cable is Placed". (This wrap may be omitted when lags or other mechanical reel protection devices are provided). Specifications of thermal wrap are suitable for compliance validation.

D. Documentation

The cable shall be supplied with manufacturer's factory test results (including FOTP-61), handling and installation recommendation instructions. Instructions shall be provided with each reel in a weatherproof envelope attached to the reel.

7. Other Material Supporting Fiber Installation Procedure

A. General Overview

This procedure and associated specifications cover materials necessary to install and terminate the fiber optic cable as identified in the projects requirements or as instructed by the engineer. It includes the fiber optic cable (specified above), termination enclosures, pigtails, and other miscellaneous mounting and attachment materials.

B. Fiber Optic Pigtails

Where fiber optic pigtails are utilized, they shall comply with Bellcore GR-20 and TR-NWT-000326. Fiber cladding type shall be compatible with that of the fiber optic cable. Pigtails shall be factory connectorized with strain relief at the connector. ST type connectors shall be utilized. A ST connector /coupler shall be used on the fiber interconnect center enclosure, spliced to the cable fiber in a Bellcore specification-compatible splice/organizing tray. The pigtail color shall be compatible be compatible with the color of the spliced fiber or labeled in a manner that will distinguish the pigtail and fiber from all other pigtails or fibers present in the splice/organizing tray. The connector number shall correspond to the cable fiber color/tube number within the attached cable (i.e. orange tube, blue fiber is fiber 13 and connector 13; blue tube, blue fiber is fiber 1 and connector 1).

All pigtails shall be fusion spliced and installed in a splice tray. Fibers shall be organized in such a manner as to not become tangled and so as not to exceed the maximum bending radius. The manufacturer's recommendations for fiber installation for fiber installation in fiber termination drawer/cabinets shall be utilized.

C. Fiber Optic Interconnect Centers (Field Installations)

Any field equipment cabinet location that is being connected to the City of Norfolk fiber optic communication network shall have a fiber optic interconnect center. Each interconnect center shall conform to the requirements of the City of Norfolk Standard Details (see typical Detail for 'Fiber Optic Interconnect Center') and shall include the following:

- Two (2) or more splice trays;
- One (1) tray housing

1) Fiber Splice Trays

a) All splice trays shall be metallic and shall accommodate a minimum of twelve (12) fusion splices plus a minimum of six (6) mechanical splices. The tray shall consist of an aluminum base and an aluminum cover. The design of the tray shall provide physical protection for both types of splices.

b) Each tray shall have crimpable metal tabs to provide strain relief for the buffer tubes. Additional strain relief points shall be provided for tie-wrapping buffer tubes or pigtails to the tray. Each tray shall contain organizers which shall hold and protect each type of splice.

c) The approximate dimensions of each tray shall be 12 inches by 4 inches by 0.2 inches. Two (2) trays shall be provided in each cabinet. Additional trays shall be provided as necessary to accommodate the number of fusion splices required by the system construction shown in the Plans and on the fiber splice details.

d) Splice trays shall slide into the housing and shall securely lock into place using a mechanical application approved by the engineer.

2) Tray Housing

The fiber interconnect housing shall have the following features:

a) Accommodation for the number of splice trays necessary to accommodate the splice;

b) Tray housing shall be 1U height;

c) Provide strain protection for the fiber;

d) Sliding tray; and

e) Connector panel with ST connectors on both sides of the panel. Mating ST connectors with factory-connected pigtails fusion spliced to the incoming or outgoing fibers shall be plugged into the rear of the panel. Factory-connectorized jumpers shall be plugged into the front of the panel on one end and into the fiber optic transceiver on the other. All connectors shall be permanently numbered.

f) Tray housings in all new cabinets shall be rack-mounted. Tray housings in existing cabinets shall be shall be 19” rack-mounted, or is to be bolted to a cabinet shelf, if no rack is available.

8. Markings on Materials

Fiber termination boxes/drawers and splice enclosures shall be permanently marked with manufacturer's name and address, functional name of the unit, model number, part number, and (where applicable) serial number

All connectors or connector panels shall have permanent markings. All fiber optic cables shall include a permanently marked, water and oil proof Mylar or equivalent (non-metallic) band uniquely identifying it in relation to other cables within the system and relating to the As-Built drawings provided to the City of Norfolk by the contractor. Each device shall be uniquely identified and referenced to its installation location. Markings shall facilitate easy understanding of the device's or cable's interconnectivity to the City of Norfolk's Advanced Traffic Management System and/or the City of Norfolk's Fiber Optic Communication Network.

The contractor shall place a permanent tag or marking on equipment providing the unique identifier referenced to location and As-Built drawings. The identifying information shall be permanent, legible and not cryptic (easily understandable and not requiring interpretation). Installation and/or As-Built drawings shall include 'FROM– TO' details and information identifying interconnection, equipment, plug/rack number, cable number, and connector(s) identified on the cable.

711.03 – Material Quality

The fiber optic cable shall be manufactured under ISO 9001 Quality Assurance and/or Bellcore-874-CORE, "Reliability and Quality Generic Requirements". All fiber optic cable and other material supplied shall be of new manufacture and shall not have been previously delivered to another construction site. Any variance request for this requirement must be submitted to the Engineer, for approval, prior to ordering or installing on any project executed by the City of Norfolk. Fiber optic cable shall be free from optical splices and compliant with all specifications stated herein when delivered to the installation site. Records of all quality inspections and tests shall be made available to the engineer upon request. When delivered, if the fiber optic cable is inspected and tested at the delivery site and shown to be in non-conformance with this specification it shall be replaced with new manufacture fiber optic cable complying with this specification. In no case shall the contractor install fiber optic cable and other related material which:

- Delivered test results show non-conformance with this specification
- At the delivery site, inspections and tests of the fiber optic cable show non-conformance with this specification.

Should the contractor install fiber which is non-conforming, it shall be replaced at the contractor's own cost with specification compliant fiber optic cable.

711.04 – Installation

1. Scope of Installation

The SMFO cable shall be installed in conduit or overhead as shown in the Project Plans, or as directed by the engineer, and in accordance with manufacturer's installation techniques and procedures. The Contractor shall take every precaution to prevent damage to the SMFO cable during storage and installation. The SMFO cable shall not be stepped on by workers or run over by any vehicle or equipment. The cable shall not be pulled along the ground or over or around obstructions. A bend radius of ten (10) times the cable diameter (not under stress) or twenty (20) times cable diameter (under stress) shall not be exceeded.

It shall be the responsibility of the Contractor to coordinate his overhead and underground construction activities on a continuing basis with each of the utility agencies which have facilities in the immediate vicinity. Where required the contractor shall coordinate with Dominion Power to establish approved pole mounting heights. The documentation of the installation heights from Dominion Virginia Power shall be submitted to the City of Norfolk

The Contractor shall furnish all attachment hardware and installation guides necessary to install the fiber optic cable.

2. Allowable Splice Points

All splices shall be fusion splices made in splice trays located in fiber interconnect centers in: equipment cabinets; aerial splice enclosures; splice closures; and stand-alone fiber splice cabinets (wall-mounted or base-mounted), as called for on the Plans. **No mechanical splicing shall be allowed**. The Contractor shall furnish and install the splice trays, tray housings and enclosures.

SMFO cable runs shall be continuous between allowable splice points in equipment cabinet splice points. The Contractor shall carefully determine the length of SMFO cable necessary to reach from termination point to termination point. Splicing of SMFO cable in conduit, pole bases, manholes, or aerial locations shall not be permitted. For all splices and associated splice enclosures, adequate spare cable shall be provided to allow convenient splicing by a maintenance technician in a vehicle.

3. Splicing Methods

All splicing shall be done by means of a fusion splice technique which induces not more than 0.3 dB attenuation. Each spliced fiber shall be packaged in protective sleeving or housing. Bare fibers shall be completely re-coated with a protective RTV gel or similar substance prior to application of the sleeve or housing to protect the fiber from scoring, dirt, or micro bending. All splices shall

be performed in accordance with the cable manufacturers and the splice manufacturer's recommendations.

The connector loss for the complete connection to the terminal equipment including connector shall not exceed 1.0 dB. With periodic connector cleaning, this loss characteristic shall be maintained for a minimum of five-hundred (500) connections.

In equipment cabinets, the incoming and outgoing fibers shall be spliced in splice trays to pigtails with factory-installed ST connectors that connect to the connector panel of the splice tray housing. Each such pigtail shall have an attenuation of not more than 1.0 dB.

4. Requirements for Separate Conduit Entrance into Cabinets.

SMFO cables shall enter the cabinets by means of a separate conduit entrance:

A. For new and existing cabinets mounted on the vertical shaft of existing steel mast arm poles, the Contractor shall install, as shown in the typical details, a new conduit entrance from the pole into the bottom of the new cabinet. This conduit entrance shall make use of a AUB mogul or similar fitting which accommodates the bending radius of the SMFO cables.

B. For base-mount cabinets, the Contractor shall use a separate conduit entrance which, as shown in the typical details, shall either be an existing spare conduit entrance or a new entrance drilled into an existing foundation or formed into a new or modified foundation.

C. Where the existing cabinet does not have sufficient room for a fiber interconnect center and two or more fiber cables to be stored within the cabinet the SMFO cables shall be spliced in a splice enclosure that is either placed in a junction box or installed aerially.

5. Installation in Conduit

Where shown on the project plans, all SMFO cable shall be installed in new or existing underground conduit. The SMFO cable shall be installed in conduit with other cables only within existing underground conduit segments as called for on the project plans, or as directed by the engineer.

A bare #8 copper tracer wire shall be installed in conduit as noted in Section 716.03 (17).

Twenty-five (25) feet of each SMFO cable shall be loosely looped in each new and existing junction box.

Before the installation of any SMFO cable in conduit is performed, the Contractor shall provide the Engineer with two (2) copies of the cable manufacturer's recommended and maximum pulling tensions. Included with these pulling tensions shall be a list of the cable manufacturers approved pulling lubricants. Only those lubricants, in the quantity recommended by the SMFO cable manufacturer, shall be approved for use.

When installing the cable in underground conduit, the maximum allowable pulling tension for the cable installation by the Contractor shall not exceed 80 percent of the manufacturer's maximum pulling tension. If the cable is pulled by mechanical means, a dynometer (clutch device) approved by the Engineer shall be used to ensure that a maximum allowable pulling tension is not exceeded at any time during installation.

SMFO cable shall not be pulled over edges or corners, over or around obstructions or through unnecessary curves or bends. Approved cable guides, feeders, shoes and bushings shall be used to prevent damage to the cable during installation.

SMFO cable shall not be pulled through any intermediate junction box, manhole, pull box, pole base or any other opening in the conduit unless specifically required by the Engineer in specific facilities. The necessary length of cable to be installed shall be pulled from one junction box, manhole, pull box, pole base, or cabinet to the immediate next downstream manhole, box, pole base, or cabinet. The remaining length of cable to be installed in the next conduit shall be carefully stored in a manner that is not hazardous to pedestrian or vehicular traffic yet ensures that no damage to the cable shall occur. The cable shall be stored in a manner that shall allow that length of cable to be safely pulled into the next conduit. (E.G. figure 8 storing of cable). The Engineer shall approve the storing methods to be used.

6. Aerial Installation

Where SMFO cable is to be installed on overhead poles, the Contractor shall exercise care in temporary placement of installation equipment to provide safety to the public and to prevent damage to existing facilities. Should the Contractor cause damage to any existing cables and/or equipment, the Contractor shall immediately notify the Engineer and the affected owner and the Contractor shall repair or have the repair made at no additional cost.

During installation, the Contractor shall provide cable blocks a maximum of every 50 feet to guide the cable and reduce pulling tension. Corner blocks, appropriately sized to ensure that the minimum bending radius of the cable is not violated, shall be provided whenever fiber optic cable must be pulled around a corner. Unless otherwise approved by the Engineer, the maximum pulling tension shall be 600 lbs during installation (short term) and 200 lbs long term installed.

Where the project plans call for aerial installation, the Contractor shall lash the SMFO cable to the designated supporting messenger (which in the majority of cases is new 1/4 messenger cable installed by the Contractor).

The SMFO cable shall be lashed to the existing or new messenger cable with aluminum wrapping tape spaced at intervals not to exceed 15 inches or with .06 inch (minimum diameter) galvanized steel spiral cable wrap. Wrapping tape, if used, shall be .05 inches x .30 inches. At least four (4) wraps of tape turns shall be used per interval. Lashing shall be accomplished in a manner that results in the wire and cable appearing to be an integral part of the support cable.

The SMFO cable shall be double-lashed when the SMFO cable crosses controlled access facilities and railroads

At locations shown on the project plans, the Contractor shall provide spare cable for restoration purposes by backlashing cable. The Contractor shall furnish and install cable guides (aerial snow shoes) to maintain the proper bending radius on both ends of the backlashed segment.

711.05 – Fiber Optic Communication Cable Testing

1. General

The times and dates of all tests shall be approved by the Engineer. The Contractor shall conduct all tests in the presence of the Engineer or his authorized representative. Testing shall only take place on weekdays which are official working days of the City of Norfolk Division of Transportation and during normal working hours unless otherwise approved by the Engineer.

The Engineer reserves the right to examine and test any and all materials furnished and/or installed by the Contractor to determine if they meet the requirements of these Special Provisions or any Project Plans contracted as a project with the Contractor. If any material used in the construction of any project does not meet these requirements, the Contractor shall replace such defective parts and material at no cost to the City of Norfolk. Rejected equipment may be offered again by the Contractor for retesting provided all non-compliance has been corrected and the equipment has been pretested by the Contractor.

Testing of Contractor-furnished and installed hardware and equipment shall be conducted as described below. All tests specified herein shall be successfully conducted prior to Final Acceptance of the Project or task under any contract with the City of Norfolk. All test equipment shall be provided by the Contractor unless otherwise provided herein or as instructed/provided by the Engineer or his authorized representative. The Contractor shall perform the tests and document the test results. When the tests are completed, whether successful or not, the test results shall be furnished to the Engineer or his authorized representative. All test

documentation forms shall be submitted to the Engineer for approval prior to conducting the tests.

2. Communication Cable Tests (General)

Fiber Optic Cable provided to the City of Norfolk under these specifications shall have been pretested in accordance with the EIA/TIA Fiber Optic test procedures listed below and as required by Bellcore GR-20-CORE. Proof of successful testing shall be supplied by the Contractor.

A) On-Reel Attenuation Test

An on-reel attenuation test shall be performed on each fiber of each SMFO cable as furnished by the manufacturer for this project. This test shall be an end-to-end attenuation test performed with a high resolution OTDR. The attenuation measurement of any single mode fiber shall not exceed 0.35 dB per kilometer at 1310 nm. Additionally, fiber inclusions manifested as attenuation spikes on the OTDR shall not exceed 0.5 dB or 50 percent to the total measured attenuation in the cabled fiber, whichever is less. Only one (1) inclusion perturbation shall be allowed per cable length.

Tests shall be performed "on-reel" for each fiber of each SMFO cable as furnished by the manufacturer for this project. Except for the access to and the test preparation of any one end of the SMFO cable to be tested, the Contractor shall preserve the cable in its originally-shipped condition. Except as noted, the entire reel of cable shall be rejected and shall not be used on this project if any fiber of the cable fails the on-reel cable attenuation test. The rejected cable shall be replaced at the Contractor's expense.

B) Cable Segment Testing

Tests shall be performed for each fiber of each SMFO cable installed by the Contractor as part of this project. Cable segment testing shall be performed as each cable segment (a segment being any continuous run of cable without splices or terminations) is installed and terminated. The cable segment shall be rejected for use on this project if any fiber of the SMFO cable segment fails the cable segment attenuation test. Rejected cables shall be removed and replaced by the Contractor at the Contractor's expense. The Contractor shall conduct the entire test series again on any cable segment that is replaced.

C) Cable Segment Attenuation Test

An attenuation test shall be performed on each fiber of each terminated SMFO cable segment installed by the Contractor as part of this project. This test shall be an end-to-end attenuation test performed with a high resolution OTDR. Installed and terminated cable segments shall be tested, from connectorized-end to connectorized-end. During testing, both ends of the segment shall be disconnected from the mating connectors of their designated electronic device terminals. SMFO connector losses shall not exceed 0.75 dB

per mating connector pair. SMFO splice losses shall not exceed 0.3 dB per installed fusion splice.

D) Circuit Continuity and Attenuation Test

The Contractor shall conduct tests on all optical circuits and shall document these tests. Attenuation tests shall be conducted utilizing OTDR techniques per FOTP-61. The Contractor is to provide these test results to the Engineer for review. Any fiber optic link which exceeds attenuation design (fiber link attenuation plus splices attenuation plus connector loss) by more than 10 percent will be investigated by the Contractor to determine the cause of excessive attenuation. Corrective action shall be taken to provide a circuit compatible with optical transceiver loss budget plus a 20 percent margin for aging.

E) Drop Cable Testing

All tests described above shall also be conducted for the drop cables.

711.06 - MEASUREMENT AND PAYMENT

Measurement - The contract unit price for fiber optic cable shall be measured in linear feet, from connection point to connection point, for the size, and number of conductors, specified on the plans. For auditing of fiber optic cable for a proposed project the contractor shall be paid in hours.

Basis of Payment - The measurement and basis of the unit contract price shall vary according to the specified work tasks.

1. Furnish and Install Communications Cable: The unit price for furnishing and installing the specified fiber count (6-, 12-, 24-, 48-, and 96-count) shall include wire, conforming to Section 711 of these specifications, all hardware required for installation, connectors, fan-out kits, pigtails, labor, tools, equipment, splice enclosures, fittings, cable testing (including OTDR traces before and after installation and splicing of the fiber optic cable), and incidentals necessary for a complete and accepted installation.

2. Fiber Optic Cable Splice: The unit price for splicing single mode fiber optic cable will be measured in units of each (EA) and paid for at the contract unit price. The contract unit price shall include the specified splicing method, all materials, labor, equipment, connectors, pigtails, adapters, cable testing (including OTDR traces before and after installation and splicing of the fiber optic cable), and incidentals necessary for a complete and accepted installation.

3. Furnish and Install Fiber Optic Communications Cable Riser: The unit price for furnishing and installing a fiber optic communication cable riser will be measured in units of each (EA) and paid for at the contract unit cost. The contract unit price shall include the riser, seal-tight coupling, mounting of the riser to the identified

support structure, extending the riser into the nearest existing junction box or a new junction box as detailed in the project plans. The riser will be of a material specified by the Engineer.

4. Provide OTDR Traces: Normally OTDR traces are incidental to the installation or relocation of fiber optic cables. When requested by the Engineer, OTDR traces may be required on existing fiber optic cables or for troubleshooting purposes. The unit price for providing OTDR traces (based on an averaged A-B & B-A test procedure) on a fiber optic cable will be measured in units of Each (EA) and paid for at the contract unit price. The contract unit price shall include all materials, labor and equipment necessary for a complete and accepted OTDR fiber test.

5. Optical Light Meter Testing: Normally Optical Light Meter tests are incidental to the installation or relocation of fiber optic cables. When requested by the Engineer, Optical Light Meter tests may be required on existing fiber optic cables or for troubleshooting purposes. The unit price for providing optical light meter testing will be measured in units of Each (EA) and paid for at the contract unit price. The contract unit price shall include all materials, labor and equipment necessary for a complete and accepted fiber run testing.

++ END OF SECTION ++

SECTION 712 - MAST ARM ASSEMBLY STANDARD

712.01 - Description

The traffic signal pole mast arm assembly and lighting pole assembly standard shall conform to contract drawings and specifications, VDOT specifications and shall be Union Metal Design No. 50700 or approved equal. The work under this section shall consist of designing, supplying, and installing a combination traffic signal/mast arm pole with luminaire assembly, where required.

712.02 - Design

All signal pole designs shall be provided by the Contractor. The Contractor shall submit all designs, signed and sealed by a licensed Professional Engineer in the Commonwealth of Virginia, for review and approval by the Engineer. The pole and mast arm shall consist of:

A. A tapered steel monotube shaft complete with anchor base, anchor bolts, reinforced handhole, cast pole top cap, and steel flange plate assembly for mounting the mast arm.

B. A tapered steel arm complete with a mounting flange plate, hanger clamp, and outlet having a one inch inside diameter rubber grommet for wiring each signal head, and a removable end cap.

C. All casting shall be clean and smooth with all details well defined and true pattern.

D. All components of the mast arm assembly shall be designed to withstand pressure created by winds of at least 110 mph in accordance with AASHTO latest approved edition.

E. The design of mast arm and pole shall accommodate all equipment and signs as shown on the design plans and at a minimum at least one (1) City of Norfolk standard metro street name sign panel [varies" (not to exceed 72" minimum size) x 18"], located over the center lanes of the approach and one (1) traffic signal sign (minimum size 24” x 30”) located at the end of the mast arm.

712.03 – Materials

A. **Shaft**

The shaft shall be fabricated from only one length of steel of no less than No. 7 Manufacturers Standard Gauge, and shall conform to the requirement of ASTM A595 Grade A. The shaft shall have one

longitudinal weld; no transverse welds will be permitted. Welds and joints shall be waterproof and shall fully develop the ultimate strength of the pole. Welds shall be ground or cold rolled smooth to a uniform finish.

The shaft shall have a handhold (with an opening area of at least 26 square inches) reinforcing frame complete with cover and grounding nut located near the base to facilitate wiring. The flange plates shall have a deburred 2 l/2" diameter wiring hole and four tapped holes for flanged bolts. The shaft shall be circular in cross section and shall have a uniform taper of not more than 0.l4" per foot of length from the base to the top. The shaft shall have minimum yield strength of 60,000 P.S.I. after fabrication.

A J-hook wire support shall be welded inside near the top of the shaft. The cast pole top shall be secured in place with set screws.

For combination type poles where indicated on contract plans, an opening shall be furnished near the top of the shaft to provide a cable entrance from the shaft into the luminaire bracket arm. A special steel adapter shall be welded into this opening, providing a smooth cable guide for wiring and support for the attaching plate which is welded to the luminaire bracket arm. The luminaire arm shall be furnished with a 400-watt high-pressure sodium lamp in a "Cobra" head type enclosure as specified by Dominion Virginia Power.

B. **Anchor Base**

Each shaft shall have a one-piece cast steel anchor base of adequate strength, size and shape secured to the butt end of the shaft by two continuous electric arc welds. The casting shall conform to ASTM A-36 Grade A. The anchor base shall telescope the shaft and the one weld shall be on the inside of the base at the end of the shaft while the other welds shall be on the outside at the top and the base. The two welds shall be approximately two inches apart and the design shall be such that the welded connection will develop the full yield strength of the shaft.

The base shall be provided with six (6) holes to receive the anchor bolts and four tapped holes for attaching the covers. Six (6) removable covers for the anchor bolts shall be provided with each base, and each cover shall attach to the upright portion of the body of the base by means of one hex head cap screw.

C. **Monotube Mast Arm**

The mast arm shall be made of steel not less than #7 Manufacturers Standard Gauge, and shall conform to the requirements of ASTM A595 Grade A. For arms up to 40' in length, the mast arm shall be made of one

length of steel. For arms lengths greater than 40', the arms shall be made in two pieces which shall assemble by a metal pipe dowel piece that fits inside the two pieces and is welded at the joint. The joint shall be secured against movement with a through bolt or stud and locknuts on both sides of the joint line. The flange plate shall have four holes for the four tapped holes the mounting plate on the pole. Each mast arm shall have wire outlet holes on the bottom surface, with rubber grommet, located at each signal portion. A pressed steel removable cap shall be attached to the end of the arm by a screw. For each required signal, a clamp and clevis with 11/l6" diameter hole shall be furnished, complete with 5/8" diameter hinge bolt with nuts.

D. **Anchor Bolts**

Six high-strength steel anchor bolts conforming to ASTM F1554, Grade 55, and capable of resisting at yield strength stress, the bending moment of the shaft at its yield strength stress, and each fitted with two hex nuts, shall be furnished with each pole.

Each anchor bolt shall have an "L" bend at the bottom, and shall be threaded at the other end for a minimum length of six inches. The threaded ends of the bolts shall be galvanized in accordance with ASTM Al53.

E. **Luminaire and Luminaire Arm**

The luminaire if specified or indicated on the construction plans shall be made by the same manufacturer as the traffic signal pole.

The luminaire arm shall conform to the same material and design.

The luminaire arms shall be at least 2 inches O.D. and accept 2" slip-fitter luminaries.

Provide pull rope between proposed luminaire arms and adjacent junction boxes for the installation of electrical service conductors by Dominion Virginia Power. Pull rope shall be secured to the luminaire arm and junction box at either end to ensure the pull rope remains in place until installation of the fixture. Pull rope shall be considered incidental and will not be measured or paid for separately.

The fixture shall be supplied and installed by others.

F. **Disconnect Box**

A disconnect box shall be installed on the mast arm pole adjacent to the controller cabinet. The box shall conform to VDOT Road and Bridge Specifications 2007, Section 238.02 (h) 1. for safety switches.

712.04 – Finish

The finish shall conform to the requirements as specified in the contract plans and specifications according to the following types:

A. **Type A - Galvanized**

All steel components, nuts, bolts and fasteners shall be hot-dipped galvanized in accordance with ASTM A153. Shafts and arms shall be galvanized inside and out in accordance with ASTM A123.

B. **Type C – Painted Black**

1. Finish

The finish shall conform to the requirements as specified in the contract plans and specifications according to the following:

a. All components, nuts, bolts, screws shall have shop painted finish coat.

b. The color shall be City of Norfolk "Black", Color Number FS 27038, Federal Standard 595B.

c. The finish coating shall be a six stage chemical treatment for an electrostatic applied fusion bonded polyester powder coating. The polyester protective coating shall be one coat, minimum 4 mils thick, and heat curable, thermosetting powdered coating.

d. The polyester coating shall be checked for continuity using 67-1/2 volt wet sponge detector to check for holidays, pinholes and discontinuities. Coating shall be checked and certified.

2. Installation

Installation shall conform to manufacturer's recommended procedures, Steel Structures Painting Council (SSPC) Specifications and VDOT Specifications Sections 411.04(b), 411.03(c) and 411.07.

712.05 - Certification

Material certification consisting of physical and chemical properties of the castings shall accompany the material submittal.

712.06 - Warranty

The standard assembly shall be guaranteed from any defects and workmanship for a minimum of two years at installation.

712.07 - Installation

A. The standard assembly shall be securely bolted to the prepared foundation in a manner so that, after all signals, hardware, and luminaries have been installed, the shaft shall be plumb. Stainless steel shims shall be used, if necessary for raking.

B. All exposed edges of the plates which make up the base assembly shall be finished smooth and all exposed corners of such plates shall be neatly rounded to l/8" radius, unless otherwise shown on the plans.

C. Each standard assembly shall be effectively grounded using a #6 copper wire attached to a pole by a stainless steel bolt and to the ground rod by a square head bolt clamp.

D. There shall be NO grouting around the pole base and the top of the foundation.

E. The completed assembly shall be effectively weatherproof with no uncovered openings.

F. The mast arm(s) shall be securely attached to the shaft and positioned as indicated on contract plans or directed by the Engineer.

712.08 – Measurement and Payment

Method of Measurement: A mast arm assembly will be measured in units of Each (EA) for the type specified on the plans.

Basis of Payment: The contract unit price per assembly shall be based on the following work tasks.

A. Furnish and Install: The unit price to furnish and install a standard mast arm assembly shall consist of shaft, anchor base, anchor bolts, monotube mast arm material, hardware, template, tools, equipment, labor, shipping

costs and incidentals necessary for a complete and accepted installation in accordance with Section 712 of this specification.

++ END OF SECTION ++

SECTION 716 – CONDUITS

This work shall consist of furnishing and installing conduit in accordance with these specifications and as shown on the plans or as directed by the Owner. The work specified in this section shall override all conduit references in the 2007 VDOT Road and Bridge Specifications Section 700 – General Traffic Control Devices.

716.01– General

The work under this section shall consist of furnishing and installing conduit of the number, type and size specified and necessary fitting at the locations shown on the Contract Drawings, or as ordered by the Engineer and in conformance with these specifications.

716.02 – Materials

1. Conduit, Couplings, and Fittings

   The three types of conduit for the use in traffic signal work are designated as follows:

   a. Polyvinyl chloride (PVC) plastic conduit, conforming to Underwriters' Laboratories (UL) Standard (Publication 61L-651) and National Electric Code (Article 347), Grade I, and Schedule 40, or Schedule 80 for Rigid PVC; each section shall carry the UL seal of approval.
   b. High Density Polyethylene (HDPE) conduit conforming to PE conduit prescribed in Section 238.02 (d) of this specification.
   c. Rigid Metal Type EB conforming to UL Publication UL-6 and NEC Article 348 for Rigid Metallic Conduit, galvanized conforming to ASTM A123; each section shall carry the UL seal of approval.

2. Joint Material

   One coupling of the appropriate type shall be furnished with each length (section) of conduit. Joint material used in connecting two pieces of conduit shall be as specified below:

   TYPE A: For PVC and HDPE conduit the material for the joints shall be slip-fit plastic couplings, designed specifically for such use. The joining material shall be a solvent-cement conforming to ASTM D2564.

   TYPE B: The joint material for rigid conduit shall be threaded couplings and galvanized to ASTM A122, and of the same material as the conduit. The coupling shall be a 3 piece Union type coupling used with a proper sealant which will assure a fully watertight seal.

716.03 – Installation

All installations of conduit shall conform to the following requirements and in accordance with VDOT Standard ECI-1.

1. All conduit, couplings, and fittings installed on the surface of poles or structures or other exposed locations or in concrete structures and foundations shall be the rigid metal type. Exposed conduit installed on a painted surface shall be painted the same color as the structure. The conduit run between a structure and the nearest pull box shall be rigid metal type.

2. Where existing rigid metal conduit systems are to be modified or extended, rigid metal type shall only be installed unless approved by the Engineer.

3. The conduit shall be installed in the locations shown on the Contract Drawings or as ordered by the Engineer. All conduit runs shall be as straight as possible, and shall be installed in a neat and workmanlike manner. All conduits shall be installed parallel to or at right angles to visible lines. No bends will be accepted which are not smooth.

4. Conduits shall be installed so as to be continuous and watertight between outlets. Conduit runs shall have a minimum number of couplings as permitted by standard conduit length and 90 degree bends will only be used when authorized by the Engineer Conduit which has been crushed or in any way deformed shall not be used. Conduits shall be free from kinks or other injuries so as to permit pulling of conductors without damage to the conductors. Conduits shall be installed so that any moisture condensation will drain properly and drainage tees with drip spouts shall be provided where necessary.

5. When obstructions are encountered during installation and conduit cannot be economically located elsewhere, the obstruction shall be bypassed by deflecting the conduit at a rate of at least 10:1. Minimum 4’ radius, maximum 90° bends may be used to avoid obstructions at locations where 10:1 deflection is not possible, provided the least degree bend needed to clear the obstruction is used. Flexible bends may be utilized when needed to facilitate proper location of the conduit, only at locations approved by the Engineer. Conduit runs between any 2 junction boxes shall not employ more than 4 bends, or exceed an angular sum of 270°.

6. Seal conduits containing fiber-optic communications cable with mechanical sealing devices. Seal conduits containing signal cable and loop lead-in wire with moldable duct seal.

7. The ends of all conduits, whether shop or field cut, shall be reamed to remove burrs and rough edges. Cuts shall be made square and true so that the ends will butt or come together for the full circumference thereof. All couplings for metal type conduit shall be tightened until the ends of the conduits are brought together, providing a good electrical connection throughout the entire length of the conduit run. Non-metallic type conduit shall be cut with a hacksaw or other approved tool.

8. Conduit shall be laid to a depth of not less than 18 inches below grade or encased in a concrete envelope. The envelope shall have a clearance of not less than 3 inches below the bottom or the sides of conduit and not less than 6 inches from the top of the conduit. Install longitudinal runs of conduit a minimum of 1 foot from back of curb or 6 feet from edge of pavement in the absence of curb.

9. Upon completion, restore surface to like-original condition within seven calendar days of occurrence of damage. Remove all rock and debris from backfill material. Remove excess material from site and compact area. Backfill with excavated material and compact to 95% of original density. Backfill trench at locations along the trench path where non-movable objects, such as rocks and boulders, cannot be avoided. The purpose of the backfill is to provide a gradual change in elevation of the trench, so that excessive bending and stress will not be transferred to conduits once underground conduit system is installed.

10. Upon completion of conduit installation, each conduit run or any existing conduit used shall be tested for obstructions by means of a rigid or flexible mandrel having a diameter of at least 80 percent of the inside conduit diameter, pulled through each conduit run in the presence of the Engineer. Any obstructions shall be removed and conduit repaired at no additional cost to the owner. After testing, individual conduit runs in excess of 150 feet which are to remain empty shall be equipped with a 12-gauge galvanized pull-wire with 6-inch loops on each end or a pull-rope of nylon or polypropylene with a minimum tensile strength of 500 pounds and with 12 inches of the rope double back into the conduit at each end.

11. Where the Contract Drawings call for the conduit to be connected to an existing electric, telephone or other manhole or existing conduit, the Contractor shall not enter into, or work inside, or physically alter the structure of said manhole or conduit <u>without</u> a representative of the owner present at said manhole/conduit. The Contractor shall give the owner at least 72 hours' notice prior to working on a particular manhole or conduit.

12. Where shown on the Contract Drawings, outlet boxes with conduit properly connected along with concrete conduit hanger, inserts shall be placed accurately and securely in the forms for the concrete. Care should be taken during the placement of concrete around the boxes, conduit and inserts to compact it thoroughly to prevent voids and honeycomb and also to avoid any displacement

of the boxes, inserts, or conduit during such operation. Concrete shall conform to the applicable standard specifications or as directed by the Engineer.

13. All necessary fittings shall be sealed to the conduit length by the use of a waterproof cement made by the manufacturer of the conduit or equivalent, and shall be used in strict accordance with the manufacturer's recommendations, as approved by the Engineer.

14. The Contractor shall take extra care to ensure that the conduit is not crushed from the use of heavy equipment over the conduit. If the conduit is found to be damaged, the Contractor shall replace the conduit at his own expense. When the conduit is terminated, it shall be capped with an approved cap and marked unless otherwise shown on the Contract Drawings.

15. The Contractor shall remove pavement, curbs, sidewalks, and driveways as shown on the Contract plans or as directed by the Engineer, sufficient to safely install the conduit. Surplus materials shall be disposed of by the Contractor at his expense as required in "Maintenance of Traffic During Construction." Permanent repairs shall be made to the pavement, curbs, sidewalks, driveways, and unpaved areas as soon as reasonably possible after installation of the conduit. The finished repairs shall be similar to the contiguous areas and shall conform to the Contract plans or other requirements of the Engineer.

16. Conduits terminating in standards or pedestals shall extend not more than two inches vertically above the foundation and shall be sloped toward the handhole opening. Conduit entering through the side of non-metallic pull boxes shall terminate not more than two inches inside the box wall and not less than two inches above the bottom, and shall be sloped toward the top opening to facilitate pulling of conductors. Conduit entering through the bottom of the box shall terminate one to two inches above the bottom and shall be located near the walls of the box to leave a major portion clear for future use. At all outlets, conduits shall enter from the direction of the run.

17. Conduit couplings shall be located not less than six inches from face of foundation.

18. The number of conductors permitted in a single conduit shall not exceed the percentage fill as specified by National Electric Code (NEC).

19. When shown on the plans, the Contractor shall modify the existing controller or pole foundations to allow the new conduit sweeps to enter the foundation in accordance with the following:

    a. Remove concrete by cutting, chiseling or any other approved method as required to install new conduit sweeps without damage to existing

conduit(s). The Contractor shall repair any damage incurred at no additional cost to the City.

b. After removing concrete, the area shall be washed with pressurized water and thoroughly dried with compressed air.

c. Position new conduit sweeps, and apply an approved concrete bonding compound on the exposed concrete surfaces as recommended by the manufacturer.

d. Forms shall be positioned so that the profile of the existing foundation above grade will be matched.

If there are adequate existing conduit sweeps which can be used to install the new conductors, it will not be necessary to modify the foundation. It will be the Contractor's responsibility to ascertain that he may use the existing sweeps.

20. The Contractor shall install a polyolefin 500lb stress pull line, or approved equal, and a bare, stranded #8 copper tracer wire into all proposed conduits.
21. Upon completion of the conduit system for communications, furnish the Engineer with a plan of record drawing detailing the horizontal and vertical locations of the conduit system.

716.03.01 – Unpaved Trenching

Install conduit in all unpaved areas. Rake smooth the top 1 1/2 inches seed with same type of grass as surrounding area. Finish unpaved areas flush with surrounding natural ground.

Pre-Approvals and Minimum Depth Requirements

Obtain approval before beginning drilling operations.

At all points where HDPE conduit will traverse under roadways, driveways, sidewalks, or Controlled Access Areas including entrance/exit ramps, and railroad right-of-way, maintain a minimum depth of 4 feet or 8 times the back reamer's diameter, whichever is deeper. For an installation that runs parallel to a controlled access area or entrance/exit ramps maintain a minimum depth of 18 inches below finished grade. Maintain a minimum clearance of 18 inches below finished grade when crossing ditch lines. For the following structures, the minimum clearance requirements are:

Man-made Structure	**Minimum Clearance Requirement**
Bridge foundation	5' horizontal & 4' vertical (clearances greater than minimum horizontal should continue to

	use the 4V:5H ratio, i.e., 10’ horizontal should be no deeper than 8’)
Drainage pipes less than 60”	1’ above or below [while maintaining a minimum depth of 18” below grade]
Drainage pipes greater than 60”	1’ above or 4’ below [while maintaining a minimum depth of 18” below grade]
Box Culverts	1’ above or 4’ below [while maintaining a minimum depth of 18” below grade]
Slope protection	2’ below
Slope protection foundation footing	5’ below

Guarantee the drill rig operator and digital walkover locating system operator are factory-trained to operate the make and model of equipment provided and have a minimum of one year experience operating the make and model of drill rig. Submit documentation of the operators’ training and experience for review at least two weeks before start of directional drilling operations.

Provide a means of collecting and containing drilling fluid/slurry that returns to the surface such as a slurry pit. Provide measures to prevent drilling fluids from entering drainage ditches and storm sewer systems. Prevent drilling fluid/slurry from accumulating on or flowing onto pedestrian walkways, driveways, and streets. Immediately remove all drilling fluids/slurry that are accidentally spilled.

Perform test pit when crossing underground utilities to confirm the vertical elevation of such utilities. Maintain minimum 12 inch separation between utilities unless otherwise approved by the Engineer. Backfill test pit with excavated material and restore to existing conditions. Test pits shall be performed only after notification of such requirements are provided to the Engineer 48 hours in advance of the request.

716.03.02 – Directional Drill Operations

Provide grounding for the drill rig in accordance with the manufacturer’s recommendations.

Place excavated material near the top of the working pit and dispose of properly. Backfill pits and trenches to facilitate drilling operations immediately after drilling is completed.

Use drill head suitable for type of material being drilled and sized no more than 2 inches larger than the outer diameter of the conduit. Direct drill to obtain proper depth and desired destination. Pressure grout with an approved bentonite/polymer slurry mixture to fill all voids. Do not jet alone or wet bore with water.

During drilling operation, locate drill head every 10 feet along drill path and before traversing underground utilities or structures. Use digital walkover locating system to track drill head during directional drilling operation. Ensure locating system is capable of determining pitch, roll, heading, depth, and horizontal position of the drill head at any point.

Once drill head has reached final location, remove head, and install back reamer of appropriate size (no more than 2 inches larger than outer diameter of conduits) to simultaneously facilitate back reaming of drill hole and installation of conduit. Back reamer is sized larger than actual conduits to ensure conduits are not adversely subjected to deviations caused by the original drill operation and are as straight as practical in their final position.

The intent of these Specifications is to limit the diameter of the actual drill shaft/hole so that it is no more than 2 inches larger than the conduit outer diameter. The 2-inch larger diameter may be accomplished during the original bore or during the back reaming/conduit installation process.

Once installation of conduit has started, continue installation without interruption so as to prevent conduit from becoming firmly set. Apply bentonite/polymer slurry mixture during conduit installation.

Upon completion of conduit installation, perform a mandrel test on conduit system to ensure conduit has not been damaged. Furnish non-metallic mandrel with a diameter of approximately 80% of the inside diameter of the conduit in which it is to be pulled through. If damage has occurred, replace the entire length of conduit and ensure that pull line is re-installed.

Drilling Fluids

Use lubrication for subsequent removal of material and immediate installation of the conduit. The use of water and other fluids in connection with directional drilling operations will be permitted only to the extent necessary to lubricate cuttings. Do not jet alone or wet bore with water. Use drilling fluid/slurry consisting of at least 10 percent high-grade bentonite/polymer slurry to consolidate excavated material and seal drill hole walls.

Transport waste drilling fluid/slurry from site and dispose of in a method that complies with local, state and federal laws and regulations.

Conduit Splicing

With prior approval, install a junction box at locations where splicing or coupling of conduit is necessary. Otherwise, splicing or joining of HDPE conduit is prohibited.

Reuse of Existing Conduit

Prior to use of existing conduit, the Contractor shall be responsible for verifying the usability of the conduit for the size cable(s) called for in the Plans and clear any existing debris/blockages in a manner that is approved by the Engineer. Pull rope shall be installed after the conduit has been confirmed clear prior to installing required cables. For any locations where new conductors are to be installed where existing cable is present, the Contractor shall not damage nor affect the usability of performance of the existing cable.

716.04 – Size

1. Conduit from an electrifier to an adjacent pull box shall be two inches minimum diameter.

2. Conduit from a pedestrian push button to the adjacent pull box shall be 2" minimum diameter.

3. Where junction boxes are installed adjacent to the base of signal standard or controller pedestal, conduit installed between the junction box and the signal standard or pedestal shall not be less than 3 inches in diameter.

4. Conduit for detector runs shall not be less than 1 1/2 inch in diameter.

5. All other conduit not specified shall not be less than two inches in diameter.

716.04 – Measurement and Payment

1. Conduits, as referred to within this section, shall include all hardware necessary to make a complete unit with proper coupling, pull wire, ground wire and any other material or equipment necessary for a complete installation.

   Method of Measurement: Conduits will be measured in units in linear feet for each size and type as specified on the plans.

   Basis of Payment: The unit price for conduit shall be based on the following work tasks specified on the plans.

   Furnish and Install: The unit price for conduit furnished and installed shall include the conduit that conforms to section 716 of this specification, fittings, couplings, bonding system, joint material, pull wires, plastic spacers when required, tools, equipment, labor, including trenching, backfilling, restoration and incidentals necessary for a complete and accepted installation in accordance with this section.

2. Pull Wire and Tracer Wire, as referred to within this section, shall include all material or equipment necessary for a complete installation within existing conduit. Wires installed within proposed conduit shall be paid for by the price of the conduit.

   Method of Measurement: Pull Wire and Tracer Wire will be measured in units of Linear Feet (LF) for each size and type as specified on the plans.

   Basis of Payment: The unit price for Pull Wire and Tracer Wire shall be based on the following work tasks specified on the plans.

   Furnish and Install: The unit price for Pull Wire and Tracer Wire furnished and installed shall include the materials, tools, equipment, labor, and incidentals necessary for a complete and accepted installation into existing conduit in accordance with this section.

++ END OF SECTION ++

SECTION 725 – PEDESTAL POLE AND BASE

725.01 - Description

The pedestal pole and base shall conform to contract drawings and specifications, VDOT specifications and shall be designed to carry the loading as specified on the contract drawing and specifications. The work under this section shall consist of designing, supplying, and installing a pedestal pole and base.

725.02 - Design

The pole shall consist of the following design parameters:

A. A tempered steel monotube shaft complete with anchor base, anchor bolts and nuts, reinforced handhole with cover, pole cap and J-hook welded inside of pole at top.

B. All casting shall be clean and smooth with all details well defined and true pattern.

C. All components of the pedestal pole shall be designed to withstand pressure created by winds of at least 110 mph in accordance with AASHTO latest approved edition.

D. The shaft shall be circular in cross section and shall have a uniform taper of not more than 0.14 inch per foot of length from the base to the top.

E. The shaft shall have a minimum yield strength of 60,000 psi after fabrication.

F. The design of the pole foundation shall be in accordance with VDOT Specifications, Section 105 (See Specifications Section 770).

725.03 – Materials

A. Aluminum Pedestal Pole

The aluminum pedestal pole shall be extruded with the following minimum requirements:

Aluminum Alloy	6063-T6
Tensile Strength, KSI	30
Elongation (% in 2")	25
Standard Wall Thickness	0.237 inches
Outside Diameter	4.50 inches

Threading and deburring shall be in accordance with the basic dimensions of American National Standard Taper Pipe Threads, NPT (ANSI B2.1).

The aluminum pedestal pole shall be free of excess material, heat discoloration, irregular grain spacing, grain patterns, waviness, scratches, burrs or other surface defects.

B. Pedestal Pole Base

Upper end shall be threaded to receive a 4 inch NPT pipe shaft.

The pedestal pole base shall be of such design that it may be fastened to a foundation with four (4) anchor bolts located 90 degrees apart on the bottom of the base. There shall be slots in the bottom of the base 1 1/2 inches wide and 2 1/2 inches long measured along the circumference of the bolt circle, allowing a proper fit even if the bolts are placed slightly off center.

The pedestal pole base shall accommodate bolt circles of a minimum of 12 inches through a maximum of 14 1/2 inches and anchor bolts with a minimum of 5/8 inches through 1 inch diameter.

It shall be equipped with a removable plastic door. Door opening shall be free of burrs and sharp edges. The door shall be attached to the base using one socket button head screw to prevent unauthorized entry.

The base shall be fabricated free of voids, pits, dents, molding sand and excessive foundry grinding marks. All design radii shall be smooth and intact. Exterior surface finish shall be smooth and cosmetically acceptable by being free of molding fins, cracks and other exterior blemishes.

The base shall be fabricated from new aluminum ingot. No scrap materials shall be used. Minimum requirements as follows:

Aluminum Alloy	319	Elongation (% in 2")	l.5
Tensile Strength, KSI	28	Brinell Hardness	70-100
Yield Strength, KSI	14		

Structural Integrity:

In order to prove structural soundness a certification from a recognized independent structural laboratory shall be provided certifying that the base will withstand a bending moment of 10,750 ft. lbs. Such test shall be performed in the following manner:

A force shall be applied to the end of the pipe measured from the bottom of the base in order to produce a moment capacity of 10,750 ft. lbs without

breaking, cracking or rupturing in any manner. After the force has been removed, the lever arm shall return within 0.250 inches of its original rest position. All tests shall be made using 4" Schedule 40 Steel Pipe.

DOOR

The door shall be cast from 319 alum alloy. All flat surfaces shall be straight without blisters, buckling or warping. The bottom of the door shall have 2 molded lugs with slots of the proper width and depth to fit the base door opening.

HARDWARE

The base shall be supplied with a set of 4 Anchor Bolts, 3/4" Diameter by 18" length, as specified. Material shall be per ASTM A-572 and galvanized per ASTM A-153. Each bolt shall have (1) Hex Nut and (1) Flat washer.

CERTIFICATION

Material certification consisting of physical and chemical properties of the castings shall accompany the material submittal.

725.04 – Finish

The finish shall conform to the requirements as specified in the contact plans and specifications according to the following types:

A. **Aluminum Pedestal Pole**

TYPE A

Finish Type A shall have a rough surface texture consisting of a uniform grain pattern that is perpendicular to the axis of the pole for the full length of the pole.

TYPE C Black

Finish Type C shall have a textured grain profile having a surface roughness of at least two, but not more than four times the Roughness Average which shall be 250 micro inches. The color shall be City of Norfolk “Black”, Color Number FS 27038, Federal Standard 595B.

B. **Pedestal Pole Base**

Square cast aluminum with natural finish or painted as specified in the bid documents. Base shall have a minimum weight of 21 lbs.

TYPE A

Finish Type A shall have a rough surface texture consisting of a uniform grain pattern that is perpendicular to the axis of the pole for the full length of the pole.

TYPE C Black

Type C shall have a textured grain profile having a surface roughness of at least two, but not more than four times the Roughness Average which shall be 250 micro inches. The color shall be City of Norfolk "Federal Green", Federal Standard Colors No. 14062, Federal Standard 595B.

725.05 - Certification

Material certification consisting of physical and chemical properties of the castings shall accompany the material submittal.

725.06 - Warranty

The standard assembly shall be guaranteed from any defects and workmanship for a minimum of two years at installation.

725.07 - Installation

A. The standard assembly shall be securely bolted to the prepared foundation in a manner so that, after all signals, hardware, and luminaries have been installed, the shaft shall be plumb. Stainless steel shims shall be used, if necessary for raking.

B. All exposed edges of the plates which make up the base assembly shall be finished smooth and all exposed corners of such plates shall be neatly rounded to l/8" radius, unless otherwise shown on the plans.

C. Each standard assembly shall be effectively grounded using a #6 copper wire attached to a pole by a stainless steel bolt and to the ground rod by a square head bolt clamp.

D. There shall be NO grouting around the pole base and the top of the foundation.

E. The completed assembly shall be effectively weatherproof with no uncovered openings.

725.08 – Measurement and Payment

Method of Measurement: A pedestal pole and base will be measured in units of each for the size and height specified on the plans.

Basis of Payment - the contract unit price per assembly shall be based on the following work tasks.

A. **Furnish and Install**: The unit price to furnish and install a standard pedestal pole and base shall consist of shaft, anchor base, anchor bolts, nuts, washers, paint, flange plates, hardware, template, tools, equipment, labor, and incidentals necessary for a complete and accepted installation in accordance with Section 725 of this specification.

++ END OF SECTION ++

SECTION 735 – Internal 170 Ethernet Module

735.01 - Description

This work shall consist of furnishing, installing and testing Internal 170 Ethernet Modules in accordance with these Specifications and as directed by the Engineer. Furnish and install Internal 170 Ethernet Module in the existing controller.

735.02 - Design

The Internal 170 Ethernet Card shall meet the following design requirements.

1. Model 400 modem footprint
2. 100 Base-T RJ45 connector
3. Direct IP addressable
4. Auto Sensing
5. 170 Standard
6. .063", double-sided, FR4, solder masked, with plated through holes, gold-plated finger contacts, conformal coated
7. Operating temperature: -37º C to +74º C Humidity: 0 to 95% (non-condensing)
8. Power Requirements: +12 VDC + 5% @ 75 mA

735.03 – Functional Requirements

The Internal 170 Ethernet Card shall meet the following functional requirements.

1. Network Interface:
    a. Interface: Ethernet 10Base-T or 100Base-TX (Auto- Sensing)
2. Protocols:
    a. TCP/IP, UDP/IP, ARP, SNMP, TFTP, Telnet, DHCP, BOOTP, HTTP and AutoIP
3. Security:
    a. Password protection
    b. 256-bit AES encryption

735.04 – Installation

Install the Internal 170 Ethernet Module in the existing controller in locations shown in the project plans, or as directed by the engineer. Connect Ethernet patch cable to the Ethernet switch as shown in the plans. Secure and neatly route patch cable in the cabinet with appropriate cable ties and strain relief. Provide a minimum of three feet of slack for the cable.

1. Install the Internal 170 Ethernet Modules in the Type 400 modem slot in the 170 controller.

2. Configure as necessary.

3. Provide Ethernet Patch cable and route the cable through the top of the controller cage as shown on the plans.

The Contractor shall be responsible for providing a complete, functional system including all necessary cables and connectors in accordance to the specifications and as specified on the plans. All miscellaneous patch and interconnect cables shall meet the proposed equipment specification requirements and shall meet EIA/TIA telecommunications standards.

735.05 - Warranty

The Internal 170 Ethernet Module shall be warranted against defects in materials and workmanship for a period of two (2) years from the original date of delivery.

735.06 – Measurement and Payment

Method of Measurement: The unit price shall be measured in units of EACH (EA).

Basis of Payment: The unit price for an Internal 170 Ethernet Module shall be based on the following work tasks.

A. **Furnish and Install**: The unit price for furnishing and installing an Internal 170 Ethernet Module shall include the tools, equipment, labor, and incidental fittings necessary to install the Internal 170 Ethernet Module will be considered full compensation of this work task.

++ END OF SECTION ++

SECTION 755 – SPAN, TETHER, AND LASHING WIRE & SPAN WIRE ASSEMBLY

755.01 – Description

The work under this section shall consist of furnishing and installing of span wire, tether wire, lashing wire, and span wire assembly used for traffic signal installation as shown on the Contract Drawings or as ordered by the Engineer and in conformance with these specifications.

755.02 – Materials

1. **Span Wire** - shall meet the following requirements for the specified application.

   The span wire shall be of ½ inch nominal diameter, 7-strand, galvanized conforming to ASTM A475, (10 M) Utilities grade or better.

2. **Tether Wire -** shall meet the following requirements for the specified application.

   The tether wire shall be of 7/16 inch nominal diameter, 7-strand, galvanized conforming to ASTM A475, high strength grade of better.

3. **Lashing Wire** - shall meet the following requirements for the specified application.

   The lashing ties shall be heavy duty black weather-resistant and UV resistant Type PLT cable ties.

   Reel Size –

   l) The reel size for span and tether wire shall be in l000 foot reels.
   2) The coil for the lashing wire shall be in 375 foot coils.

4. **Span Wire Assembly**

   The components of the span wire assembly shall comply with the details on the plans and the following specifications.

   Span Wire Hanger - The span wire hanger shall be cast ductile iron or equivalent, free of voids, pits, dents, molding sand and excessive foundry grinding marks.

   Disconnect Hanger - The disconnect hanger shall comply with the following;

The disconnecting housing shall be made of cast aluminum alloy with a removable cover. A standard balance adjuster fitting at the top shall be supplied and made of the same material. The housing shall contain a tri-stud head type adapter to connect to the signals.

Terminal Block - Inside the housing shall contain a 12-circuit or 18-circuit field wires marathon terminal block wired to a multi-circuit female type connector. A male mating connector with an attached wiring harness shall be included for making connections to the signal head. The harness shall have a minimum length of 48 inches.

Color - The disconnect hanger and balance adjuster shall be Black color.

Cover Plate - The cover plate shall fasten with a single thumb screw and must swing-out of the way for access to the hanger's interior.

Tri-Stud Washer - Kit-A Tri-stud washer kit shall be provided and it shall consist of neoprene weather seal gasket, tri-stud locking plate, lock washers and aluminum nuts.

755.03 – Packing and Shipping

The package and shipping requirements shall be in accordance with section ll0 of these specifications.

755.04 - MEASUREMENT AND PAYMENT

1. **Span Wire, Tether Wire, and Lashing Wire**

Method of Measurement - The furnishing and installation of the wire, accessories, and the tools, equipment, and labor required to do so shall be considered incidental to the relocation of existing fiber optic cable (refer to Section 510) and the Wireless Detection System (refer to Section 825) and will not be measured or paid for separately.

++ END OF SECTION ++

SECTION 770 – FOUNDATIONS

770.01 – Description

This work under this section describes the minimum requirements for installation of foundations.

Foundations for controller cabinets, traffic signal poles, and pedestal poles shall consist of designing, furnishing in accordance with VDOT Section 105, and installing and shall conform to the size, type, location, and details as shown in the contract plans, or as ordered by the Engineer, and conform with these specifications.

770.02 - Material

All signal pole foundation designs shall be provided by the Contractor. The Contractor shall submit all designs signed and sealed, by a licensed Professional Engineer in the Commonwealth of Virginia, for review and approval by the Engineer. The foundations shall conform to the following general specifications and specific requirements:

a. Concrete shall conform to the requirements with Sections 217 and 404 of the Virginia Department of Transportation (VDOT) Road and Bridge Specifications, 2007, for Class "A-3", general use, air entrained (3,000 P.S.I) Hydraulic Cement Concrete.

b. Steel reinforcements shall conform to Section 223 of the applicable requirements for "Steel Reinforcement" given in the VDOT Road and Bridge Specifications, 2007, and shall be of type and size as indicated on contract plans.

c. Ground rod shall be a 5/8" diameter by 24' copper-clad steel rod conforming to UL467 (ANSI C33.8) or as directed by the Engineer.

d. Anchor bolts shall be furnished by the pole manufacturer in accordance with plans and specifications. For mast arm foundations, the Contractor shall be responsible to ensure that the correct bolts are provided of the length and diameter as indicated on the details for the mast arm foundations, and coordinate their installation with the Project Engineer. Mast arm pole bolts shall be furnished with an extra square nut for plumbing.

e. Signal pole and mast arm assembly foundation shall be VDOT Standard PF-1.

f. Pedestal pole foundation shall be VDOT Standard PF-2.

g. Traffic controller cabinet foundation shall be CF-2 Modified or CF-3.

770.03 – Installation

Installation of foundations shall follow specification installation procedures and in accordance with these specifications.

a. The Contractor shall survey and stake the right-of-way line and the location of the proposed signal pole, pedestal pole, and cabinet foundations prior to installation. After locations have been staked, the Contractor shall coordinate with the project Engineer to confirm the final locations of all poles and cabinet foundations.

b. Concrete foundations shall rest on firm ground.

c. Foundations for post, signal standard, or pedestal, not located on structures, shall be placed "in the solid" and monolithic, except for the top 4" which shall be placed after the post, signal standard, or pedestal is in proper position.

d. Welding shall not be performed on any portion of galvanizing part of the high strength anchor bolts, anchor bars, or studs.

e. Each foundation shall be permanently marked to indicate all sides from which conduits pass. The mark shall be made with a trowel when finishing the concrete and shall be 1/4" deep and 4" to 6" long.

f. When foundations extend 4" above the finished grade, all corners shall be chamfered 3/4".

g. When a foundation is to be abandoned, the top of the foundation, anchor bolts, and conduits shall be removed to a depth of not less than 3 feet below the surface of sidewalk or unimproved ground. The resulting hole shall be back-filled and landscaped with material equivalent to the surrounding material.

h. Top of foundations for posts, signal standards, and pedestals, except where directed by Engineer, shall be finished flush with natural ground or sidewalk grade.

i. Forms if used shall be true to line and grade. Forms shall be rigid and securely braced in place. Conduit ends and anchor bolts shall be placed in proper position and to proper height, and shall be held in place by means of a template until the concrete sets.

j. All forms shall be treated with oil or an approved form-coating material, or thoroughly moistened with water immediately before placing the concrete.

k. Posts, poles, standards, and pedestals shall not be erected until the foundation has set for 14 days, and shall be plumbed or raked, as directed by Engineer.

l. When shown on the plans, the Contractor shall modify the existing controller or pole foundations to allow the new conduit sweeps to enter the foundation in accordance with the following:

1. Remove concrete by cutting, chiseling or any other approved method as required to install new conduit sweeps without damage to existing conduit(s). The Contractor shall repair any damage incurred at no additional cost to the City.

2. After removing concrete, the area shall be washed with pressurized water and thoroughly dried with compressed air.

3. Position new conduit sweeps, and apply an approved concrete bonding compound on the exposed concrete surfaces as recommended by the manufacturer.

4. Forms shall be positioned so that the profile of the existing foundation above grade will be matched.

If there are adequate existing conduit sweeps which can be used to install the new conductors, it will not be necessary to modify the foundation. It will be the Contractor's responsibility to ascertain that he may use the existing sweeps.

770.04 - Measurement and Payment

Method of Measurement: Pedestal Pole Foundations (VDOT Std PF-2), and Traffic Controller Cabinet Foundations (CF-2 Modified or CF-3) will be measured in units of Each (EA). Signal Pole Foundations (VDOT Std PF-1) will be measured in units of Cubic Yards (CY).

Basis of Payment - The unit price shall be based on the following work tasks specified.

Furnish and Install - The unit price for a furnished and installed standard specified foundation shall include design of foundation, materials (concrete, reinforcing steel, ground rod, conduits when required, excavation, backfill with suitable material, compaction and disposal of suitable material), labor, equipment and incidentals for a complete installation in accordance Section 770 of these Specifications. Foundation structural design computations shall be submitted to Owner. Separate measurement and payment for surveying and staking the right-of-way line and locations of proposed pole and cabinet foundations will not be made under this item and is considered incidental to the furnishing and installation of each foundation.

++ END OF SECTION ++

SECTION 810 - EMERGENCY PRIORITY SYSTEM

810.01 - Description

This work shall consist of furnishing and installing emergency priority system in accordance with these specifications and as shown on the plans or as directed by the Engineer.

810.02 - Equipment

Emergency priority system shall be optically activated providing all features and functions as the existing equipment within the City of Norfolk's emergency priority system and shall fully interface with existing equipment. Existing equipment consists of 3M's: Model 711 Single Channel – One Direction Optical Detector; Model 721 Single Channel - Two Direction Optical Detectors; Model 722 Dual Channel (two outputs) – Two Direction Optical Detectors, Model 764, Dual Priority, Dual Mode, Infrared/GPS Phase Selectors necessary to interface the priority detection devices to the controllers. Phase selectors are configured for installation directly into the input file slots of the Type 170 traffic controllers in the signal cabinet. When input file space is not available, the 3M Model 760 Card Rack and wiring harness is required. Depending on the specific project a 3M Model 758 Auxiliary Interface Panel and Cable may be used to provide connection for auxiliary detection and/or activation of confirmation lights.

The Conductor cables, 3M Model 138 detector cable, between the optical detectors and the phase selector(s) shall be installed in accordance with the manufacturer's recommendations. Typically this is a direct connection to the lower input file rear terminals based on the channel configuration. Transient protection for the cables shall be in accordance with VDOT Specifications Section 703.02(d) 3b.

Mounting assemblies for the Optical Detectors shall be fabricated from corrosion resistant materials or shall be galvanized.

810.03 - Procedures

Locations of optical detectors shown on Project Plans are approximate; exact locations shall be as required for proper alignment. Installation of all emergency priority system equipment shall be in accordance with the manufacturer's recommendations. The Contractor shall provide all equipment necessary to completely install this equipment including programming the phase selectors. The software required for programming the phase selectors shall remain the property of the Contractor. The City of Norfolk shall be provided with a copy of each intersection's programmed database on a read/writeable CD ROM. Emergency priority system conductor cables shall be permanently identified in accordance with VDOT Specifications Section 703.03(g) except tags shall indicate identification of the optical detector and the direction of approach. The Contractor shall provide the manufacturer's installation, operational and maintenance manuals for each piece of equipment to the Engineer.

810.04 - Testing

Testing of the emergency priority system shall be accomplished in the presence of the Engineer or their assigned representative. The Contractor shall provide the City of Norfolk with an emergency priority system acceptance test procedure for approval prior to scheduling any system testing. The Contractor shall contact the Engineer (757-664-7300) 72 hours in advance to arrange priority/preemption system acceptance testing. The Contractor shall have the manufacturer's representative on site for testing and set up of the emergency priority system. The City of Norfolk will provide an operator and vehicle equipped with an emitter for the test to determine if equipment is operating and logging properly. Deficiencies shall be corrected and faulty equipment replaced by the Contractor at no expense to the City of Norfolk.

810.05 – Measurement and Payment

Method of Measurement:

The installation of an Emergency Priority System is location and configuration dependant. Therefore the Method of Measurement is based on a summary of the quantity of the following components required for the specific Project.

A. Furnish and Install Emergency Priority System Optical Detector will be measured in units of Each (EA) for each **Optical Detector** unit, based on type, supplied for the system shown in the project plans.

B. Furnish and Install Emergency Priority System Phase Selector will be measured in units of Each (EA) for each **Phase Selector** unit, based on type, supplied for the system shown in the project plans

C. Furnish and Install Emergency Priority System Conductor Cable between the optical detectors and the phase selector(s) will be measured in units of linear feet (LF) and will be paid for at the contract unit price per linear foot.

Basis of Payment:

A. Furnish and Install Emergency Priority System Optical Detector: The unit price for each furnished and installed **Optical Detector** shall include the detector, mounting assembly, transient protection and all system documentation, labor, equipment, tools, calibration/alignment and testing and incidentals necessary for a complete and accepted installation in accordance with this section. Connecting the Optical Detector to the cable is incidental to the cost of the detector.

B. Furnish and Install Emergency Priority System Phase Selector: The unit price for each furnished and installed **Phase Selector** shall include the phase

selector, conductors, mounting assemblies, cabinet connecting cables, wiring harnesses, transient protection and all system documentation, labor, equipment, tools and testing and incidentals necessary for a complete and accepted installation in accordance with this section. All cabinet wiring, component configuration, set-up, programming, diagnostics, calibration, and modifications required for a complete and accepted installation, including operations of auxiliary detectors, operations of confirmation lights, and communications from the Priority System are incidental to the cost of the Phase Selector.

C. Furnish and Install Emergency Priority System Conductor Cable: The unit price for furnished and installed **emergency priority system conductor cable** shall include the cabling, labor, equipment, tools and testing and incidentals necessary for a complete and accepted installation in accordance with this section.

+ END OF SECTION ++

SECTION 820 – OPTICAL VIDEO DETECTION

820.01 - Description

This section describes the minimum design standard for the equipment requirements for non-intrusive optical vehicle detection system that detects vehicles for presence. The detection system shall conform to these specifications. The non-intrusive vehicle detection system shall be by means of a video camera mounted at or near the intersection and shall detect all legal vehicles and pedestrians. The system shall be housed in either a standard 336 or 332 170-Type cabinet. The vehicle detection system shall NOT require a separate PC or software to setup, maintain or operate. Detection is established by processing an image provided by a video camera. The detection algorithms shall have a proven record of field use at other installations for at least three (3) years of service. The detector board (Video Image Processor) shall work with any video source and shall be capable of outputting the video signal (image) to a remote site. The system shall be capable of monitoring vehicles by providing video detection for areas outlined in the project plans and by providing vehicle counts in zones/lanes identified in the project plans. Each detector shall incorporate a fail safe operation if the video signal is lost or is of poor quality. The detection needs of the intersection determine the total number of optical detectors (cameras) and video image processors (VIP modules) required. Each traffic signal cabinet or system detector cabinet will require only one (1) communications module and only one (1) video monitor. The City of Norfolk currently uses TRAFICON model VIP3D.1 or VIP3D.2 equipment, depending on field conditions. An approved optical video detection system shall conform to the following specifications at a minimum.

820.02 – Hardware Components and Requirements

The Video Detection System shall consist of the following components and requirements:

- IP addressable Video Detection Module Video Image Processor (VIP) (detector board)
- Remote Monitoring and Image Storage Module. (Communications Module).
- IP Video Camera(s) with IR Filter, Lens, Enclosure, and Sunshield.
- Luminaire Arm or Signal Mast Arm Sensor Bracket(s).
- Ethernet/Power/Control Cable.
- Surge Suppression for the Ethernet cable, power and camera control conductors.
- Programming Devices and/or Software.
- All Other Necessary Equipment for Operation.

a) The detector shall be modular by design and is installed (Plug-in) directly into a standard Type-170 Controller input file, in place of a loop detector card. The detector shall be powered from AC mains.

b) The system shall control from 1 to 8 detectors for at least one camera for each detector.

c) The system shall meet or exceed all NEMA TS-1, TS-2, and Type 170 environmental specifications for operating conditions. The operating temperature range shall be from -30 to +60 degrees Centigrade and at 0 to 95% relative humidity non-condensing.

d) The system shall utilize 12-40 VDC or 110/220 VAC and draw less than 2 amperes. Surge ratings shall be as set forth in the NEMA TS-1 and TS-2 Specifications.

e) The VIP board shall have a minimum of 1 video input. For use in applications requiring multiple detection zones, the VIP board shall have 2 video inputs (RS-170 NTSC or CCIR composite video) and one video out.

f) Each detector board shall have error detection. Outputs will be turned "ON" if the video signal is bad or the VIP board is not functioning properly. A user defined quality level will automatically put selected outputs to recall in cases of severe degraded visibility (i.e., fog, blizzard, etc.). Normal detection resumes when visibility improves above the user defined quality level.

g) A video select button on the detector board front panel will switch between camera images of the VIP in applications with multiple detection zones.

h) The detector board shall have a reset button on the front panel to reset video detectors to "learn" the roadway image. During "relearn", selectable recall can be enabled or disabled for immediate operation. Learning time of video detectors shall be less than 6 minutes.

i) External surge suppression, independent of the detector board shall separate the detector board from the image sensor.

j) The detector (VIP board) shall have separate light emitting diodes (LED) that indicate power, communications, and vehicle presence.

k) Ethernet communications from the Communications Module shall be through an RJ-45 port. This port shall be used to communicate to a laptop PC or Ethernet switch to upload/download detector configurations, count data and software upgrades.

l) The Communications Module shall be capable of transmitting video using MPEG-4 or H.264 video compression technology; it shall provide real-time video streams over the STC network, with traffic detection information included. It shall support standard Real Time Streaming Protocol (RTSP) for delivering video at full frame rate.

820.03 – Detector Board Functional Requirements

a) Each Detector shall be capable of processing the video signal of one or more cameras. The video shall be analyzed in "real time". The detector shall detect the presence of all legal vehicles or pedestrians within the view of the connected camera. User programmable areas shall be defined by keypad or other device not requiring a PC or other software device. Each detector shall detect vehicles in a minimum of eight zones.

b) Each detector board shall be capable of processing the video signal of one or two cameras. The video signal shall be analyzed in real time (up to 30 frames per second)

c) The system shall be expandable up to 12 cameras that may be connected to different detector units and programmed independently.

d) The system shall be capable of displaying detectors on the video image with associated outputs. Outputs/Inputs status will be indicated on the screen. Parameters will also include the ability to view raw video without any verbiage and/or detectors for surveillance purposes.

e) Each detector board will detect within the view of the connected camera the presence of vehicles in user defined zones. Detectors available shall be presence, count, delay, extension, or pulse mode for either arrival or departure of vehicles.

f) The detector board shall be programmed without the use of a supervisor computer. A standard CCTV monitor and keypad plugged into the detector board's serial port will facilitate detector programming. In addition, a standard laptop or PC plugged into the network will facilitate detector programming.

g) All detectors and parameters can be changed without interrupting detection. For example: when one detector is modified all existing detectors continue to operate, including the one that is being modified. When the new position is confirmed, the new detector will enter a learning phase. Once the new detector is in function it will take over the job of the old one. In this way, the detector is always fully operational with no interruption on any detector, even during modification. Learning phases for new detectors shall not exceed 6 minutes.

h) The detector board shall be able to emulate loop emulation with user selectable loop dimensions.

i) When a vehicle is within a detection zone and approaching from the proper direction, the detection zone shall change appearance so as to graphically identify a call.

j) The contractor shall submit a vendor recommended Video Detection System test procedure to the Engineer for approval prior to final Video Detection System acceptance testing.

820.04 – VIP Communications Module:

a) The board shall be modular by design and fit directly into Type 170/2070 input files.

b) Shall only occupy a single detector file slot.

c) The board shall control from 1 to 4 VIP boards allowing for 1 to 8 image sensors.

d) Shall be designed to operate reliably in the adverse environment of roadside cabinets and shall meet or exceed Type 170/2070 environmental specifications.

e) Ambient operating temperature shall be from –30 to +60 degrees Centigrade at 0 to 95% relative humidity non-condensing.

f) Shall be powered by 12-24 VDC or 110/220 VAC and draw less than 2 amperes.

g) Surge ratings shall be set forth in the NEMA TS1 and TS2 specifications.

h) The Communication board shall have separate light emitting diodes (LEDs) that indicate power, communications, and video output.

i) The communication board shall be programmed without the use of a supervisor computer. A standard CCTV monitor and keypad plugged into the communication serial port will facilitate board programming.

j) The communication shall support H.264/MPEG-4/MJPEG dual streaming video over Ethernet.

k) Shall send the traffic data from the VIP boards at a programmable interval from 10 seconds to 60 minutes.

l) A (via Ethernet) connection with any standard Internet browser shall be possible to communicate with the Communications Module for remote set-up, monitoring and real-time traffic data (count, speed, occupancy) of the VIP modules.

m) Communications Module and VIP firmware upgrades shall be possible via Ethernet communication.

820.05 - Image Sensor Camera

A high resolution color or black and white CCD camera of appropriate focal length shall be provided. The video detection system shall use the video signal from this camera to detect vehicles. The camera shall produce a noise free signal at scene luminance of no more than 2.0 lux. The image sensor shall have an automatic gain control, automatic iris and black level clamping.

The camera shall be housed in a NEMA-4 water-resistant, dust proof enclosure. The camera shall come equipped with all necessary filters, mounting brackets, hardware, cabling and incidentals for a complete and accepted installation.

The camera unit shall be a high resolution, 1/4” image format CCD camera, designed for professional video surveillance systems. Incorporating the latest in CCD technology, the video camera shall provide detailed video without lag, image retention, or geometric distortion.

- Temperature range -5 to + 45 degrees C
- Humidity 5% to 95% relative, non-condensing

- Finish — Off-white semi-gloss polyurethane
- Construction — All metal housing
- Imager — 1/4” Progressive scan RGB CCD
- Frame rate MPEG-4 H.264 — Up to 30 fps
- Video streaming — Simultaneous MPEG-4/H.264 and Motion JPEG Controllable frame rate and bandwidth

820.06 – Image Sensor Lens

The camera lens shall be a motorized vari-focal 6.5-65mm with auto iris.

- Image format — 1/4 inch
- Focal length — 10X zoom (6.5-65mm)
- Focus control — Motorized
- Zoom — Motorized

820.06 – Image Sensor Housing and Mounting Brackets

a) The environmental housing shall be an aluminum enclosure designed for outdoor CCD camera installations with a light gray semi-gloss polyurethane finish. The housing shall provide up to three liquid-tight fittings to accept necessary power and video cabling with diameters up to 10 mm. The window shall include a thermostatically-controlled window heater/defogger to prevent image obstruction due to atmospheric conditions. The enclosure shall be waterproof and dust tight.

b) Mast arm installations shall be mounted at a sufficient height to prevent occlusion from cross traffic between the stop bar and the mast arm on which the camera is installed. A six- (6) ft. maximum length of internally reinforced tube shall be attached to the mast arm bracket for camera mounting above the mast arm. Camera shall be mounted to the top of the tube with the camera manufacturers recommended bracket. Camera bracket shall provide adjustments for both vertical and horizontal positioning for the camera. Camera attachments shall be designed to securely fasten the camera to prevent the extension tube from falling into the path of vehicles and/or becoming loose. Miscellaneous hardware shall be stainless steel or galvanized steel. The cameras and associated pole/arm attachment unit shall be designed to withstand a wind load of 90 MPH with a 30-second gust factor.

c) Luminaire arm installations shall be installed on the luminaire arm, with the camera/video manufacturers recommended brackets. Camera luminaire brackets shall provide adjustments for both vertical and horizontal positioning of the camera. Camera attachments shall be designed to securely fasten the camera to the luminaire arm. Miscellaneous hardware shall be stainless steel or galvanized steel. The cameras and associated pole/arm attachment unit shall be designed to withstand a wind load of 90 MPH with a 30-second gust factor.

820.07 - Warranty

All components of the video detection system shall be warranted against manufacturing detects in material and workmanship for a period of three years from date of installation or thirty months from date of shipment, whichever comes first. The video detection supplier shall provide all documentation necessary to maintain and operate the system.

820.08 – Measurement and Payment

Method of Measurement - The video detection will be measured in units of each (EA) for each video processor board; each (EA) for each optical detector (camera) supplied and installed; and each (EA) for each VIP Communications Module. The video detection system conductor cable will be measured in units of linear feet (LF) between the optical detectors, the surge suppressors, and the video processor board.

Basis of Payment - The contract unit price of each per system and the contract unit price of linear feet for conductor cable shall be based on the following work tasks.

A. Furnish and Install Video Detection Optical Detector (Camera): The unit price to furnish and install a Video Detection Optical Detector (camera) shall consist of the camera, camera housing, mounting brackets, camera lens, filters, miscellaneous fittings and connectors, material, that conforms to Section 820 of this specification, shipping costs, hardware, tools, equipment, labor and incidentals necessary for a complete and accepted installation in accordance with Section 820 of this specification.

B. Furnish and Install Video Detection Video Processor Board: The unit price to furnish and install a Video Detection Video Processor Board shall consist of the video processor board, mounting devices, adapters for 170 cabinets, internal cabinet cabling, miscellaneous fittings and connectors, surge protection, camera alignment, setup of detection zones, set up of counting zones, and material, that conforms to Section 820 of this specification, shipping costs, hardware, tools, equipment, labor and incidentals necessary for a complete and accepted installation in accordance with Section 820 of this specification. A Video Detection System acceptance test procedure shall be conducted as a requirement for final acceptance.

C. Furnish and Install Video Detection Conductor Cable: The unit price to furnish and install Video Detection Conductor Cable shall consist of all material, shipping costs, hardware, tools, equipment, labor and incidentals necessary for a complete and accepted installation in accordance with Section 820 of this specification.

D. Furnish and Install VIP Communications Module The unit price to furnish and install VIP Communications Module shall consist of all material, shipping costs, hardware, tools, equipment, labor and incidentals necessary for a complete and accepted installation in accordance with Section 820 of this specification. A Communications Module System set-up and acceptance test procedure, recommended by the

manufacturer, shall be conducted as a requirement for final acceptance. The contractor and/or manufacturer representative is required to coordinate with City of Norfolk personnel to configure an IP-Address schema. This set-up shall establish the communication between the detector boards. The set-up and test shall demonstrate remote access to the Communications Module via the internet browser to allow for real-time monitoring of the video detection video processor boards (streaming video) and board setup(s).

E. Furnish Standard CCTV Monitor: There is no measurement and payment for providing a standard CCTV monitor. The contractor is required to provide one (1) standard CCTV monitor for each intersection that Video Detection is being installed at. The cost of the standard CCTV monitor is incidental to the installation of Video Detection at the intersection.

++ END OF SECTION ++

SECTION 825 – WIRELESS MAGNETIC SENSOR VEHICLE DETECTION SYSTEM

825.01 - Description

This section describes the minimum design standards, equipment requirements, and communication requirements for a wireless magnetic sensor vehicle detection system. This vehicle detection system shall be configurable to provide for vehicle count station detection. The magnetic sensors need to respond to the change in the earth's local magnetic field resulting from the presence and passage of a vehicle.

The vehicle detection system shall use battery-powered magnetic field sensors installed in the roadbed to communicate the traffic detection data by wireless communication to an aerially mounted receiver at the adjacent roadside. This receiver shall transmit the traffic detection data (via hardwired CAT5e cable) to the local traffic signal cabinet to provide for traffic counts. Detection data shall be communicated over TCP/IP via an integrated 10Base-T Ethernet interface. The system shall be scalable, and expandable, to provide detection data to a traffic signal controller using varying quantities of magnetic sensor(s), transceiver(s), CAT5e cable, riser conduit, guy assemblies, and any other device(s) and/or equipment based on the design plans.

825.02 – Hardware Component Descriptions and Requirements

a) **Detection Configuration:** Provide wireless magnetic sensors to detect vehicle traffic such as cars, trucks, and motorcycles. Ensure each sensor is sized for an installation into a minimally intrusive (approximately 4"dia x 3"deep) hole in the roadbed. The magnetic sensor shall provide vehicle traffic data for volume and/or occupancy, and shall be configurable to collect accurate speed data. The magnetic sensor shall hold a detection call when a vehicle is stopped in its detection field. The magnetic sensor should be able to simulate a detection zone of a traditional 6' x 6' inductive loop. The magnetic sensors shall operate as vehicle count detectors.

b) **Communication to Wireless Magnetic Sensors:** Provide two-way wireless communication between the magnetic sensor and the transceiver (communication) device. The installation shall ensure that there is no disruption to the wireless communication when the transceiver devices are aerially installed on poles or structures on the side-of or adjacent-to the road. The magnetic sensors shall communicate with the transceiver devices from a distance of 125 feet, at a minimum. The wireless communications within the system shall operate in an unlicensed frequency band and avoid interference with other devices operating in the unlicensed frequency band. The wireless communication devices shall provide for at least 16 frequency channels that are user-configurable.

c) **Component Placement:** Based on the location and lane configuration of the magnetic sensors, optional components may be required to provide optimal communications and system performance. The approximate location for optimal system components are shown on the plans. Final installation locations for optional system components shall be approved by the Engineer.

d) **Wireless Detection System Components:**

i. Battery-powered wireless magnetic sensors installed in-pavement in each traffic lane as shown on the plans.

ii. Serial Port Protocol (SPP) Digital Radios mounted on the side of the roadway, as shown on the plans, to proposed pedestal poles (see below).

iii. Wireless Repeaters (RPs) mounted on the side of the roadway, serving to extend the radio range of an SPP, as shown on the plans.

iv. Access Point Contact Closure Interface (APCC) cards to provide sensor information processing and support the interface between an SPP and a Type 170 traffic signal controller using contact closure signals.

v. CAT5e outdoor rated bulk cable, installed aerial or in conduit, to provide connectivity and power for communication from the SPP Digital Radio to the APCC Interface Cards, through the Isolation Module.

vi. Isolation (ISO) Module to provide surge suppression and isolation, as well as providing signal conditioning to enhance the communication distance from the SPP and the APCC

vii. Optional Extension (EX) cards to provide additional detector outputs to a traffic controller

viii. Optional Input/output (I/O) Module is used to provide additional communication options, memory option and a battery backed real time clock

ix. Software to control and configure the sensors, APCC, SPP's and RPs

x. Software to store and retrieve detection data

e) Serial Port Protocol (SPP) Digital Radio Pedestal Pole and Foundation: Furnish and install a pedestal pole of a height equal to the mounting height of the SPP Digital Radio plus eighteen (18) inches at locations indicated on the Plans. The pole shall be a minimum 4 ½" in diameter. The pole foundation shall be made of hydraulic cement concrete and be a minimum 30" deep and 2' in diameter. All poles and foundations are to conform to Section 1302.30 and 1310.10, respectively, of the 2008 VDOT Road and Bridge Standards.

f) <u>Wireless Magnetic Sensors</u>

A. Each magnetic sensor shall transmit its detection data within 150 ms of a detected event. The magnetic sensor shall be able to sample the earth's magnetic field at a rate of 128 Hz or faster. Each magnetic sensor shall be able to transmit a unique device identifying code. The magnetic sensor shall automatically recalibrate its threshold values in response to changes in the ambient magnetic field based on user-programmed criteria.

B. Each magnetic sensor shall be manufactured as a single-housing module. The components of the magnetic sensor shall be fully encapsulated within the housing to prevent moisture from degrading the components. The magnetic sensor shall operate at temperatures from -37 degrees F to 176 degrees F. The magnetic sensor shall be equipped with battery-power with an average life expectancy of 10 years when the magnetic sensor is operating under normal traffic conditions.

C. The magnetic detector shall be enclosed in a clear injection molded clamshell style case made of polypropylene, recommended by the manufacturer, for protecting the sensor in the roadway. This case shall protect the magnetic sensor from the sealant material. The case shall hold the sensor in place and is form-fitted to ensure the cured sealant does not collapse when exposed to traffic loads.

g) <u>Wireless Magnetic SPP Digital Radio</u>

A. Furnish the transceiver (SSP Digital Radio) to provide detection data to the traffic signal cabinet and ensure the traffic signal controller receives each magnetic sensor detection call. The system configuration shall be capable of traffic signal controller receives both presence mode and pulse mode detection calls.

Provide indications inside the traffic signal cabinet to display each channel detection status and fault condition. Provide a switch inside the traffic signal cabinet to select presence mode and pulse mode for each channel. Provide user-selectable sensitivity levels for vehicle detection. Furnish equipment to operate in Type 332 and 336S traffic signal cabinets.

Provide software for installation and use on personal computers to upload and download configuration data to each sensor. Ensure application software is compatible with Windows 2000 and Windows XP operating systems. Ensure software does not require administrative permissions to load and operate. Ensure the software can retrieve and store detection data from the sensors. Ensure the software on the personal computer transmits data from the personal computer to each sensor through the transceiver by wireless communication. Also, provide any update to the firmware in each sensor by wireless communication. Provide a license to the Department to allow the duplication of the personal computer software as needed to design, install and maintain these systems.

825.03 – Installation and Training

Install the wireless magnetic sensor vehicle detector system in accordance with the manufacturer's recommendations. Enclose the wireless magnetic sensor in a molded clamshell style case before installation into the roadway. When installing each sensor into the hole, ensure epoxy sufficiently covers the sensor in the road surface.

Arrange and conduct site surveys with the system manufacturer's representative and Department personnel to determine proper sensor and transceiver selection and placement. Provide the Department at least 3 working days notice before conducting site surveys. The Engineer will approve final locations of sensors, transceivers and any necessary repeaters.

Install the transceiver in such a manner that avoids conflicts with other utilities, provides a clear line-of-sight to the in-road sensors, and as specified in the manufacturer's recommendations. Secure the transceiver mounting hardware to the pole and route the cabling such that no strain is placed on connectors.

Route CAT5e cable from the transceiver to the signal cabinet according to the Plans. Transition from underground conduit to utility poles using 2" rigid galvanized steel (RGS) conduit with an appropriately sized weatherhead. Attach RGS conduit to the utility pole using approved clamps and/or banding. Attach aerially spanned cable using approved attachment hardware at mounting heights as specified or as directed by the Engineer. A guy assembly shall be installed as indicated on the plans to stabilize the existing pole where the cable transitions from the aerial span into the proposed riser (wood poles only).

Before beginning work at locations that require a wireless magnetic sensor vehicle detector system, furnish system software. Upon activation of the system, provide detector configuration files.

Place system into operation. Configure wireless magnetic sensor vehicle detector system to achieve required detection in designated areas. Have a certified manufacturer's representative on site to supervise and assist with installation, set up, and testing of the system.

Install the necessary processing and communications equipment in the signal controller cabinet. Make all necessary modifications to install equipment in cabinet. Ensure the traffic signal controller receives each sensor detection call.

Place a copy of all manufacturer equipment specifications and instruction and maintenance manuals in the equipment cabinet.

Provide at least 4 hours of training on the set up, operation, troubleshooting, and maintenance of the wireless magnetic sensor vehicle detector system to a maximum of ten Department personnel. Arrange for training to be conducted by the manufacturer's representative at an approved site within the Division responsible for administration of

the project. Thirty days before conducting training submit a detailed course curriculum, draft manuals and materials, and resumes. Obtain approval of the submittal before conducting the training. At least one week before beginning training, provide three sets of complete documentation necessary to maintain and operate the system. Do not perform training until installation of the wireless magnetic sensor vehicle detector system is complete.

825.04 - Warranty

All components of the wireless magnetic sensor vehicle detection system shall be warranted against manufacturing detects in material and workmanship for a period of two years from date of installation or thirty months from date of shipment, whichever comes first. The wireless magnetic sensor vehicle detection system supplier shall provide all documentation necessary to maintain and operate the system.

825.05 – Measurement and Payment

Method of Measurement - Actual number of wireless magnetic sensor vehicle detector systems furnished, installed, and accepted.

No measurement will be made of cables, hardware, riser conduit, tools, and equipment as these will be considered incidental to furnishing and installing wireless magnetic sensor vehicle detector system.

Basis of Payment – Wireless Magnetic Sensor Vehicle Detector System will be measured and paid in units of EACH (EA) system furnished, installed, tested, and accepted. The price shall include the required number of in-road wireless magnetic sensors, pedestal pole and foundation, wireless transceiver, cabling, RGS riser conduit, guy assemblies, and all required tools, hardware, equipment, and labor to furnish a functioning wireless magnetic sensor vehicle detector system. No separate measurement or payment will be made for labor, tools, equipment, or hardware required for integration of the system with the traffic signal controller and traffic signal system network. A payment schedule will be utilized to authorize payment of 50% of the materials cost upon delivery of materials. The remaining 50% will be authorized once the system is tested and accepted.

++ END OF SECTION ++

SECTION 830 – FIBER OPTIC MEDIA CONVERTERS

830.01 - Description

This work shall consist of furnishing, installing and testing fiber optic media converters in accordance with these Specifications and as directed by the Engineer. Fiber optic media converters are used in 'PAIRS' to connect Ethernet switches over single mode fiber optic cable. Fiber optic media converters shall be Gigabit Interface Connector (GBIC), Small Form Factor Pluggable (SFP) modules and installed in Ethernet switches in locations as shown on the plans. SFP modules shall be compatible with the existing Cisco layer 3 switch optics at the STC and other layer 3 node locations.

830.02 – Design Requirements

The Fiber Optic Ethernet Transceivers shall transmit and receive 100BaseFX data over the designated fiber type as per the plans. Each transceiver shall operate at 1300 nm and have a range of 10 km unless a greater range is required to reach the adjacent switch on the same ring. The Fiber optic media converter (SFP modules) shall be compatible with the proposed Ethernet switches as shown on the plans. The fiber optic media converters shall meet the following requirements:

- Multi-source package with Duplex LC connector (for optical GBIC modules)
- Optical patch cables shall be compliant with GR-326 (single-mode)
- Safety - Laser Class I 21CFR1040
- Hot-swappable
- 4.75VDC input voltage
- -40 to +85 C operating temperature
- -40 to +85 C storage temperature
- Standards
    - Compatible with GBIC standard as specified in IEEE 802.3z
    - Compliant with GBIC Specification Revision 5.4
    - GR-20-CORE: Generic Requirements for Optical Fiber and Optical Fiber Cable
    - GR-326-CORE: Generic Requirements for Single-Mode Optical Connectors and Jumper Assemblies

830.03 – Installation

Install the SFP modules in Ethernet switches in existing controller cabinets in locations shown in the project plans, or as directed by the engineer. Connect LC patch cable to SFP modules as shown in the plans. Secure and neatly route fiber patch cables in the cabinet with appropriate cable ties and strain relief. Provide a minimum of three feet of slack for each cable.

1. Install the SFP module in the Ethernet switch slot.

2. Configure as necessary.

The Contractor shall be responsible for providing a complete, functional system including all necessary cables and connectors in accordance to the specifications and as specified on the plans. All miscellaneous patch and interconnect cables shall meet the proposed equipment specification requirements and shall meet EIA/TIA telecommunications standards.

830.04 – Testing

The Contractor shall provide the City of Norfolk a system acceptance test procedure and documentation form for execution by the Contractor under the supervision of a City of Norfolk Division of Transportation representative. The Contractor will test each fiber optic media converter pair at the cabinet and corresponding location to verify the optical and network connectivity. Upon completion of stand-alone testing and subsequent integration with the Ethernet switches, a similar system level testing shall be performed by the Contractor at the STC in City Hall for proper network performance measures.

830.05 – Measurement and Payment

Furnish and Install Fiber Optic Media Converter will be measured in units of each (EA) and paid for at the contract unit price each. The price includes all materials, cables, labor, tools, equipment, and incidentals necessary to complete the work. All jumper cables and connectors shall be included under this item.

++ END OF SECTION ++

SECTION 835 - LAYER 2 ETHERNET SWITCH

835.01 - Description

This work shall consist of furnishing, installing and testing environmentally hardened Layer 2 Cisco **IE-3000-8TC** Ethernet switches in accordance with these Specifications and as directed by the Engineer. This work is the furnishing and installation of an (8) port managed Ethernet switch with single mode fiber-based SFP uplink ports and modules for connection to the fiber network.

835.02 – Design Requirements

The Layer 2 Ethernet switch shall meet the minimum design requirements:

- 8 Ethernet 10/100 ports and 2 Dual-Purpose Uplinks (Each Dual Purpose Uplink port has
- one 10/100/1000 Ethernet Port and one SFP based Gigabit Ethernet port, one port active)
- Each switch shall support two (2) Cisco IE3000-8FE modules, one (1) Cisco IE3000-8FX
- module, or one (1) Cisco IE3000-8FE module and one (1) Cisco IE3000-8FX module
- 10BASE-T ports: RJ-45 connectors, two-pair Category 3, 4, or 5 unshielded twisted-pair (UTP) cabling
- 100BASE-TX ports: RJ-45 connectors, two-pair Category 5 UTP cabling
- 1000BASE-T ports: RJ-45 connectors, four-pair Category 5 UTP cabling
- 1000BASE-SX, -LX/LH, -ZX SFP-based ports: LC fiber connectors (single/multimode fiber)
- 100BASE-LX10, -FX: LC fiber connectors (single/multimode fiber)
- Meets NEMA TS-2 (traffic control equipment)
- The internal power supply shall support voltages between 18VDC and 60VDC
- Environmentally hardened
- -40°C to +70°C operating temperature
- -25°C to +70°C storage temperature
- Weight: 4lbs

835.03 –Functional Requirements

- IGMP Snooping for multicast filtering
- SNMP
- Remote Monitoring
- Port based security
- Standards:
    - VLAN (802.1Q)
    - MSTP (802.1Q-2005)
    - Quality of Service (802.1p)
    - Link aggregation (802.3ad)
    - IEEE802.3 10Base-T Ethernet
    - IEEE802.3u 100Base-TX/100Base-FX
    - IEEE802.3z Gigabit fiber

- IEEE802.3ab 1000Base-T
- IEEE802.3x Flow Control and Back Pressure
- IEEE802.3ad Port trunk with LACP
- IEEE802.1d Spanning Tree/ IEEE802.1w Rapid Spanning Tree
- IEEE802.1p Class of Service
- IEEE802.1q VLAN Tag
- IEEE802.1x User Authentication (Radius)
- IEEE802.3af Class 1 – 3 Power over Ethernet
- IEEE802.1ab LLD

835.04 – Installation

Mount the Ethernet switch on din rails in existing controller cabinet equipment racks in locations shown in the project plans, or as directed by the engineer. Make power connections from existing power distribution assembly in the controller cabinet. Annotate all electrical cables with the correct connection information and function. Secure and neatly stow all cables and power supply in the cabinet with appropriate cable ties and strain relief. Provide a minimum of three feet of slack for each cable.

1. Mount the switch in the cabinet.

2. Make power and communication connections.

3. Provide power cables, Category 5e or Category 6 patch cords, and LC type single mode patch cords as required and depicted on communications diagrams.

4. Configure switch

The Contractor shall be responsible for providing a complete, functional system including all necessary cables and connectors in accordance to the specifications and as specified on the plans. All miscellaneous patch and interconnect cables shall meet the proposed equipment specification requirements and shall meet EIA/TIA telecommunications standards.

835.05 – Testing

The Contractor shall provide the City of Norfolk a system acceptance test procedure and documentation form for execution by the Contractor under the supervision of a City of Norfolk Division of Transportation representative. The Contractor shall test each Ethernet switch at the intersection cabinet and corresponding intersection location to verify Ethernet connectivity on the network.

835.06 – Measurement and Payment

Furnish and Install Layer 2 Ethernet Switch (Cisco IE-3000-8TC) will be measured in units of each (EA) and paid for at the contract unit price per each model. The price includes all materials, cables, labor, tools, equipment, and incidentals necessary to complete the work. All rack chassis, mounting brackets, mounting hardware (e.g., screws, nuts, bolts, etc.), power cords,

transformers, jumper cables and connectors shall be included under this item. This price shall include factory and stand-alone testing, and system documentation including: shop drawings, manuals, wiring diagrams, block diagrams, flow charts, MIB's and other material necessary to document the installation details and operation of the units.

++ END OF SECTION ++

SECTION 860 - VIDEO SURVEILLANCE CAMERA SYSTEM (CCTV)

860.01 - Description

This work shall consist of furnishing, installing and testing a video surveillance system. The system shall include the CCTV camera, cables, surge protection, power supply, camera control receiver and all other accessories as needed to install a complete functioning CCTV system. The completed installation shall provide National Television System Committee (NTSC) video to the Smart Travel Center (STC) located at City Hall. This installation shall be in conjunction with the delivery of a Video Management System to be paid for and installed separately from this system. Installation and testing shall be in accordance with manufacturer's specifications and these special provisions.

860.02 - Materials

Provide a surveillance system that consists of a CCTV camera that has zoom capabilities, Pan and Tilt mechanism, camera control receiver, and all associated cables, power supplies, connectors, software, and documentation. The additional cost of integrating new software protocols into the existing surveillance system shall not be considered under this contract. An approved camera shall be capable of being integrated into the existing traffic control system without further development or integration of additional camera control drivers. The City of Norfolk Smart Travel Center currently uses and has drivers for COHU iDome cameras. An approved camera shall conform to the following specifications at a minimum.

A) General

1. The CCTV camera shall be of the dome variety designed to provide at least three individually configured simultaneous video streams at 30 frames per second (NTSC) or 25 frames per second (PAL) in all resolutions up to 704x480 pixels (NTSC) or 704x576 pixels (PAL) in Motion JPEG and H.264, and shall support a total of 20 simultaneous streams using unicast.
2. The CCTV camera shall be equipped with Day/Night functionality, provide high speed pan and tilt functions and be equipped with 35x optical and 12x digital zoom.
3. Operate on an open source; Linux-based platform, and including a built-in web server.
4. Be equipped with a slot for SD/SDHC memory card expansion.
5. Be manufactured with an all-metal body, support operation down to -40°C (-40°F) and be IP66-classified.
6. Utilize a separate power injector allowing the camera and heater/fan functions to be powered over the network cable.

B) Hardware

1. The camera shall:
   - Use a high quality IR-sensitive 1/4" progressive scan CCD sensor.
   - Be equipped with an automatically and manually removable IR-cut filter, providing so-called day/night functionality.
   - Be equipped with a high quality F1.4 – F4.2 DC-iris lens with 35x optical zoom providing a horizontal angle of view between 55.8° and 1.73°.
   - Provide pictures down to 0.5 lux at F1.4 while in day mode (with IR-filter in use) and down to 0.008 lux while in night mode (with IR-filter removed).
   - Be equipped with accurate high-speed pan-tilt functionality with 360° endless pan

range and a 220° tilt range.

- Provide pan and tilt speed between 0.05° - 450°/sec.
- Support memory expansion by providing an available SD/SDHC card slot.

C) Video

1. RESOLUTION: The camera shall be able to deliver at least three individually configurable full resolution full frame rate video streams over IP networks.

   Supported video resolutions shall include:
   - 176x120 (NTSC) / 176x144 (PAL)
   - 352x240 (NTSC) / 352x288 (PAL)
   - 704x480 (NTSC) / 704x576 (PAL)

D) Encoding

1. The camera shall support Motion JPEG encoding in a selectable range from 1 up to 30 frames per second (NTSC) / 25 frames per second (PAL) in all resolutions
2. The camera shall support H.264 encoding in a selectable range from 1 up to 30 frames per second (NTSC) / 25 frames per second (PAL) in all resolutions
3. The camera shall be able to provide independently configured simultaneous H.264 and Motion JPEG streams
4. The camera shall support both Constant Bit Rate (CBR) and Variable Bit Rate (VBR) in H.264
5. The camera shall provide configurable compression levels
6. The camera shall support motion estimation in H.264

E) Transmission

1. The camera shall allow for video to be transported over:
   - HTTP (Unicast)
   - HTTPS (Unicast)
   - RTP (Unicast & Multicast)
   - RTP over RTSP (Unicast)
   - RTP over RTSP over HTTP (Unicast)
   - The camera shall support Quality of Service (QoS) to be able to prioritize traffic.
   - IMAGE CONTROL
   - The camera shall incorporate Automatic and Manual White Balance and an electronic shutter operating in the range 0.5 and 1/30.000 second for NTSC and 1.5 and 1/30.000 seconds for PAL.
   - The camera shall provide Wide Dynamic Range, Electronic Image Stabilization and backlight compensation with automatic and definable exposure zones.

860.03 - Functionality

A) Web server

1. The camera shall contain a built-in web server making video and configuration available to multiple clients in a standard operating system and browser environment using HTTP, without the need for additional software.

2. Optional components downloaded from the camera for specific tasks, e.g. Active X, shall be signed by an organization providing digital trust services, such as VeriSign, Inc.

B) IP addresses

1. The camera shall support both fixed IP addresses and dynamically assigned IP addresses provided by a Dynamic Host Control Protocol (DHCP) server.
2. The camera shall allow for automatic detection of the Camera based on UPnP and Bonjour when using a PC with an operating system supporting this feature.
3. The camera shall provide support for both IPv4 and IPv6.

C) PTZ functionality

1. The camera shall provide at least 100 preset positions
2. The camera shall provide e-flip functionality, which will automatically rotate the image 180° electronically when following a moving object passing under the dome
3. The camera shall provide a guard tour functionality which allows the dome to automatically move between selected presets using an individual speed and viewing time for each preset
4. The camera shall be able to detect and automatically follow moving objects in the cameras field of view

D) Event functionality

1. The camera shall be equipped with an integrated event functionality, which can be trigged by:
   - Video Motion Detection
   - Auto Tracking
   - PTZ position
   - Schedule
   - Local storage full
   - Fan malfunction
   - Response to triggers shall include:
   - Notification, using TCP, SMTP or HTTP
   - Image upload, using FTP, SMTP or HTTP
   - Preset call up
   - Guard Tour activation
   - Recording to local storage

2. The camera shall provide at least 56 MB memory for pre & post alarm recordings.
3. Event functions shall be configurable via the web interface.

E) Protocol support

1. The camera shall incorporate support for at least IP, HTTP, HTTPS, SSL/TLS, TCP, ICMP, SNMPv1/v2c/v3 (MIB-II), RTSP, RTP, UDP, IGMP, RTCP, SMTP, FTP, DHCP, UPnP, ARP, DNS, DynDNS, SOCKS, NTP and Bonjour.
2. The SMTP implementation shall include support for SMTP authentication.

F) Text overlay

1. The Camera shall provide embedded on-screen text with support for date & time, and a customer-specific text, camera name, of at least 45 ASCII characters.
2. To ensure accuracy, the camera shall accept external time synchronization from an NTP

(Network Time Protocol) server.

3. The Camera shall provide 8 individually configurable privacy masks to conceal defined areas in the image as non-viewable. These masks shall be dynamically adjusted based on current zoom-factor, and not be able to bypass.
4. The Camera shall allow for the overlay of a graphical image, such as a logotype, into the image.

G) Security

1. The camera shall support the use of HTTPS and SSL/TLS, providing the ability to upload signed certificates to encrypt and secure authentication and communication of both administration data and video streams.
2. The camera shall support IEEE 802.1X authentication.
3. The camera shall provide support for restricting access to pre-defined IP addresses only, so-called IP address filtering.
4. The camera shall restrict access to the built-in web server by usernames and passwords at three different levels.

H) API support

1. The camera shall be fully supported by an open and published API (Application Programmers Interface), which shall provide necessary information for integration of functionality into third party applications.

I) Installation and Maintenance

1. The camera shall be supplied with Windows-based management software, which allows the assignment of IP addresses, upgrade of firmware and backup of the Cameras' configuration.
2. The camera shall support the use of SNMP-based management tools according to SNMP v1, 2c & 3 / MIB-II.
3. The camera shall allow updates of the software (firmware) over the network, using FTP or HTTP.
4. All customer-specific settings shall be stored in a non-volatile memory and shall not be lost during power cuts or soft reset.

J) User logs

1. The camera shall provide a log file, containing information about the 250 latest connections and access attempts since the unit's latest restart. The file shall include information about the connecting IP addresses and the time of connecting.
2. The camera shall provide a connection list of all currently connected viewers. The file shall include information about connecting IP address, time of connecting and the type of stream accessed.

860.04 - Camera diagnostics

A) The camera shall:

- Be equipped with an LED, indicating the camera's functional status.
- Be monitored by a Watchdog functionality, which shall automatically re-initiate processes or restart the unit if a malfunction is detected.

860.05 – Camera Interfaces

A) Network interface
The camera shall be equipped with one 100BASE-TX Fast Ethernet-port, using a standard RJ-45 socket and shall support auto negotiation of network speed (100 MBit/s and 10 MBit/s) and transfer mode (full and half duplex).

860.06 – Camera Enclosure

A) The camera enclosure shall include the following:

- Manufactured with an all-metal body
- Clear transparent cover
- IP66-rating
- Four temperature sensors, two heaters and two fans inside the enclosure
- Removable sunshield

860.07 – Camera Power requirements

A) Power Details
An electrical service of 100-240 VAC / 50-60 Hz, max 60 W – shall be provided to the camera through the network cable by a separate injector, supplied with the camera.

THE POWER INJECTOR SHALL INCLUDE THE FOLLOWING:

Device Type	Power injector - external
Localization	United States
Power Device	
Input Voltage	AC 100-240 V
Frequency Required	50 - 60 Hz
Output Voltage	55 V
Output Connector(s)	RJ-45
Power Provided	30 Watt
Expansion / Connectivity	
Interfaces	1 x network - Ethernet 10Base-T/100Base-TX/1000Base-T - RJ-45
Miscellaneous	
Compliant Standards	Plug and Play, VCCI, cUL, EN 60950, GS, EN55024, EN55022 Class B, FCC Part 15 B, RoHS
Environmental Parameters	
Min Operating Temperature	32 °F
Max Operating Temperature	104 °F
Humidity Range Operating	0 - 90%

860.07 – Camera Communication/Power Cable

A) Cable:
The camera connection shall be wired using CAT5e outdoor rated bulk cable, installed aerial or in conduit, to provide the connectivity and power for communication from the camera

to the traffic signal cabinet or CCTV cabinet. The CAT5e cable's communication/data conductors shall be connected to an approved surge suppression device. The CAT5e cable's power conductors shall be connected to an approved surge suppression device.

B) CAT5e Cable Communication/Data Surge Suppression

1. The communication/data conductors shall be connected to a surge suppressor device for protection. The surge suppressor's technology shall be based on the use of high energy Metal Oxide Varistors (MOVs) that are combined with a double network of ultra fast diodes and silicon avalanche diodes to form three distinct stages of protection. The device is required to support the following

   - Circuit Type – 3 Stage Series Hybrid
   - Lines Protected – Eight (8) per port
   - Connecter Type – RJ45 (Pins 1 – 8)
   - Surge Capacity – 1kA per wire
   - Clamp Voltage – 30V @0.5kA, 8/20µs
   - Rated Voltage – 5V
   - Max. Frequency – 155MHz
   - Attenuation – Better than -0.3dB at 100MHz
   - Ambient Temperature - -40^0 F to +185 F (working): -40^0 C to +85 C (working)
   - Humidity – 95% RH (non-condensing)
   - N.E.X.T. – Worst pair, better than -43 dB at 100MHz
   - Mounting – Capable of being mounted to a din-rail or flat surface

C) **CAT5e Cable Power Surge Suppression**

1. The power conductors shall be connected to a surge suppressor device for protection. The surge suppressor's technology shall be a hybrid type based on the use of high energy Metal Oxide Varistors (MOVs). The MOVs shall be monitored with a thermal sensitive device that disconnects the MOVs if a failure occurs. The suppressor will indicate a failure when the green LED goes out. The device is required to support the following

   - Circuit Type –Hybrid
   - Lines Protected – 3 (L, N, G)
   - Cage Clamp – Terminal Strip
   - Surge Capacity – 13kA 8/20 impulse
   - Clamp Voltage – 395V @ 2kA 8/20
   - MCOV – 125Vac, 175Vdc
   - Max Load Current – 16 Amperes
   - Mounting – Capable of being mounted to a din-rail or flat surface

860.08 – Environmental Requirements

- The camera shall operate in a temperature range of -40°C to +50°C (-40°F to +122°F).
- The camera shall operate in a humidity range of 20–80% RH (non-condensing).
- The camera shall be equipped with Arctic Temperature Control, allowing camera start-up at temperatures down to -40°C (-40°F).

860.09 – Installation

The Contractor shall install Closed Circuit Television (CCTV) Cameras as shown on the plans. The Contractor shall provide all necessary mounting and wiring to provide for a fully operational system.

The Contractor shall demonstrate the functionality of the provided CCTV system with the digital video system at the Smart Traffic Center for seamless control functionality and operation.

The CCTV shall be capable of delivering high-quality color video transmitted over the fiber optic Ethernet communications network.

860.09 – Measurement and Payment

Method of Measurement – The Video Surveillance System (CCTV) will be measured in units of each (EA) and the Video Surveillance System Conductor Cable Assembly will be measured in units of each (EA).

Basis of Payment - The contract unit price of each per system shall be based on the following work tasks.

Furnish and Install Video Surveillance System (CCTV) - The unit price to furnish and Install a Video Surveillance System includes all materials, labor, tools, equipment, and incidentals necessary to complete the work. All camera mounting brackets, mounting hardware (e.g., screws, nuts, bolts, etc.), power cords, transformers, jumper cables and connectors shall be included under this item. This price shall include factory and stand-alone testing, and system documentation including: shop drawings, manuals, wiring diagrams, block diagrams, flow charts, MIB's and other material necessary to document the operation of the units. The contractor shall submit an acceptance test procedure recommended by the manufacturer for approval by the Engineer.

Furnish and Install Video Surveillance System Conductor Cable Assembly – The unit price to Furnish and Install Video Surveillance System Conductor Cable Assembly between the CCTV camera and the controller cabinet will be measured in units of each per given length and paid for at the contract unit price per each. Cable lengths shall be 100 foot, 200 foot, and 300 foot. This price shall include the requirements for power and communication/data surge suppression devices. This price shall include all materials, labor, tools, equipment, and incidentals necessary to complete the work.

++ END OF SECTION++

SECTION 885 – TEST PITS

885.01 -Description

This item will consist of performing test pits within the project for the purpose of locating underground utilities prior to excavation. Prior to any test pit operation, the Contractor is to review the location, number of test pits and the existing utilities with the Owner. The contractor shall obtain the vertical and horizontal location, measured off of the construction center line or base line, and determine the size of the utility line being test pitted. Test pits will be considered incidental to installing conduit.

885.02 - Materials

Materials for backfill and pavement replacement shall meet applicable provision of these supplemental specifications and the 2007 VDOT Road and Bridge Specifications.

885.03 – Measurement and Payment

Test Pits will not be measured or paid for separately and shall be considered incidental to the cost of installing new conduit.

++ END OF SECTION ++

SECTION 890– NORFOLK BATTERY BACKUP ASSEMBLY

890.01 - System Description

The supplier shall provide and install a microprocessor-controlled software driven UPS power system. The primary purpose of the system will be to provide emergency power for the traffic control system and associated equipment in the event of a utility power failure or when utility power is outside of the programmable voltage and frequency range of the UPS system. The UPS is equipped with a programmable front panel display to allow for both full programming and monitoring of the UPS via a back lighted LCD display. An additional LCD annunciates the status of real time events occurring in the system. The UPS offers capability via an RS-232C data port for programming the flashing mode timer, monitoring the UPS system and transferring status and event data to a laptop computer. A Power Management Module (PMM) is integral to the UPS system to switch between utility power and battery power when required.

Fully compatible with incandescent and LED traffic signal control equipment, pedestrian signals, and camera systems. Compatible with all police panel functions.

Environmental operation: from -40°C (-40°F) to +74°C (165°F) and certified.

This work shall consist of furnishing and installing traffic signal equipment in accordance with these specifications and as shown on the plans or as directed by the Engineer.

890.02 - Equipment

All equipment and materials provided must be included in the City of Norfolk DOT's Approved Equipment list or be an approved equal. The City of Norfolk typically uses various models of the GenTran PowerStay line of equipment depending on the needs of the application.

A. Type Battery Backup Assembly:

The purpose of this specification is to describe the minimum acceptable design and operating requirements for a traffic control battery backup assembly. These special provisions define the work and materials necessary to provide traffic control battery backup equipment for the City of Norfolk. Each Traffic Controller Assembly to be furnished shall consist of all necessary quantities from the following items to fulfill, or as specified per bid document:

1. UPS Module
2. Power Management Module (PMM)
3. Battery Bank
4. Batteries
5. Transfer Switch
6. Battery Backup Cabinets

To assure full and complete utilization of all equipment furnished, the Contractor/Manufacturer shall provide support services and materials, which shall include, but not be limited to, furnishing complete equipment documentation, warranties, and training.

B. Enclosed Equipment:

Related Specifications and Standards

All equipment furnished shall be new and shall conform to the plans, Special Provisions, Specifications, and to the applicable requirements of the Underwriter's Laboratory Incorporated (UL), the Electronics Industries Association (EIA), the National Electric Code (NEC), the American Society for Testing and Materials (ASTM), the American National Standards Institute (ANSI), and the applicable standards, specifications, and regulations of the City of Norfolk.

1. UPS Module

2000W solid-state uninterruptible power supply fully programmable at the front panel, UPS Module Features:

a. True sine wave inverter utilizing high frequency IGBT technology

b. Provides regulated voltage for any power factor load from 0 to 1, capacitive, inductive or non-Linear and handles non-symmetrical loads.

c. UPS input voltage switch-over thresholds adjustable from 85 VAC to 135 VAC and 40 to 70 Hz.

d. Power transfers in 16 milliseconds or less (seamless transfer), from utility power to battery supplied power.

e. UPS Module synchronized to utility power before switching from battery supplied power back to utility power.

f. Event Status LCD: Displays total events recorded, total time on batter, and real-time alarms.

g. P.C. compatible to program flashing mode time delay and to monitor and record system events and status.

h. Connections available to wire remote event monitoring and operation of the UPS system.

i. Programmable advanced charger accommodates various battery types and capacities with up to 3-step charging capability, and charging can be completed in ten hours starting with completely exhausted batteries.

j. Advanced charger minimized input power while charging batteries and proportions charging current based on the sensed traffic signal load; if necessary, priority is given to the traffic signal controller.

k. Utilized advanced heat sink design with smart cooling to minimize cooling fan use and to extend fan life.

2. Power Management Module (PMM)

a. Contains a series mode design TVSS (Transient Voltage Surge Suppressor) with a non-degrading surge reactor.
  1) TVSS does not shunt current to the ground plane.
  2) TVSS provides conditioned power to UPS power system and the entire traffic control system including, wiring and associated electronics,

b. Equipped with a wrap around maintenance bypass switch to enable removal and replacement of the UPS Module without shutting down the traffic control equipment.

3. Battery Bank

The Battery Bank will be comprised of the Batteries and connection components as described herein. Each Battery Bank will contain four (4) batteries.

a. Batteries are parallel connected providing redundancy should any battery fail and to insure that each battery is equally charged.

b. All battery connections are bolted utilizing stainless steel hardware.

c. Battery cables to connect the batteries in parallel are to be constructed of a flexible 1/0 AWG copper-tin stranded conductor and have terminals that are copper-tin alloy which are factory-crimped and include an insulation cover over the copper core to help provide protection from physical contact and severe conditions.

d. Battery cables to connect the batteries in parallel are to be either 15” or 18” in length as required for physical field conditions or as directed by the Engineer.

e. Battery cables (Battery Hook-up Cable) to connect the battery-bank to the Power Management Module and UPS Module must be 60” long and are to be equipped with Anderson type lug connectors compatible with the receiving end.

f. System can be equipped with Valve regulated, Absorbed Glass Mat (AGM) or Gel cell battery as described in Section 890.02.B.4.

g. System is capable of utilizing any approved “off the shelf” domestic battery.

4. Battery

a. Each individual battery shall be equipped with a high strength outer steel jacket to aid in battery longevity.

b. Battery shall be a 12V; 71Ah, or 101Ah battery, as directed by the Engineer or identified in Project Plans
c. Battery shall be Absorbed Glass Mat (AGM) Valve Regulated, Lead Acid design
d. Battery shall be UL Approved
e. Battery shall be DOT Approved as non hazardous cargo for ground, sea and air transportation. DOT 49CFRI 73.159 (d), I and H
f. Battery Case and Cover shall be manufactured of flame retardant material and meet UL94 VO Standards
g. Battery shall have high cycle capability in excess of 500 cycles to 80% depth of discharge and be compliant with Telcordia ST 4228
h. In compliance with ITC Standard for environmental exposure (negative 40 degrees Celsius to 74 degrees Celsius) the battery shall be fitted with a steel outer jacket for temperature exposures above 55 degrees Celsius
i. At time of shipment the battery shall be tagged with the open cell voltage (OCV) and conductance measured in Siemens
j. Minimum acceptable open cell voltage at time of shipment is 12.85 volts with a maximum voltage deviation between + 0.03 volts
k. The conductance deviation measured at time of shipment can be no greater than + 6% of the mean value
l. At time of shipment, a report will be included certifying voltage and conductance of each individual battery, which is identified by a serial number. In addition, each shipment will contain two (2) copies of the manufacture's Material Safety Data Sheet.

5. Battery Backup Cabinets

The battery backup system (BBS) cabinet is used for housing batteries and / or BBS, which includes UPS module, Power Management Module, Transfer Switch, any other control panels, and all wiring and harnesses. All battery backup system (BBS) cabinets are to be supplied with a Transfer Switch installed prior to shipping.

a. Transfer Switch

Transfer Switch as required by 2002 National Electrical Code to prevent back-feeding the Utility Service provider. Must comply with NEC Article 702.6. The Unit Dimensions must be: 9”Width x 4-1/4” Height. The Unit Design must be based on a Semi-Flush installation.

1) Installation - Surface Mount Design Transfer Switch Enclosure is to be installed in “piggy-back” cabinets, 336S and 332 stand-alone cabinets mounted in the door assembly. Unit must be installed at least 24” above ground and 24” below the top.

2) Aluminum Construction - Heavy duty 12 gauge (Type 5052-H32) rust and corrosion-resistant material ensures long life in the field.

3) Safe – Sliding interlock prevents generator and utility from feeding circuit at the same time.

4) Rain-tight Design – includes heavy duty rubber gasket and J-channel to keep out precipitation.

5) Simple installation – NEMA 3R-Rated enclosure slides into a cutout on new equipment, and wiring is accomplished through the back. Ground post is incorporated into the enclosure.

6) Security - #2 keyed lock makes unit tamper-proof. Tight-fitting, hinged bottom and cover prevent nesting insects from entering.

7) External Pilot light to indicate when utility power is restored.

8) Switch neutral shall be provided.

9) Service Entrance rating

Current Configurations of GenTran's PowerStay Equipment Used in City*

MODEL	TS 200120	TS 300130	TS 500150
Nema Config. Of Male Inlet	L5-20	L5-30	CS6377
Max Amps	20Amps @125V	30Amps @125V	50Amps @125V
Max Generator Size in Watts	Up to 2500	Up to 3750	Up to 6250
Compatible 25 ft. Power Cords	RJB12325	RJB10325	RJB06325

*Approved equal may be used

b. Piggy-back Cabinet

The battery backup system (BBS) cabinet is used for housing batteries and or BBS, which includes inverter/charger unit, power transit relay, manually operated bypass switch, any other control panels, and all wiring and harnesses. The cabinet is NEMA 3R rated cabinet and is mounted to the side of the Model 332 Caltrans-style cabinet.

1) Dimensions:
- **i)** Height: 56"
- **ii)** Width: 26"
- **iii)** Depth: 14" *

* Note: Dimension does not include depth of the door

2) Cabinet Finish:

- **i)** TYPE A - The cabinet shall have a standard aluminum finish if not specified on plans or special provisions.

ii) TYPE C - Painted finishes shall conform to the requirements as specified in the contract plans and specifications according to the following:

- All components, nuts, bolts, screws shall have shop painted finish coat.

- The color shall be City of Norfolk "Federal Black", Federal Standard Color No. 27038, and Federal Standard 595B.

- The finish coating shall be a six stage chemical treatment for an electrostatic applied fusion bonded polyester powder coating. The polyester protective coating shall be one coat, minimum 4 mils thick, and heat curable, thermosetting powdered coating.

- The polyester coating shall be checked for continuity using 67-1/2 volt wet sponge detector to check for holidays, pinholes and discontinuities. Coating shall be checked and certified.

3) Cabinet Door Locks:

The cabinet shall have door locks (Corbin Norfolk B4R97849 lock).

4) Mounting:

Mount cabinet such that the bottom-rear of cabinet is resting upon the existing control cabinet concrete base, flush against the hinged side panel of the control cabinet. Piggy-back cabinet shall be secured to the control cabinet using four ½-inch stainless steel bolts evenly spaced at the four corners of the BBS cabinet. One 4-inch conduit nipple with appropriate bushings will be mounted through the BBS and Control cabinet. The 4-inch conduit shall be centered approximately 10 inches from the base of the control cabinet operations side approximately 8 inches up from the bottom of the cabinet. [Bear in mind that the installation of the control cabinet adapter base may change the installation mounting].

5) Handle:

The latching handles shall have provision for padlocking in the closed position. Each handle shall be 3/4-inch minimum diameter stainless steel with a minimum of 1/2-inch shank. The padlocking attachment shall be placed at 4 inches from the handle shank center to clear the lock and key. An additional 4 inches minimum gripping length shall be provided.

The latching mechanism shall be a three-point draw roller type. The pushrods shall be turned edgewise at the outward supports and have a cross section of 1/4-inch thick by 3/4-inch wide minimum. Rollers shall have a minimum diameter of 7/8 inches with nylon wheels and steel ball bearings. When the door is closed and

latched, the door shall be locked. The locks and handles shall be on the left side of the front door and right side of the rear door. The locks on Housing #3 shall be centered in the middle of the cabinet. The lock and lock support shall be rigidly mounted on the door. In the locked position, the bolt throw shall extend a minimum of 1/4-inch ± 5/16-inch into the latch Cam area. A seal shall be provided to prevent dust or water entry through the lock opening.

6) Cabinet Light:

i) Each cabinet shall include one (1) fluorescent lighting fixture mounted horizontally inside the top portion of the cabinet. The fixture shall include a cool white lamp, lamp cover and shall be operated by a normal power factor UL listed ballast.

ii) A door-actuated switch shall be installed to turn on the applicable cabinet light when the door is opened.

7) AC Service Input Terminal

Each controller cabinet shall be provided with a main service block terminal. The terminal shall be installed between the pole mounted service disconnect panel and the cabinet breaker. The terminal shall be mounted on the bottom right hand side of the cabinet. Approximately 5" left of main service block and centered between the bottom of the input file and the bottom of the rack chassis. The terminal shall be used to connect the following:

8) 120 VAC Receptacles

i) Power Strip (non-GCFI)
Each controller cabinet shall be provided with a power strip consisting of eight (8) 15A-125V; 2-Pole, 3-Wire receptacles. The power strip shall be mounted so not to interfere with the input/output drop down back panels. The strip can be mounted (bolted or with mounting screws) either on the left or right of the rear of the cabinet where it will not interfere with existing terminal blocks. The power strip shall be wired directly, un-fused, from the AC service input terminal block.

ii) GCFI Protected Receptacle
A two outlet GCFI receptacle shall be mounted within the cabinet.

9) Fans w/ Thermostatic Control
Two (2) electric fans shall be equipped with ball or roller bearings and with a capacity of at least 100 cubic feet of free air delivery per minute. The fans shall be mounted within the housing and vented. (7.2.7.2. TEES)

10) AC Breaker/Switch
The cabinet shall be provided with a main circuit breaker to provide protection equipment and all accessories thereof. The Ampacity rating of this breaker shall

be sized in accordance with the total load which will result from the equipment called for in these special provisions and the plans. A separate, 15-ampere circuit breaker shall be provided for AC power to the cabinet light and convenience (GFCI) outlet. This breaker shall be wired parallel to the main breaker.

11) Shelves
The cabinet shall be provided with three adjustable-height shelves. Each shelf shall be capable of supporting 250 pounds. The adjustable mounting for the shelves shall enable the shelves to be removed and/or adjusted to any position within the cabinet.

c. Stand-Alone Cabinets

All "Caltrans" style stand-alone battery backup cabinets are to include the appropriate 19" rack cage, cabinet shell, built-in transfer switch as specified and the features detailed below:

1) Cabinet Shell, Model 336S

1) Cabinet Finish: same as Piggy-back Cabinet

b) Cabinet Door Locks and Lifting Rings

i. The cabinet shall have door locks (Corbin Norfolk B4R97849 lock)
ii. Lifting eyes attached to the side of cabinet.

c) Cabinet Light:

i. Each cabinet shall include two (2) fluorescent lighting fixture (one front, one back) mounted horizontally inside the top portion of the cabinet. The fixtures shall include a cool white lamp, lamp cover and shall be operated by a normal power factor UL listed ballast.
ii. A door-actuated switch shall be installed to turn on the applicable cabinet light when the front door or back door is opened.

d) AC Service Input Terminal: same as Piggy-back Cabinet

e) 120 VAC Receptacles: same as Piggy-back Cabinet

f) Fans w/ Thermostatic Control: same as Piggy-back Cabinet

g) AC Breaker/Switch: same as Piggy-back Cabinet

h) Adapter Base
An eight inch (8") high "M" base adapter base shall be provided to extend the height of the cabinet when the cabinet is installed on a foundation.

i) Shelves
Three (3) shelves capable of supporting 250 pounds shall be mounted upon the provided 19” rack.

2) Cabinet Shell, Model 332

a) Cabinet Finish: same as Model 336S Cabinet

b) Cabinet Door Locks and Lifting Rings: same as Model 336S Cabinet

c) Cabinet Light: same as Model 336S Cabinet

d) AC Service Input Terminal: same as Model 336S Cabinet

e) 120 VAC Receptacles: same as Model 336S Cabinet

f) Fans w/ Thermostatic Control: same as Model 336S Cabinet

g) AC Breaker/Switch: same as Model 336S Cabinet

h) Adapter Base: same as Model 336S Cabinet

i) Shelves:
Five (5) shelves capable of supporting 250 pounds shall be mounted upon the provided 19” rack.

890.03 - Documentation

Each cabinet drawing shall include the following additional information. The City Division of Transportation shall also be provided with AUTOCAD 2000 drawings file on electronic media.

890.04 - Testing

Prior to installation and intersection cut-on, the equipment will be fully tested using industry standard testing and diagnostic software. The Contractor shall coordinate with the Division of Transportation project representative to schedule the testing. Any equipment that fails these tests will not be approved for installation by the contractor. The following equipment shall be subject to testing:

890.05 - Statement of Warranty and Compliance

A. In these specifications, whenever a specific design or construction has been specified, it is intended to establish a standard of performance, and any design or construction giving strictly equivalent performance may be considered, provided that the vendor brings such exceptions to the attention of the Traffic Engineer in writing, at the time of bid submittal.

B. Each vendor shall include in his proposal all warrants and/or guarantees with respect to materials, parts, workmanship, or performance which are included for equipment covered by this specification.

C. The vendor shall ship only complete controller/cabinet assemblies with complete documentation included. Substandard controller/cabinet assemblies will not be accepted and will be returned to the vendor after the Contractor has notified the vendor both by telephone and by letter.
Within seven (7) days after the vendor first receives notice of rejection of a shipment, the vendor shall remove the shipment, the Contractor will forward the shipment to the vendor by common carrier at the vendor's expense and risk.

890.06 - Warranty

A. The entire UPS system and batteries shall be warranted for a term of two (2) years for parts and labor. Warranty period to begin upon official date of acceptance of work.

B. Each cabinet and controller component shall have a 90-day field burn-in period after the approved testing has been completed.

1. Any controller or controller component failing to meet the specifications or which has repeated malfunctions within 90 days of installation shall be subject to replacement of the defective unit or complete controller at no cost to the City (or to refund of the purchase price of the controller, at the discretion of the City).

2. The full two-year warranty shall be applicable on all replacement UPS and PMM modules. Continued failure and repeated malfunctions of any module/equipment shall be cause to remove that module/equipment from the list of acceptable modules/equipment for future purchasing.

890.07 - Packaging and Shipping

A. All equipment shall be clearly marked with the intersection location, City of Norfolk Service Request# and/or Contract on all packaging.

B. Responsibility for damage to equipment during shipment shall be that of the shipper and supplier. All adjustment for damages to equipment will be the responsibility of the supplier/shipper and the transfer company. All shipping costs shall be the responsibility of the successful bidder.

C. The City of Norfolk will not be responsible for settlement of damages. Packages which appear to be damaged on delivery will be set aside and inspected by a representative of the manufacturer.

890.08 - Installation

A. Stand-Alone Cabinets

1. The controller assembly shall be securely bolted to a prepared foundation of specified size (See Details of Cabinet foundation). The bolt pattern shall match the bolt pattern of the cabinet.

2. The front door of the battery backup cabinet (in the case of stand-alone cabinets) shall open in the direction which will permit maintenance personnel to view the intersection.

3. The complete assembly shall be effectively weatherproof.

4. Each assembly shall be effectively grounded using a #8 copper wire attached to the cabinet by a stainless steel bolt and to the ground rod by a square head clamp.

5. Grouting around the base foundation shall be with "no-shrink" grout.

6. Installation procedure in all cases shall be those as recommended by National Electrical Code.

B. Piggy-back Cabinets

1. The complete assembly shall be effectively weatherproof.

2. Each assembly shall be effectively grounded using a #8 copper wire attached to the cabinet by a stainless steel bolt and to the ground rod by a square head clamp.

3. Grouting around the base foundation shall be with "no-shrink" grout.

4. Installation procedure in all cases shall be those as recommended by National Electrical Code.

890.09 - Measurement and Payment

Battery Backup Assembly:

A. Method of Measurement: The unit price for a Battery Backup Assembly shall be measured in units of Each (EA) as the specified work task indicates on the plans.

B. Basis of Payment: The unit price for a Battery Backup Assembly shall be based on the following work tasks.

1. Furnish and Install: The unit price for furnishing and installing a Battery Backup Assembly shall include the UPS Module, Power Management Module (PMM), Battery Bank, Batteries, and Transfer Switch for the requested cabinet type outfitted as specified herein, cabinet shell, tools, equipment, labor, and incidental fittings necessary to mount the controller cabinet will be considered full compensation of this work task.

Cabinet Shell:

A. Method of Measurement: Cabinet Shell will be considered incidental and will not be measured and paid for separately.

++ END OF SECTION ++

SECTION 895 – DECORATIVE MEDIAN FENCE

895.01 - Description

The Contractor shall furnish and install a decorative median fence where indicated on the Plans. The fence system shall conform to an internally secured 1" aluminum pickets with 4" nominal air space. The fence shall be designed with singular top and bottom rails (two total) and include all components (i.e. pickets, rails, posts, foundations, hardware) required. The fence shall have a durable, weatherproof, non-corrosive black finish.

895.02 - Material

Aluminum material for fence framework (i.e., tubular pickets, rails and posts) shall conform to the requirements of ASTM B221. The aluminum extrusions for posts and rails shall be Alloy and Temper Designation 6005-T52. The aluminum extrusions for pickets shall be Alloy and Temper Designation 6063-T52.

The manufactured framework shall be subjected to the thermal stratification coating process (high-temperature, in-line, multi-stage, and multi-layer) including, as a minimum, a six-stage pretreatment/wash and an electrostatic spray application of a polyester finish. The topcoat shall be "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be black. Height shall be three (3) feet measured from the top of the post foundation to the top of the upper rail.

Material for pickets shall be 1" square x 0.060" thick extruded tubing. Fore runner rail to be a "U" channel 1.75" square. The top wall of the outer channel shall be 0.100" thick; the sidewalls shall be 0.120" thick. Picket holes in the forerunner rail shall be spaced 4.715" o.c. Pickets to have internal retaining rod. Retaining rod to be .125" diameter galvanized steel. High quality PVC grommets shall be supplied to seal all pickets to the rail intersections. Posts shall be 2.5"x2.5"x0.080" aluminum with reinforced web
.
All fasteners shall be stainless steel. Bracket to the rail attachments shall be made using specially designed one-way tamper proof security bolts with inverted "T-nuts". Bracket to post connection shall be made using self-drilled hex-head screws.

895.03 – Fabrication

Pickets, rails and posts shall be pre-cut to specified lengths. Fore runner rail to be pre-punched to accept pickets.

Completed panels shall be capable of supporting a 300lb. load (applied at mid-span) without permanent deformation. Panels shall accommodate up to a 25% change in grade.

Posts shall be set in square concrete footings measuring four (4) times the post width and three (3) feet deep. Where called for on the plans, posts shall be removable. Posts shall be secured in place in an anchor sleeve utilizing a minimum of two (2) corner bolts. Fence sections secured to

removable posts shall be detachable at the rail connection points to the post and be secured in place with stainless steel bolt, washer, and lock nut.

895.04 - Measurement and Payment

Decorative Median Fence

Method of Measurement: Decorative Median Fence will be measured in units of linear feet (LF) and shall be furnished in increments of complete fence sections. No partial fence sections will be permitted unless approved by the Engineer.

Basis of Payment: The unit price for Decorative Median Fence shall be based on the following work task.

A. Furnish and Install Decorative Median Fence: The unit cost to furnish and install decorative median fence shall consist of pickets, rails, posts, foundations, finish paint, hardware, and all tools, equipment, labor, and incidentals necessary for a complete in place median fence in accordance with Section 895 of this specification. Post foundation excavation and refuse disposal, as well as coordination with the Engineer shall be considered incidental to the installation of the decorative median fence.

++ END OF SECTION ++

SECTION 900 – MANAGEMENT OF CONTAMINATED SOILS DURING CONSTRUCTION

900.01 - Procedures

The Contractor shall excavate only the minimum volume of soil as necessary to perform the required work. If during construction activities, the Contractor detects a petroleum odor or other evidence of soil contamination emanating from the soil, the Contractor should immediately call the City of Norfolk Project Engineer, or his representative, and Kimley-Horn & Associates, Inc., Michelle Wharton (757-213-8600), to report the suspected contaminated soil. A representative of Kimley-Horn & Associates, Inc. will arrive onsite within 24 hours of notification to field screen the suspected contaminated soil using a pre-calibrated Photo-ionization Detector (PID).

Contaminated soil shall be handled in the following manner:

- During excavation, the Contractor should make a reasonable effort to separate potentially contaminated soil from clean soil.
- At the direction of the OWNER, temporarily stored soil suitable for backfill should be used to backfill the trench within the original area of excavation, immediately after the roadway work is complete. Soils shall be re-deposited in accordance with §6.2.4. of the Virginia Department of Environmental Quality (VDEQ) Guidance Document #01-2024.
- Any excess contaminated soils or contaminated soils otherwise not qualifying for re-deposition shall be placed within a 55-gallon Department of Transportation (DOT) approved drum. This drum shall be temporarily stored within the limits of the project work area and properly labeled with a "pending analyses" label.
- The drum shall be properly secured with snap rings tightly bolted and bungholes capped.
- Drummed contaminated soil shall be composite sampled, analyzed, and be disposed at an off-site facility as "Special Solid Waste" in accordance with Virginia Department of Environmental Quality regulations.
- Drummed contaminated soils should be disposed of as soon as possible.
- After disposal, the Contractor shall provide the City of Norfolk and Kimley-Horn & Associates, Inc. with copies of analytical results, transportation manifests, and a Certificate of Remediation and Recycling or other written documentation indicating that the soil has been adequately disposed in conformance with applicable state and federal law.

900.02 - Measurement and Payment

Management of Contaminated Soils during Construction:

Method of Measurement: The unit price for containerizing, composite sampling, transport, and disposal of hazardous waste contaminated soil shall be paid for on a per drum basis; and the unit price for containerizing, composite sampling, transport, and disposal of hazardous waste contaminated soil with a concentration less than ten (10) times the treatment standards shall be paid for on a per drum basis

Basis of Payment: The unit price for Management of Contaminated Soils during Construction shall be based on the following work tasks.

A. Management of Contaminated Soil: The cost for containerizing contaminated soil shall include all labor, equipment and materials. Contaminated soil disposal costs shall be reimbursed to the Contractor for the transportation and disposal of contaminated soil on a per drum basis. Contaminated soil disposal costs shall be inclusive of all required composite sampling and analytical testing requirements, preparation and transportation, and actual disposal costs. Payment shall be made per drum.

B. Management of Contaminated Soil (Concentration less than 10X Treatment Standards): The cost for containerizing contaminated soil with a concentration less than ten (10) times the treatment standards shall include all labor, equipment, and materials. Contaminated soil disposal costs shall be reimbursed to the Contractor for the transportation and disposal of contaminated soil on a per drum basis. Contaminated soil disposal costs shall be inclusive of all required composite sampling and analytical testing requirements, preparation and transportation, and actual disposal costs. Payment shall be made per drum.

++ END OF SECTION ++

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Plants.

2. Fertilizers.
3. Topsoil and Planting soils.
4. Mulches.
5. Tree stabilization.
6. Landscape edgings.
7. Tree grates.

B. Related Sections:

1. Division 01 Section "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
2. Division 12 Section "Interior Planters and Artificial Plants" for live and artificial interior plants and planters.
3. Division 12 Section "Site Furnishings" for exterior unit planters.
4. Division 31 Section "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
5. Division 31 Section "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
6. Division 32 Section "Turf and Grasses" for turf (lawn), hydroseeding, and erosion-control materials.
7. Division 33 Section "Subdrainage" for below-grade drainage of landscaped areas, paved areas, and wall perimeters.

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than sizes indicated diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported,

and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than sizes indicated diameter and depth recommended by ANSI Z60.1 for type and size of plant required.

D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than minimum root spread according to ANSI Z60.1 for type and size of plant required.

E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

F. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

G. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

H. Finish Grade: Elevation of finished surface of planting soil.

I. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

J. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

K. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

L. Planting Area: Areas to be planted.

M. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

N. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

O. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

P. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

Q. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

R. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

S. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

T. Landscaping Substantial Completion: Inspection by the **City of Norfolk's - Department of Recreation, Parks, and Open Space, Division of Open Space Planning and Development, Landscape Architect** to ensure that all work encompassing this specification section and the contract documents is satisfactory to the City of Norfolk. This inspection will precede the awarding of the project's substantial completion.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, including soils.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
2. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.
3. Plant Substitutions: Substitutions of plant materials will not be permitted unless authorized in writing by Owner or Owner's Representative. If proof is submitted that any plant specified is not obtainable by two reputable plant brokers, a proposal will be considered for use of the nearest equivalent size or variety with corresponding adjustment of Contract price. Such proof shall be substantiated and submitted in writing to Owner at least 30 days prior to start of work under this Section. These provisions shall not relieve Contractor of the responsibility of obtaining specified materials in advance if special growing conditions or other arrangements must be made in order to supply specified materials.

B. Samples for Verification: For each of the following:

1. Organic Compost Mulch: 1-pint volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
2. Mineral Mulch: 2 lb of each mineral mulch required, in sealed plastic bags labeled with source of mulch. Sample shall be typical of the lot of material to be delivered and installed on the site; provide an accurate indication of color, texture, and makeup of the material.
3. Weed Control Barrier: 12 by 12 inches.
4. Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.

C. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

D. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

E. Material Test Reports: For standardized ASTM D 5268 topsoil existing native surface topsoil existing in-place surface soil and imported or manufactured topsoil. Copies of all testing results shall be submitted to the City of Norfolk's Forester, Landscape Architect, and Public Works Site Inspector.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.

G. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications **STRICTLY ENFORCED**: A qualified landscape Installer whose work has resulted in successful establishment of plants.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Five years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress. The same supervisor shall be used throughout this project unless a substitution is approved by the Owner.
4. Personnel Certifications: Installer's field supervisor personnel assigned to the Work shall have certification in all of the following categories from the Professional Landcare Network:

    a. Certified Landscape Technician - Exterior, with installation maintenance irrigation specialty area(s), designated CLT-Exterior.
    b. Certified Landscape Technician - Interior, designated CLT-Interior.
    c. Certified Ornamental Landscape Professional, designated COLP.

5. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall be given soil sampling data, with depth, location, and number of samples taken to adequately represent each soil type on project site. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. All tests will be performed with the sample compacted to 30 foot pounds at 40 cm. moisture tension where applicable.
4. Report suitability of tested soil for turf growth.

    a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
    b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.
5. If soil testing does not meet particle size distribution, physical and/or chemical properties specified; the soil shall be adjusted and re-tested, or another source secured, tested, and submitted for approval.
6. All testing will be at the expense of the contractor.

D. Percolation Test: Submit a soil percolation test report for each 200 cubic yards of proposed new planting soil, or existing stockpiled planting soil, certifying that proposed soil has a proper water absorption rate.
1. Dig a rectangular pit 12” square by 18” deep and rapidly pour water to a depth of 6” (approximately 3 ¾ gallons). Note time required for water to be completely absorbed.
2. Test holes to be dug randomly within planting locations indicated on plans to ensure areas tested specifically correlate to proposed plantings.
3. Proposed planting soils having a water absorption rate faster than 18 minutes, or slower than 30 minutes, are not acceptable.

E. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1. Contractor shall keep a copy of ANSI regulation on site while installing all plant materials.

1. Selection of plants purchased under allowances will be made by Owner, who will tag plants at their place of growth before they are prepared for transplanting.

F. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

G. Plant Material Observation: Owner may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Owner retains right to observe trees and shrubs further for size and condition of balls and root systems, growth habit, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Landscape Architect of sources of planting materials seven days in advance of delivery to site.

H. **Mandatory** pre-installation Conference: **Must conduct landscape pre-installation conference at Project site, include Public Works Site Inspector and designated City Landscape Architect**.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

C. Deliver bare-root stock plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

E. Handle planting stock by root ball.

F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.

G. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Heel-in bare-root stock. Soak roots that are in dry condition in water for two hours. Reject dried-out plants.
2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
3. Do not remove container-grown stock from containers before time of planting.
4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.7 PROJECT CONDITIONS

A. Existing Utilities: **Contractor is responsible for calling Miss Utility.**

B. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

C. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1. Notify Landscape Architect Construction Manager and Owner no fewer than two days in advance of proposed interruption of each service or utility.
2. Do not proceed with interruption of services or utilities without Owner's written permission.

D. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

1. All ball and burlap plant material shall be installed from October 15 to March 31, unless otherwise authorized by the Department of Recreation, Parks and Open Space.
2. All container grown plant material shall be installed from September 15 to May 15, unless otherwise authorized by the Department of Recreation, Parks and Open Space.

E. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

F. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.8 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Death and unsatisfactory growth, except for defects resulting from abuse, or neglect by Owner, or incidents that are beyond Contractor's control.
   b. Structural failures including plantings falling or blowing over.
   c. Faulty performance of tree stabilization edgings.
   d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods from Date of **Landscaping Substantial Completion**:

   a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
   b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
   c. Contractor shall be responsible for complete and proper planting supports, installation layout, watering, fertilizing, and pest and pathogen control during warranty period.
   d. **Contractor shall be responsible for watering of installed materials during the warranty period of one year. Contractor shall be responsible for securing appropriate water source, providing the water and all associated equipment for watering at the contractor's expense.**

3. Include the following remedial actions as a minimum:

   a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
   b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
   c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.

1.9 MAINTENANCE SERVICE

A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

   1. Maintenance Period: Maintain until **Final Acceptance**.

B. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

   1. Maintenance Period: Maintain until **Final Acceptance**.

C. Initial Maintenance Service for Mulching and Weeding: Provide maintenance by skilled employees of landscape Installer. Maintain mulch depth and removal of weeds as required in Part 3. Begin maintenance immediately after beds are installed and continue until **Landscaping Substantial Completion** is awarded by City of Norfolk – Department of Recreation, Parks, and

Open Space's Landscape Architect and Parks and Forestry Department accepts the project for **Landscaping Substantial Completion** but for not less than maintenance period below.

1. Maintenance Period: Maintain until **Final Acceptance**.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots will be rejected.
2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Owner, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. If formal arrangements or consecutive order of plants is shown on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.
2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
3. Provide lime in form of ground dolomitic limestone.

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or granular texture, with a pH range of 3.4 to 4.8.

C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. of loose sawdust or ground bark.

E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.4 FERTILIZERS

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

E. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 5-gram tablets.
2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

F. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

2.5 PLANTING SOILS

A. Planting Soil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 6 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth. Mix ASTM D 5268 topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

1. Ratio of Loose Compost to Topsoil by Volume: 1:4.
2. Ratio of Loose Sphagnum Peat to Topsoil by Volume: per soil test recommendations.
3. Ratio of Loose Wood Derivatives to Topsoil by Volume: per soil test recommendations.
4. Weight of Lime per 1000 Sq. Ft.: per soil test recommendations.
5. Weight of Sulfur Iron Sulfate Aluminum Sulfate per 1000 Sq. Ft.: per soil test recommendations.
6. Weight of Agricultural Gypsum per 1000 Sq. Ft.: per soil test recommendations.

7. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: per soil test recommendations.
8. Weight of Bonemeal per 1000 Sq. Ft.: per soil test recommendations.
9. Weight of Superphosphate per 1000 Sq. Ft.: per soil test recommendations.
10. Weight of Commercial Fertilizer per 1000 Sq. Ft.: per soil test recommendations.
11. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: per soil test recommendations.

B. Planting Soil: Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process and stockpiled on-site. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

1. Supplement with another specified planting soil when quantities are insufficient.
2. Mix existing, native surface topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

   a. Ratio of Loose Compost to Topsoil by Volume: 1:2.
   b. Ratio of Loose Sphagnum Peat to Topsoil by Volume: per soil test recommendations.
   c. Ratio of Loose Wood Derivatives to Topsoil by Volume: per soil test recommendations.
   d. Weight of Lime per 1000 Sq. Ft.: per soil test recommendations.
   e. Weight of Sulfur Iron Sulfate Aluminum Sulfate per 1000 Sq. Ft.: per soil test recommendations.
   f. Weight of Agricultural Gypsum per 1000 Sq. Ft.: per soil test recommendations.
   g. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: per soil test recommendations.
   h. Weight of Bonemeal per 1000 Sq. Ft.: per soil test recommendations.
   i. Weight of Superphosphate per 1000 Sq. Ft.: per soil test recommendations.
   j. Weight of Commercial Fertilizer per 1000 Sq. Ft.: per soil test recommendations.
   k. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: per soil test recommendations.

C. Planting Soil: Existing, in-place surface soil. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

1. Ratio of Loose Compost to Surface Soil by Volume: 1:2.
2. Ratio of Loose Sphagnum Peat to Surface Soil by Volume: per soil test recommendations.
3. Ratio of Loose Wood Derivatives to Surface Soil by Volume: per soil test recommendations.
4. Weight of Lime per 1000 Sq. Ft.: per soil test recommendations.
5. Weight of Sulfur Iron Sulfate Aluminum Sulfate per 1000 Sq. Ft.: per soil test recommendations.
6. Weight of Agricultural Gypsum per 1000 Sq. Ft.: per soil test recommendations.
7. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: per soil test recommendations.
8. Weight of Bonemeal per 1000 Sq. Ft.: per soil test recommendations.
9. Weight of Superphosphate per 1000 Sq. Ft.: per soil test recommendations.

10. Weight of Commercial Fertilizer per 1000 Sq. Ft.: per soil test recommendations.
11. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: per soil test recommendations.

D. Planting Soil: Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs, or marshes.

1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1 inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes; grubs; or other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled pore space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.
2. Mix imported topsoil or manufactured topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

a. Ratio of Loose Compost to Topsoil by Volume: 1:2.
b. Ratio of Loose Sphagnum Peat to Topsoil by Volume: per soil test recommendations.
c. Ratio of Loose Wood Derivatives to Topsoil by Volume: per soil test recommendations.
d. Weight of Lime per 1000 Sq. Ft.: per soil test recommendations.
e. Weight of Sulfur Iron Sulfate Aluminum Sulfate per 1000 Sq. Ft.: per soil test recommendations.
f. Weight of Agricultural Gypsum per 1000 Sq. Ft.: per soil test recommendations.
g. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: per soil test recommendations.
h. Weight of Bonemeal per 1000 Sq. Ft.: per soil test recommendations.
i. Weight of Superphosphate per 1000 Sq. Ft.: per soil test recommendations.
j. Weight of Commercial Fertilizer per 1000 Sq. Ft.: per soil test recommendations.
k. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: per soil test recommendations.

2.6 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following (Triple Shredded Hardwood unless otherwise noted on construction drawings):

1. Type: Triple Shredded hardwood and Pine needles.
2. Size Range: 3 inches maximum, 1/2 inch minimum.
3. Color: Natural.

B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble

salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

C. Mineral Mulch: Hard, durable stone, washed free of loam, sand, clay, and other foreign substances, of following type, size range, and color:

1. Type: Rounded riverbed gravel or smooth-faced stone.
2. Size Range: 2-4 inches.
3. Color: Black.

2.7 WEED-CONTROL BARRIERS

A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally-encountered chemicals, alkalis, and acids.

B. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz./sq. yd..

2.8 PESTICIDES

A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.9 TREE STABILIZATION MATERIALS

A. Stakes and Guys:

1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
2. Wood Deadmen: Timbers measuring 8 inches in diameter and 48 inches long, treated with specified wood pressure-preservative treatment.
3. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.

4. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch in diameter.
5. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
6. Guy Cables: Five-strand, 3/16-inch- diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches long, with two 3/8-inch galvanized eyebolts.
7. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.
8. Proprietary Staking-and-Guying Devices: Proprietary stake and adjustable tie systems to secure each new planting by plant stem; sized as indicated and per manufacturer's written recommendations.

B. Root-Ball Stabilization Materials:

1. Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated; stakes pointed at one end.
2. Wood Screws: ASME B18.6.1.
3. Proprietary Root-Ball Stabilization Devices: Proprietary at- or below-grade stabilization systems to secure each new planting by root ball; sized per manufacturer's written recommendations unless otherwise indicated.

2.10 LANDSCAPE EDGINGS

A. Steel Edging: Standard commercial-steel edging, rolled edge, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.

1. Edging Size: 3/8 inch wide by 6 inches deep.
2. Stakes: Tapered steel, a minimum of 12 inches long.
3. Accessories: Standard tapered ends, corners, and splicers.
4. Finish: Standard paint.
5. Paint Color: Black.

2.11 MISCELLANEOUS PRODUCTS

A. Wood Pressure-Preservative Treatment: AWPA C2, with waterborne preservative for soil and freshwater use, acceptable to authorities having jurisdiction, and containing no arsenic; including ammoniacal copper arsenate, ammoniacal copper zinc arsenate, and chromated copper arsenate.

B. Root Barrier: Black, molded, modular panels manufactured with 50 percent recycled polyethylene plastic with ultraviolet inhibitors, 85 mils thick, with vertical root deflecting ribs protruding 3/4 inch out from panel, and each panel 18 inches wide.

C. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

D. Burlap: Non-synthetic, biodegradable.

E. Planter Drainage Gravel: Washed, sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.

F. Planter Filter Fabric: Woven geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.

G. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Owner and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install 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.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Owner's acceptance of layout before excavating or planting. Make minor adjustments as required.

D. Lay out plants at locations directed by Owner. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

E. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

F. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 PLANTING AREA ESTABLISHMENT

A. Loosen subgrade of planting areas to a minimum depth of 12 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply superphosphate fertilizer directly to subgrade before loosening.
2. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.

a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
b. Mix lime with dry soil before mixing fertilizer.

3. Spread planting soil to a depth of 12 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

a. Spread approximately one-half the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Before planting, obtain Owner's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

D. Application of Mycorrhizal Fungi: At time directed by Owner, broadcast dry product uniformly over prepared soil at per soil test recommendations.

3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate approximately three times as wide as ball diameter for balled and burlapped container-grown stock.
2. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
5. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
6. Maintain supervision of excavations during working hours.
7. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
8. If drain tile is shown on Drawings or required under planting areas, excavate to top of porous backfill over tile.

B. Subsoil and topsoil removed from excavations may be used as planting soil.

C. Obstructions: Notify Owner if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch- diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

D. Drainage: Notify Owner if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.

1. Use planting soil for backfill.
2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.

3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Set container-grown stock plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Use planting soil for backfill.
2. Carefully remove root ball from container without damaging root ball or plant.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. Set fabric bag-grown stock plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Use planting soil for backfill.
2. Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

F. Set and support bare-root stock in center of planting pit or trench with root flare 1 inch above adjacent finish grade.

1. Use planting soil for backfill.
2. Spread roots without tangling or turning toward surface, and carefully work backfill around roots by hand. Puddle with water until backfill layers are completely saturated. Plumb before backfilling, and maintain plumb while working backfill around roots and placing layers above roots.
3. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside soil-covered roots about 1 inch from root tips; do not place tablets in bottom of the hole or touching the roots.
4. Continue backfilling process. Water again after placing and tamping final layer of soil.

G. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 MECHANIZED TREE SPADE PLANTING

A. Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.

B. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.

C. Cut exposed roots cleanly during transplanting operations.

D. Use the same tree spade to excavate the planting hole as was used to extract and transport the tree.

E. Plant trees as shown on Drawings, following procedures in "Tree, Shrub, and Vine Planting" Article.

F. Where possible, orient the tree in the same direction as in its original location.

3.7 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape trees, shrubs, and vines as directed by Owner.

C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Owner, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

D. Do not apply pruning paint to wounds.

3.8 TREE STABILIZATION

A. Install trunk stabilization as follows unless otherwise indicated:

1. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend to the dimension shown on Drawings above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.

2. Use two stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper; three stakes for trees less than 14 feet high and up to 4 inches in caliper. Space stakes equally around trees.
3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
4. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

B. Staking and Guying: Stake and guy trees more than 14 feet in height and more than 3 inches in caliper unless otherwise indicated. Securely attach no fewer than three guys to stakes 30 inches long, driven to grade.

1. Site-Fabricated Staking-and-Guying Method:

a. For trees more than 6 inches in caliper, anchor guys to wood deadmen buried at least 36 inches below grade. Provide turnbuckle for each guy wire and tighten securely.
b. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
c. Support trees with strands of cable or multiple strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
d. Attach flags to each guy wire, 30 inches above finish grade.
e. Paint turnbuckles with luminescent white paint.

2. Proprietary Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

C. Root-Ball Stabilization: Install at- or below-grade stabilization system to secure each new planting by the root ball unless otherwise indicated.

1. Wood Hold-Down Method: Place vertical stakes against side of root ball and drive them into subsoil; place horizontal wood hold-down stake across top of root ball and screw at each end to one of the vertical stakes.

a. Install stakes of length required to penetrate at least to the dimension shown on Drawings below bottom of backfilled excavation. Saw stakes off at horizontal stake.
b. Install screws through horizontal hold-down and penetrating at least 1 inch into stakes. Predrill holes if necessary to prevent splitting wood.
c. Install second set of stakes on other side of root trunk for larger trees as indicated.

2. Proprietary Root-Ball Stabilization Device: Install root-ball stabilization system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

D. Palm Bracing: Install bracing system at three or more places equally spaced around perimeter of trunk to secure each palm until established unless otherwise indicated.

1. Site-Fabricated Palm-Bracing Method:

    a. Place battens over padding and secure battens in place around trunk perimeter with at least two straps, tightened to prevent displacement. Ensure that straps do not contact trunk.
    b. Place diagonal braces and cut to length. Secure upper ends of diagonal braces with galvanized nails into battens or into nail-attached blocks on battens. Do not drive nails, screws, or other securing devices into palm trunk; do not penetrate palm trunk in any fashion. Secure lower ends of diagonal braces with stakes driven into ground to prevent outward slippage of braces.

2. Proprietary Palm-Bracing Device: Install palm-bracing system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

3.9 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.10 PLANTING AREA MULCHING

A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 6 inches and secure seams with galvanized pins.

B. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees and Tree-like Shrubs in Turf Areas: Apply organic mulch ring of 2-inch average thickness, with 36-inch radius around trunks or stems. Do not place mulch within 6 inches of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 2-inch average thickness of organic mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.11 EDGING INSTALLATION

A. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 30 inches apart, driven below top elevation of edging.

B. Shovel-Cut Edging: Separate mulched areas from turf areas, curbs, and paving with a 45-degree, 4- to 6-inch- deep, shovel-cut edge as shown on Drawings.

3.12 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Replenish mulch as necessary to maintain depths shown within the planting details and specifications.

D. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated past management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.13 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.14 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.15 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

PART 4 - INSPECTION AND ACCEPTANCE

4.1 LANDSCAPING SUBSTANTIAL COMPLETION

A. The contractor shall perform all necessary weeding, mowing and trimming, and shall replace plants that are dead, not healthy, misshaped, or otherwise damaged.

B. City of Norfolk – Department of Recreation, Parks, and Open Space's Landscape Architect shall inspect all work and materials for **Landscaping Substantial Completion** upon written request by the Contractor. The request shall be received at least ten (10) calendar days before the anticipated date of inspection and sent to City of Norfolk – Department of Recreation, Parks, and Open Space's Landscape Architect.

C. Upon correction and/or replacement of all substandard work and materials by the Contractor, the Owner shall issue a certificate of **Landscaping Substantial Completion**. The responsibility for obtaining the Certificate of **Landscaping Substantial Completion**, as well as obtaining the subsequent overall **Project Substantial Completion** rests with the Contractor. Progress payments may be withheld unless the Contractor obtains the **Certificate of Project Substantial Completion**.

D. The work may be accepted in parts when it is deemed to be in the City's best interest to do so, and when written approval is given to the Contractor to incrementally complete the work. Acceptance and use of such areas by the Owner shall not waive any of the provisions of this Contract.

4.2 LANDSCAPING INSPECTION, GUARANTEE AND REPLACEMENT

A. Landscaping Inspection: Inspection of the work to determine its completion for beginning of the Landscaping Guarantee and Maintenance Period will be made by the Owner upon request for such inspection submitted by the Contractor at least (10) days prior to the anticipated date. ALL PLANTS MUST BE ALIVE AND HEALTHY.

B. After inspection, the Owner will notify the Contractor of the date to begin the Landscaping Guarantee and Maintenance Period by issuing a Notice of Acceptance, or in the event of any deficiencies, of the requirements for beginning the Landscaping Guarantee and Maintenance Period.

1. Landscaping Guarantee and Replacement: Warranty Periods from Date of **Project Substantial Completion**:

a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.

C. Inspections shall be made at the discretion of the owner during the Landscaping Guarantee and Maintenance Period to determine that maintenance work is being performed in accordance with the Contract. The Contractor shall accompany the Owner on these inspections.

4.3 LANDSCAPING FINAL ACCEPTANCE

A. At the end of the Landscaping Guarantee and Maintenance Period the City of Norfolk – Department of Recreation, Parks, and Open Space's Landscape Architect shall inspect all guaranteed work for Final Acceptance upon written request of the Contractor. The request shall be received at least ten (10) calendar days before the anticipated date for Final Inspection and sent to City of Norfolk - Department of Recreation, Parks, and Open Space, Attention, Landscape Architect.

B. If the Owner's inspection reveals that the Contractor has satisfactorily completed the requirements of all the contract documents, the Owner shall issue a Certificate of Final Acceptance.

5.0 MEASUREMENT AND PAYMENT

Method of Measurement: All landscaping materials, labor, and equipment will be measured in units of LUMP SUM for the proposed improvements called for in the Plans.

Basis of Payment: The contract unit price for landscaping shall be based on the following work tasks.

A. **Landscaping Improvements**: The unit price for proposed landscaping improvements shall consist of all materials, labor, and equipment required to implement the proposed landscaping improvements as called for in the Plans, which includes furnishing and planting proposed plantings, trees, and/or shrubs; placement of weed barrier, mulching, staking of proposed trees, and incidentals necessary for a complete and accepted installation of all proposed improvements in accordance with Section 329300. Also included in the unit price is clearing and grubbing of existing groundcover, trees, and other plantings; maintenance of plantings and trees until final acceptance, temporary tree and plant protection, and any coordination required with the City of Norfolk Landscape Architect.

END OF SECTION 329300

CITY OF NORFOLK
LOCALLY ADMINISTERED
FEDERALLY FUNDED PROJECTS
SIGNAL POLE FOUNDATION SOIL BORING DATA

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GET Solutions, Inc.

Geotechnical • Environmental • Testing

REPORT OF SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING SERVICES

Norfolk Signal Poles
Various Intersections
Norfolk, Virginia

G E T Project No: VB12-344G
March 6, 2013

Prepared for:

Kimley-Horn & Associates, Inc.
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Suite 500
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GET Solutions, Inc.

Geotechnical • Environmental • Testing

March 6, 2013

TO: **Kimley-Horn & Associates, Inc.**
4500 Main Street
Suite 500
Virginia Beach, Virginia 23462

Attn: Mr. Daniel Markham, P.E.

RE: Report of Subsurface Exploration and Geotechnical Engineering Services
Norfolk Signal Poles
Various Intersections
Norfolk, Virginia
G E T Project No: VB12-344G

Dear Mr. Markham:

In compliance with your instructions, we have completed our Subsurface Exploration and Geotechnical Engineering Services for the referenced project. The results of this study, together with our recommendations, are presented in this report.

Often, because of design and construction details that occur on a project, questions arise concerning subsurface conditions. **G E T Solutions, Inc.** would be pleased to continue its role as Geotechnical Engineer during the project implementation.

Thank you for the opportunity to work with you on this project. We trust that the information contained herein meets your immediate need, and should you have any questions or if we could be of further assistance, please do not hesitate to contact us.

Respectfully Submitted,
G E T Solutions, Inc.

Kyle R. Martin
Staff Engineer

D. Mark Scholefield, P.E.
Senior Project Engineer
VA Lic. # 033932

COMMONWEALTH OF VIRGINIA
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1.0 PROJECT INFORMATION

1.1 Project Authorization

G E T Solutions, Inc. has completed our subsurface exploration and geotechnical engineering services for the proposed Norfolk Signal Poles project located at various intersections in the City of Norfolk, Virginia. The geotechnical engineering services were conducted in general accordance with **G E T** Proposal No. PVB12-697G (Revision I). Authorization to proceed with our services was received in the form of an electronic mail dated December 28, 2012 from Daniel Markham, P.E. with Kimley-Horn & Associates, Inc.

1.2 Project Locations and Site Descriptions

The project sites are located at the intersections of;

- St. Paul's Boulevard and Market Street
- Chesapeake Boulevard and Johnstons Road
- Monticello Avenue and East 27th Street
- Granby Street and East 27th Street

All of the intersections are located in the City of Norfolk, Virginia. At the time of our site reconnaissance the surrounding topography consisted of the existing roadway alignments, concrete sidewalks, grass covered areas, landscaped trees and shrubs, fences (Monticello Avenue) and above/below ground utilities. Site vicinity and location maps are provided in Appendix I.

1.3 Project Construction Description

The development at these sites is planned to consist of installing eleven (11) new traffic signal poles at the intersections. Specifically;

- Four (4) poles are planned for the intersection of St. Paul's Boulevard and Market Street
- Four (4) poles are planned for the intersection of Chesapeake Boulevard and Johnstons Road
- One (1) pole is planned for the intersection of Monticello Avenue and East 27th Street
- Two (2) poles are planned for the intersection of Granby Street and East 27th Street

The new poles are expected to consist of mast arms with varying signal heads. The foundation loads were not known at the time of this reporting; however, based on our experience with similar projects it is expected that the poles will be supported by drilled shafts or caissons.

If any of the noted information is incorrect or has changed, please inform **G E T Solutions, Inc.** so that we may amend the recommendations presented in this report, if appropriate.

1.4 Purpose and Scope of Services

The purpose of this study was to obtain information of the general subsurface conditions at the proposed project sites as related to the signal poles' foundation and earthwork design/construction and other geotechnical aspects, in addition to identifying the locations of underground utilities within the proposed foundation areas. The subsurface conditions encountered were then evaluated with respect to the available project characteristics. In this regard, engineering assessments for the following items were formulated:

1. General assessment of the soils revealed by the borings performed at the proposed signal pole locations.

2. General location and description of potentially deleterious material encountered in the borings that may interfere with construction progress, including existing fills or surficial/subsurface organic deposits.

3. Manual excavation at each of the pole foundation locations for clearing of existing shallow underground utilities.

4. Soil design parameters required for the proposed signal poles.

The scope of services did not include an environmental assessment for determining the presence or absence of wetlands or hazardous or toxic material in the soil, bedrock, surface water, groundwater or air, on or below or around this site. Prior to development of this site, an environmental assessment is advisable.

2.0 FIELD AND LABORATORY PROCEDURES

2.1 Field Exploration

In order to explore the general subsurface soil types and to aid in developing associated foundation design parameters, eleven (11) 35-foot deep Standard Penetration Test (SPT) borings (designated as B-1 through B-11) were drilled within the vicinity of the proposed signal pole locations.

The boring characteristics are detailed in the table on the following page (Table I).

Table I - Boring Schedule

BORING	DEPTH (FEET)	INTERSECTION	QUADRANT
B-1	35	St. Paul's Boulevard and Market Street	Northwest
B-2	35		Northeast
B-3	35		Southeast
B-4	35		Southwest
B-5	35	Chesapeake Boulevard and Johnstons Road	Northwest
B-6	35		Northeast
B-7	35		Southeast
B-8	35		Southwest
B-9	35	Monticello Avenue and East 27th Street	Northeast
B-10	35	Granby Street and East 27th Street	Northeast
B-11	35		Southwest

The SPT borings were performed with the use of wash "mud" drilling procedures in general accordance with ASTM D 1586. The tests were performed continuously from the existing ground surface to a depth of 12 feet, and at 5-foot intervals thereafter. The soil samples were obtained with a standard 1.4" I.D., 2" O.D., 30" long split-spoon sampler. The sampler was driven with blows of a 140 lb. hammer falling 30 inches, using an automatic hammer. The number of blows required to drive the sampler each 6-inch increment of penetration was recorded and is shown on the boring logs. The sum of the second and third penetration increments is termed the SPT N-value (uncorrected for automatic hammer). A representative portion of each disturbed split-spoon sample was collected with each SPT, placed in a glass jar, sealed, labeled, and returned to our laboratory for review.

In addition to the soil test borings, a five-foot by five-foot square excavation (designated as TP-1 through TP-11) approximately four feet deep was excavated at each proposed signal pole location to clear the shallow underground utilities at each location. Several underground utility alignments and obstructions were encountered at the test pit locations.

The test pit characteristics are detailed in the tables on the following pages (Table II-A through Table II-D).

Table II-A - Test Pit Characteristics
Intersection of St. Paul's Boulevard and Market Street

TEST PIT NO.	QUADRANT	UTILITIES/OBSTRUCTIONS ENCOUNTERED
TP-1	Northwest	➢ Utility: 0.33 feet below existing grades within the southern excavation sidewall. Runs east to west. (1)
TP-2	Northeast	No Utilities Encountered
TP-3	Southeast	No Utilities Encountered
TP-4	Southwest	➢ Timber: 2.5 feet below existing grades with the southern portion. Runs east to west. ➢ Utility: 3 sloping to 3.5 feet below existing grades in the western portion. Runs north to south. (1)

*Note (1) - The Utilities described above were **not** identified by Miss Utility.*

Table II-B - Test Pit Characteristics
Intersection of Chesapeake Boulevard and Johnstons Road

TEST PIT NO.	QUADRANT	UTILITIES ENCOUNTERED
TP-5	Northwest	No Utilities Encountered
TP-6	Northeast	➢ Utility: 3 feet below existing grades along the western sidewall. Runs north to south. (1)
TP-7	Southeast	➢ Three Utilities: 3.5 feet below existing grades sweeping from northwest corner to southeast corner. Appears to be abandoned. (2)
TP-8	Southwest	➢ Utility: 2.66 feet below existing grades along eastern excavation sidewall. Runs north to south. (1)

Note (1) - Utility encountered was identified by Miss Utility.
*Note (2) - The Utilities described above were **not** identified by Miss Utility.*

Table II-C - Test Pit Characteristics
Intersection of Monticello Avenue and East 27th Street

TEST PIT NO.	QUADRANT	UTILITIES ENCOUNTERED
TP-9	Northeast	No Utilities Encountered

Table II-D - Test Pit Characteristics
Intersection of Granby Street and East 27th Street

TEST PIT NO.	QUADRANT	UTILITIES ENCOUNTERED (1)
TP-10	Northeast	➢ Concrete Wall: 2.75 feet below existing grades within the eastern excavation sidewall. Runs north to south. ➢ Utility: 2.33 feet below existing grades within the western excavation sidewall. Runs north to south. (1)
TP-11	Southwest	➢ Utility: 3.75 feet below existing grades in the approximate center. Runs east to west. Appears to be abandoned.

*Note (1) - The Utilities described above were **not** identified by Miss Utility.*

The boring and test pit locations were established and staked in the field by a representative of **G E T Solutions, Inc.** The approximate boring and test pit locations are shown on the attached "Boring/Test Pit Location Plans" (Appendix II), which were reproduced based on satellite images of the site and the site plans provided by the client.

2.2 Laboratory Testing

Representative portions of all soil samples collected during drilling were sealed in glass jars, labeled and transferred to our laboratory for classification and analysis. The soil classification was performed by a Geotechnical Engineer in accordance with ASTM D2488. A summary of the soil classification system is provided in Appendix III.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Geology

The project site lies within a major physiographic province called the Atlantic Coastal Plain. Numerous transgressions and regressions of the Atlantic Ocean have deposited marine, lagoonal, and fluvial (stream lain) sediments. The regional geology is very complex, and generally consists of interbedded layers of varying mixtures of sands, silts and clays. Based on our review of existing geologic and soil boring data, the geologic stratigraphy encountered in our subsurface explorations generally consisted of marine deposited sands and clays.

3.2 Test Pit Excavation Results

Upon completion of the test pit excavations, a 4-foot long piece of reinforcing steel (no. 4 bar) was placed in the approximate center of each test pit, photographs (included in Appendix VI) were taken at each test pit location and three measurements were taken from the approximate center of the test pit to an existing feature (signs, traffic lights, etc.). These measurements are provided in the tables (Table III-A through Table III-D) below and on the following pages. The excavations were then backfilled with the excavated soils. As previously mentioned, numerous underground utilities (public and private) were encountered in the vicinity of the proposed test pit locations. Those utilities encountered were identified by Miss Utility with the exception of those noted in Tables II-A through II-D. As discussed with the client, test pits TP-2 and TP-8 were offset from the proposed pole locations due to marked underground utilities (TP-8) and an underground brick wall (TP-2).

Table III-A - Test Pit Locations
Intersection of St. Paul's Boulevard and Market Street

TEST PIT NO.	TEST PIT LOCATION (center)		
TP-1	10' from Northeast Corner of Concrete Surrounding Traffic Conduit Box	17.33' from Southeast Corner of Northern Brick Column of Brick/Metal Fence	10' from Southeast Corner of Power Conduit Box in Brick Pavers
TP-2	16.5' from "No Turn on Red" Sign Post	15.5' from Closest Tree	8.33' from Center of Traffic Conduit Box
TP-3	7.33' from Southeast Corner of Double Traffic Conduit Box	5.5' from Southwest Corner of Concrete Pad Supporting Electrical Cabinet	9.33' from Southwest Corner of Electrical Conduit Box
TP-4	30.25' from Southwest Corner of Communications Conduit Box	31.25' from Center of Manhole Cover labeled "C&P of VA"	17' from Sewage Cover labeled "VDH"

Table III-B - Test Pit Locations

Intersection of Chesapeake Boulevard and Johnstons Road

TEST PIT NO.	TEST PIT LOCATION (center)		
TP-5	15.67' from Face of Eastern Fence Post	15.75' from Center of Manhole (Sewer)	18.33' from Center of Metal "Pull-Lid" Box
TP-6	16' from Southeast Corner of Concrete Slab Beneath Electrical Box	11.75' from Closest Tree	10.67' from Northwest Corner of Brick Sign
TP-7	21.25' from Southeast Corner of Concrete Power/Light Pole	28.5' from Brick Wall	14.67' from Center of Water Meter
TP-8	7.5' from "Chesapeake Blvd./Johnstons Rd." Street Sign	10' from Center of Sewer Lid in Sidewalk	22.67' from Northwest Corner of Concrete Power/Light Pole

Table III-C - Test Pit Locations

Intersection of Monticello Avenue and East 27th Street

TEST PIT NO.	TEST PIT LOCATION (center)		
TP-9	6.25' from Northeast Corner of Light Pole	24.67' from Center of Sewer Lid in Sidewalk	6' from Southeast Corner of Metal Drop Inlet Lid

Table III-D - Test Pit Locations

Intersection of Granby Street and East 27th Street

TEST PIT NO.	TEST PIT LOCATION (center)		
TP-10	39.33' from Closest Tree	21' from Signal Pole	4.75' from Power/Light Pole
TP-11	3.75' from Southeast Corner of Metal Drop Inlet Lid	10' from Corner of Building	13.33' from Signal Pole

3.3 Subsurface Soil Conditions

A brief description of the subsurface soil conditions is presented below and on the following pages (Table IV-A through Table IV-D).

Table IV-A - Subsurface Soil Conditions
Borings B-1 through B-4 (Intersection of St. Paul's Boulevard and Market Street)

AVERAGE DEPTH (FEET)	STRATUM	DESCRIPTION	RANGE OF SPT[1] N-VALUES
0 to 0.25 - 0.5	Surficial	➢ 3 to 6 inches of topsoil material.	-
0.25 - 0.5 to 2 - 3.9	FILL	➢ SAND (SM) with varying amounts of Silt, Clay and brick fragments. ➢ CLAY (CL) with varying amounts of Silt, Sand and brick fragments.	Granular 4 - 15 Cohesive 5 - 12
2 - 3.9 to 23	I	➢ SAND (SM, SP-SM, SP) with varying amounts of Silt and Clay. ** A deposit of lean CLAY (CL) was encountered between 2 to 5 - 5.5 feet.*	WOH[2] - 14
23 to 35	II	➢ CLAY (CH) with varying amounts of Silt, Sand and marine shell fragments.	WOH[2] - 4

Note (1) SPT = Standard Penetration Test, N-Values in Blows-per-foot
Note (2) WOH = Weight-of-Hammer

Table IV-B - Subsurface Soil Conditions

Borings B-5 through B-8 (Intersection of Chesapeake Boulevard and Johnstons Road)

AVERAGE DEPTH (FEET)	STRATUM	DESCRIPTION	RANGE OF SPT(1) N-VALUES
0 to 0.54 - 0.79	Surficial	➢ 6.5 to 9.5 inches of topsoil material.	-
0.54 - 0.79 to 2 - 3	I	➢ CLAY (CL) with varying amounts of Silt and Sand.	3 - 11
2 - 3 to 23	II	➢ SAND (SM, SP-SM, SP) with varying amount of Silt and Clay.	WOH(2) - 14
23 to 33 - 35	III	➢ CLAY (CH) with varying amounts of Silt and Sand. ** Boring B-6 was terminated within this layer.*	WOH(2) - 4
33 - 34.5 to 35	IV	➢ SAND (SC, SM, SP-SM) with varying amounts of Silt, Clay, fine Gravel and marine shell fragments.	9 - 14

Note (1) SPT = Standard Penetration Test, N-Values in Blows-per-foot
Note (2) WOH = Weight-of-Hammer

Table IV-C - Subsurface Soil Conditions

Boring B-9 (Intersection of Monticello Avenue and East 27th Street)

AVERAGE DEPTH (FEET)	STRATUM	DESCRIPTION	RANGE OF SPT(1) N-VALUES
0 to 0.17	Surficial	➢ 2 inches of topsoil material.	-
0.17 to 15	I	➢ SAND (SM, SP) with varying amount of Silt and Clay.	2 - 13
15 to 35	II	➢ CLAY (CH) with varying amounts of Silt, Sand and marine shell fragments.	WOH(2) - 4

Note (1) SPT = Standard Penetration Test, N-Values in Blows-per-foot
Note (2) WOH = Weight-of-Hammer

Table IV-D - Subsurface Soil Conditions
Borings B-10 and B-11 (Intersection of Granby Street and East 27th Street)

AVERAGE DEPTH (FEET)	STRATUM	DESCRIPTION	RANGE OF SPT(1) N-VALUES
0 to 0.17 - 0.42	Surficial	➢ 6.5 to 9.5 inches of topsoil material.	-
0.17 - 0.42 to 18	I	➢ SAND (SM, SP-SM) with varying amount of Silt and Clay.	2 - 13
18 to 23 - 28	II	➢ CLAY (CH) with varying amounts of Silt, Sand and marine shell fragments.	WOH(2) - 5
23 - 28 to 28 - 33	III	➢ SAND (SM) with varying amount of Silt, Clay and marine shell fragments.	WOH(2)
28 - 33 to 35	IV	➢ CLAY (CH) with varying amounts of Silt, Sand and marine shell fragments.	WOH(2) - 5

Note (1) SPT = Standard Penetration Test, N-Values in Blows-per-foot
Note (2) WOH = Weight-of-Hammer

The subsurface descriptions are of a generalized nature provided to highlight the major soil strata encountered. The records of the subsurface exploration are included in Appendix IV (Boring Log sheets) and in the Generalized Soil Profiles presented in Appendix V, which should be reviewed for specific information as to the individual borings. The stratifications shown on the records of the subsurface exploration represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the transition may be gradual or occur between sample intervals. It is noted that the topsoil designation references the presence of surficial organic laden soil, and does not represent any particular quality specification. This material is to be tested for approval prior to use.

3.4 Groundwater Information

The groundwater level was recorded at the boring locations and as observed through the relative wetness of the recovered soil samples during the drilling operations. The initial groundwater table levels were determined at the time of our site reconnaissance and are presented in the table (Table V) on the following page. The bore holes were backfilled upon completion for safety reasons, thus these readings may not be indicative of the static groundwater level.

Table V - Groundwater Table Levels

BORINGS	INTERSECTION	GROUNDWATER LEVEL (below existing grade)
B-1 through B-4	St. Paul's Boulevard and Market Street	Ranged from 7.5' to 8'
B-5 through B-8	Chesapeake Boulevard and Johnstons Road	4'
B-9	Monticello Avenue and East 27th Street	5'
B-10 and B-11	Granby Street and East 27th Street	5'

As subsurface soils begin to dry moisture moves upwards through the soil profile by means of capillary action. Based on the subsurface soil composition, these initial groundwater readings (based on the relative wetness of the soils) could be in part attributed to the capillary action of the soils. As such, if the static groundwater elevation is critical to the design of the proposed structures and site infrastructure it is recommended to install temporary groundwater monitoring wells to substantiate these initial readings.

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences, such as existing swales, drainage ponds, underdrains and areas of covered soil (paved parking lots, side walks, etc.). In the project's area, seasonal groundwater fluctuations of ± 2 feet or more are common; however, greater fluctuations have been documented. Again, we recommend that the contractor determine the actual groundwater levels at the time of the construction to determine groundwater impact on the construction procedures, if necessary.

4.0 EVALUATION AND RECOMMENDATIONS

Our recommendations are based on the previously discussed project information, our interpretation of the soil test borings and our observations during our site reconnaissance. If the proposed construction should vary from what was described, we request the opportunity to review our recommendations and make any necessary changes. It is noted that utility relocation and/or demolition (where applicable) will be necessary to facilitate signal pole construction.

4.1 Foundation Discussion

The proposed signal pole foundations should be designed to resist the overturning moments, uplift, torsion and shear forces. Based on our experience with similar projects, it is expected that the signal poles will be supported by a drilled shaft foundation.

We recommend that the estimated design parameters and capacities shown in the following tables be used to design the signal pole foundations consisting of a drilled caisson. These parameters were developed based on the understanding that the bearing soils will be clean and free of loose soils and the perimeter walls of the excavation will be stable during the concrete placement. Additionally, the estimated soil parameters shown in this report (Tables VI-A through VI-D on the following pages) were developed based on the soil conditions and the N-values encountered at the boring locations. Soil conditions as well as soil parameters at other locations than those encountered at the boring locations may be different. When the drilling operations are complete, concrete should be placed inside the casing as soon as possible. It is recommended that concrete in a caisson be poured the same day that the caisson is drilled. We recommend caisson construction be completed in general accordance with the manual titled Drilled Shafts: Construction Procedures and Design Methods.

A qualified representative of **G E T Solutions Inc.** should verify that caisson is bearing on competent materials and that the caisson installation procedures comply with the specifications.

Table IV-A - Summary of Estimated Soil Parameters (Borings B-1 through B-4)

Intersection of St. Paul's Boulevard and Market Street

Soil Type	FILL		SAND (SM, SP-SM, SP)	CLAY(1) (CL)	SAND (SM)	CLAY (CH)
Stratum	Granular FILL	Cohesive FILL	I			II
Depth (feet)	0.25 to 2 - 3.9	0.33 to 3.7	3.7 - 5.5 to 18	2 to 5 - 5.5	18 to 23	23 to 35
Average SPT N-value	9	9	9	8	1	2
Total Moist Unit Weight (pcf)	115	100	115	100	110	100
Saturated Unit Weight (pcf)	125	105	125	105	120	105
Buoyant Unit Weight (pcf)	63	43	63	43	58	43
Friction Angle (ϕ) degrees	30	5	31	5	29	5
Ultimate Cohesion (c) psf	0	500	0	600	0	200
Active Soil Pressure Ka	0.33	0.84	0.32	0.84	0.35	0.84
At-Rest Soil Pressure Ko	0.50	0.91	0.49	0.91	0.52	0.91
Passive Soil Pressure Kp	3.03	1.19	3.13	1.19	2.86	1.19
Coefficient of Friction	0.39	0.06	0.40	0.06	0.37	0.06

Note (1) - Only encountered at boring locations B-3 and B-4.

Table IV-B - Summary of Estimated Soil Parameters (Borings B-5 through B-8)
Intersection of Chesapeake Boulevard and Johnstons Road

Soil Type	CLAY (CL)	SAND (SM, SP-SM, SP)	SAND (SM)	CLAY (CH)
Stratum	I	II		III
Depth (feet)	0.54 - 0.79 to 2 - 3	2 - 3 to 18 - 19.5	18 - 19.5 to 23	23 to 33 - 34.5
Average SPT N-value	7	7	1	0
Total Moist Unit Weight (pcf)	100	115	110	100
Saturated Unit Weight (pcf)	105	125	120	105
Buoyant Unit Weight (pcf)	38	63	58	43
Friction Angle (ϕ) degrees	5	30	29	5
Ultimate Cohesion (c) psf	500	0	0	100
Active Soil Pressure Ka	0.84	0.33	0.35	0.84
At-Rest Soil Pressure Ko	0.91	0.50	0.52	0.91
Passive Soil Pressure Kp	1.19	3.03	2.86	1.19
Coefficient of Friction	0.06	0.39	0.37	0.06

Table IV-C - Summary of Estimated Soil Parameters (Boring B-9)

Intersection of Monticello Avenue and East 27th Street

Soil Type	SAND (SM, SP)	CLAY (CH)	CLAY (CH)
Stratum	I	II	
Depth (feet)	0.17 to 15	15 to 23	23 to 35
Average SPT N-value	6	3	1
Total Moist Unit Weight (pcf)	115	100	100
Saturated Unit Weight (pcf)	125	105	105
Buoyant Unit Weight (pcf)	63	43	43
Friction Angle (ϕ) degrees	30	5	5
Ultimate Cohesion (c) psf	0	300	100
Active Soil Pressure Ka	0.33	0.84	0.84
At-Rest Soil Pressure Ko	0.50	0.91	0.91
Passive Soil Pressure Kp	3.03	1.19	1.19
Coefficient of Friction	0.39	0.06	0.06

Table IV-D - Summary of Estimated Soil Parameters (Borings B-10 and B-11)
Intersection of Granby Street and East 27th Street

Soil Type	SAND (SM, SP-SM)	CLAY (CH)	SAND (SM)	CLAY (CH)
Stratum	I	II	III	IV
Depth (feet)	0.17 - 0.42 to 18	18 to 23 - 28	23 - 28 to 28 - 33	28 - 33 to 35
Average SPT N-value	7	3	0	2
Total Moist Unit Weight (pcf)	115	100	110	100
Saturated Unit Weight (pcf)	125	105	120	105
Buoyant Unit Weight (pcf)	63	43	58	43
Friction Angle (ϕ) degrees	30	5	29	5
Ultimate Cohesion (c) psf	0	300	0	200
Active Soil Pressure Ka	0.33	0.84	0.35	0.84
At-Rest Soil Pressure Ko	0.50	0.91	0.52	0.91
Passive Soil Pressure Kp	3.03	1.19	2.86	1.19
Coefficient of Friction	0.39	0.06	0.37	0.06

At the time of this reporting the size and depth of the drilled piers was determined by the Structural Engineer.

4.2 Excavations

In Federal Register, Volume 54, No. 209 (November, 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better insure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that all excavations, whether they be utility trenches, basement excavation or footing excavations, be constructed in accordance with the new (OSHA) guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. 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.

We are providing this information solely as a service to our client. **G E T Solutions, Inc.** is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

5.0 REPORT LIMITATIONS

The recommendations submitted are based on the available soil information obtained by **G E T Solutions, Inc.** and the information supplied by the client and their consultants for the proposed project. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, **G E T Solutions, Inc.** should be notified immediately to determine if changes in the foundation recommendations are required. If **G E T Solutions, Inc.** is not retained to perform these functions, **G E T Solutions, Inc.** can not be responsible for the impact of those conditions on the geotechnical recommendations for the project.

The Geotechnical Engineer warrants that the findings, recommendations, specifications or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

After the plans and specifications are more complete the Geotechnical Engineer should be provided the opportunity to review the final design plans and specifications to assure our engineering recommendations have been properly incorporated into the design documents, in order that the earthwork and foundation recommendations may be properly interpreted and implemented. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of Kimley-Horn & Associates, Inc. and their consultants for the specific application to the Norfolk Signal Poles project located at various intersections in the City of Norfolk, Virginia.

APPENDICES

I
SITE VICINITY AND LOCATION MAPS

II
BORING/TEST PIT LOCATION PLANS

III
SUMMARY OF SOIL CLASSIFICATION

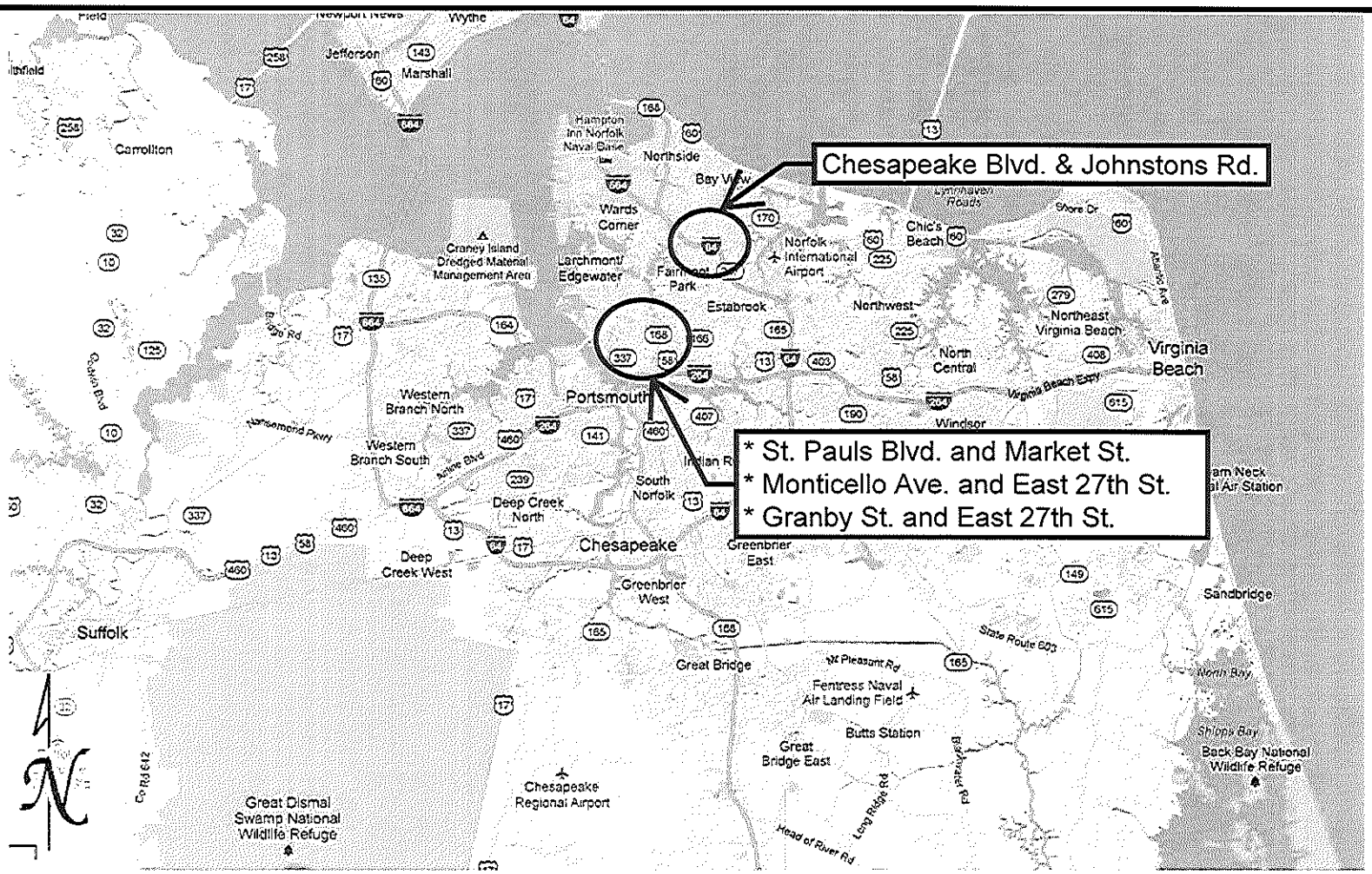
IV
BORING LOGS

V
GENERALIZED SOIL PROFILES

VI
PHOTOGRAPHS OF EXCAVATED TEST PITS

APPENDIX I

SITE VICINITY AND LOCATION MAPS

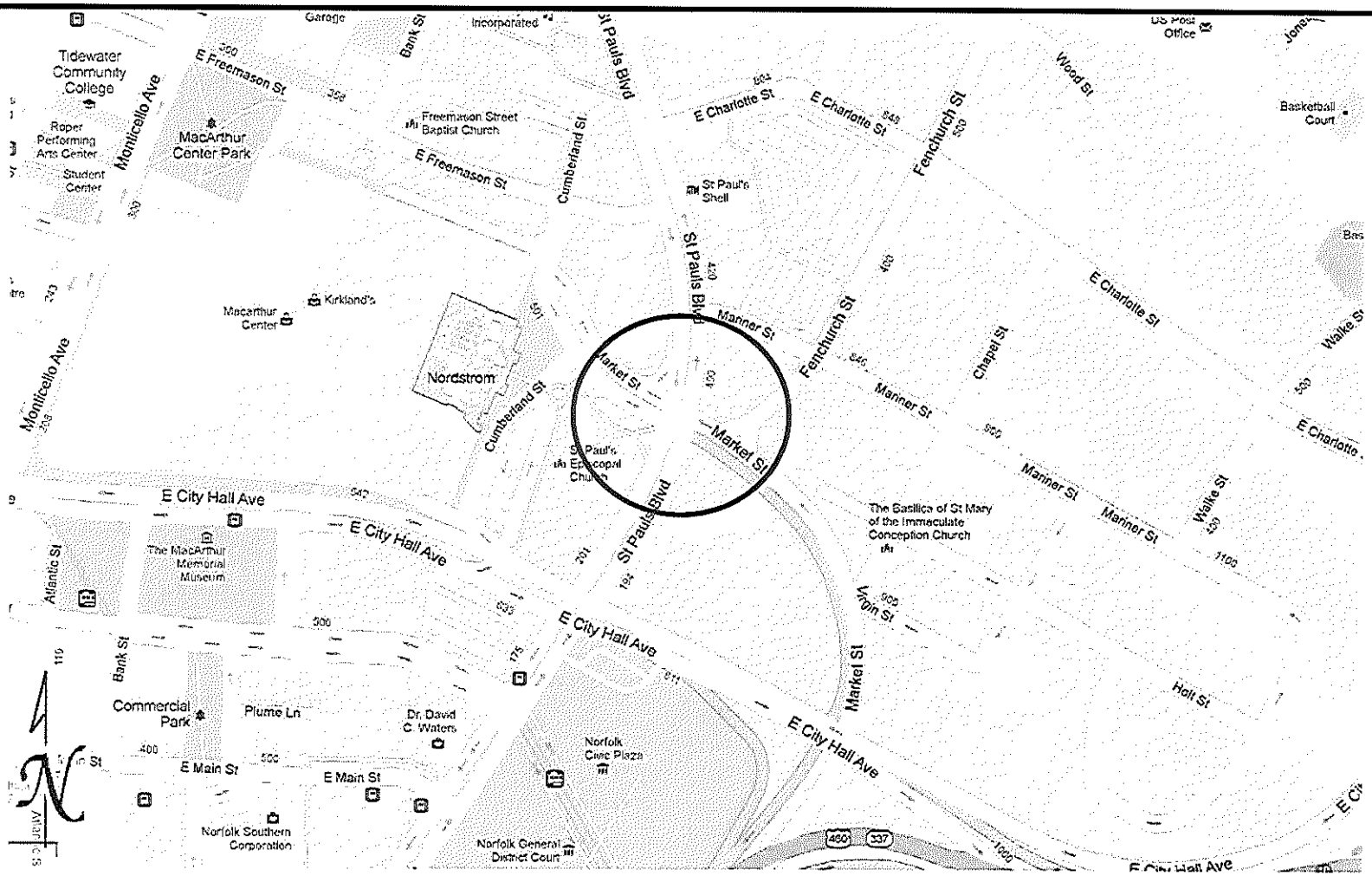


SITE VICINITY MAP

PROJECT:	**Norfolk Signal Poles Various Intersections**	**DATE:**	**3/4/2013**
		PLOT BY:	**K. Martin**
PROJECT LOCATION:	**Norfolk, Virginia**		
PROJECT NO:	**VB12-344G**		
CLIENT:	**Kimley-Horn & Associates, Inc.**		

GET Solutions, Inc.

Geotechnical - Environmental - Testing



SITE LOCATION MAP

St. Pauls Boulevard and Market Street

PROJECT:	**Norfolk Signal Poles Various Intersections**	**DATE:**	**3/4/2013**
		PLOT BY:	**K. Martin**
PROJECT LOCATION:	**Norfolk, Virginia**	**PAGE:**	**1 of 3**
PROJECT NO:	**VB12-344G**		
CLIENT:	**Kimley-Horn & Associates, Inc.**		

GET Solutions, Inc.

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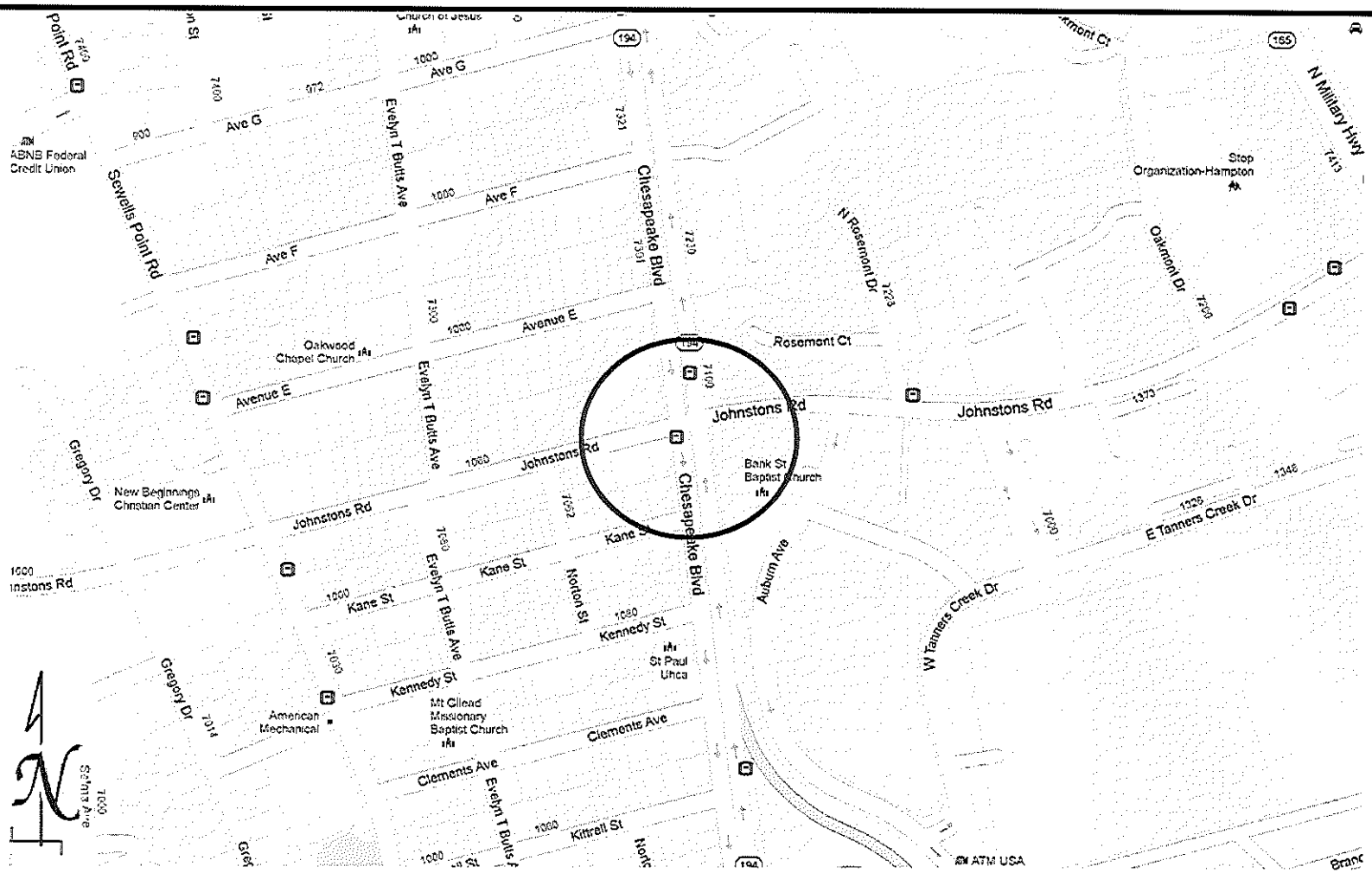

SITE LOCATION MAP

Chesapeake Boulevard and Johnstons Road

PROJECT:	**Norfolk Signal Poles Various Intersections**	**DATE:**	**3/4/2013**
		PLOT BY:	**K. Martin**
PROJECT LOCATION:	**Norfolk, Virginia**	**PAGE:**	**2 of 3**
PROJECT NO:	**VB12-344G**		
CLIENT:	**Kimley-Horn & Associates, Inc.**		

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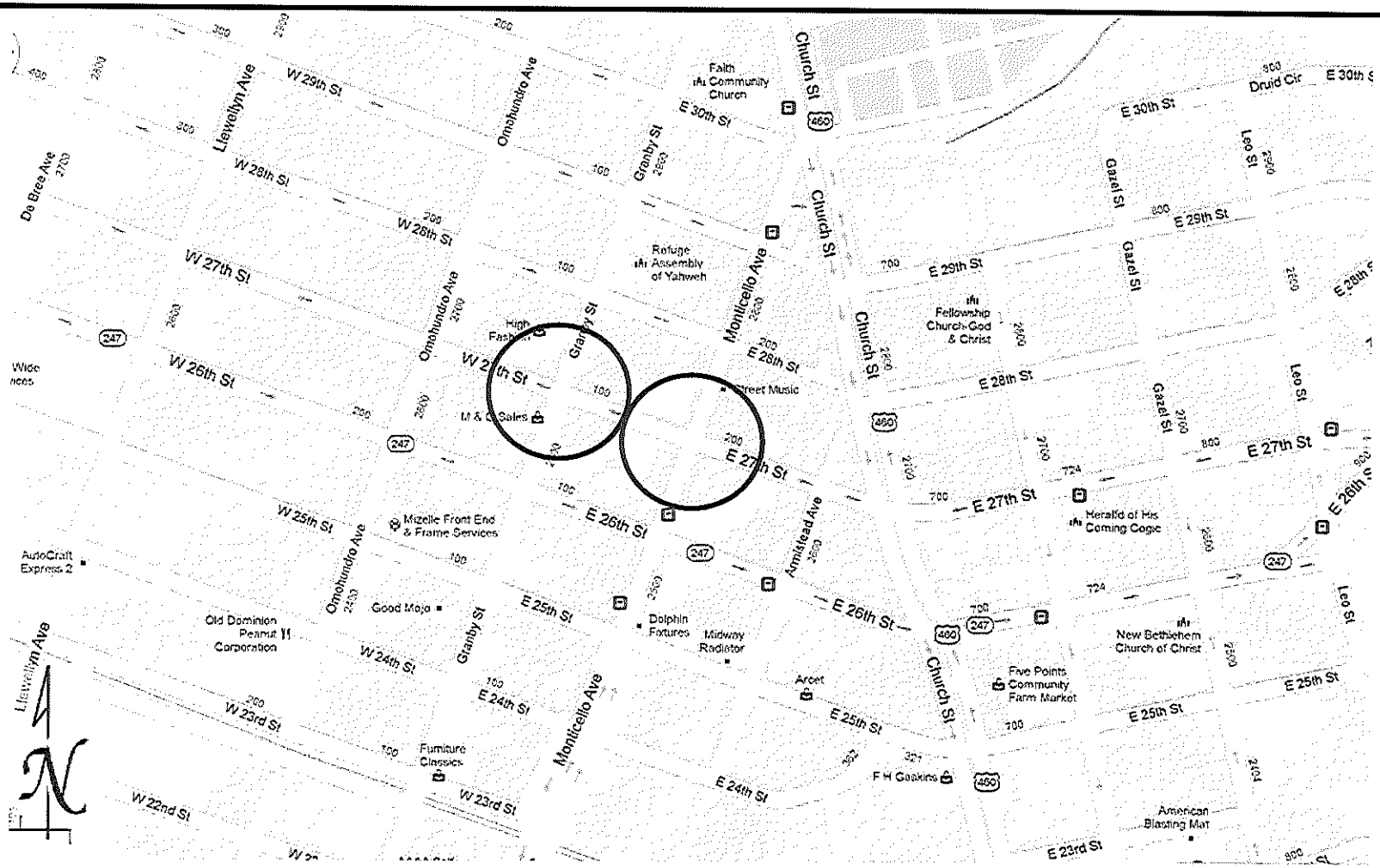

SITE LOCATION MAP

Monticello Avenue and Granby Street at East 27th Street

PROJECT:	**Norfolk Signal Poles Various Intersections**	**DATE:**	**3/4/2013**
		PLOT BY:	**K. Martin**
PROJECT LOCATION:	**Norfolk, Virginia**	**PAGE:**	**3 of 3**
PROJECT NO:	**VB12-344G**		
CLIENT:	**Kimley-Horn & Associates, Inc.**		

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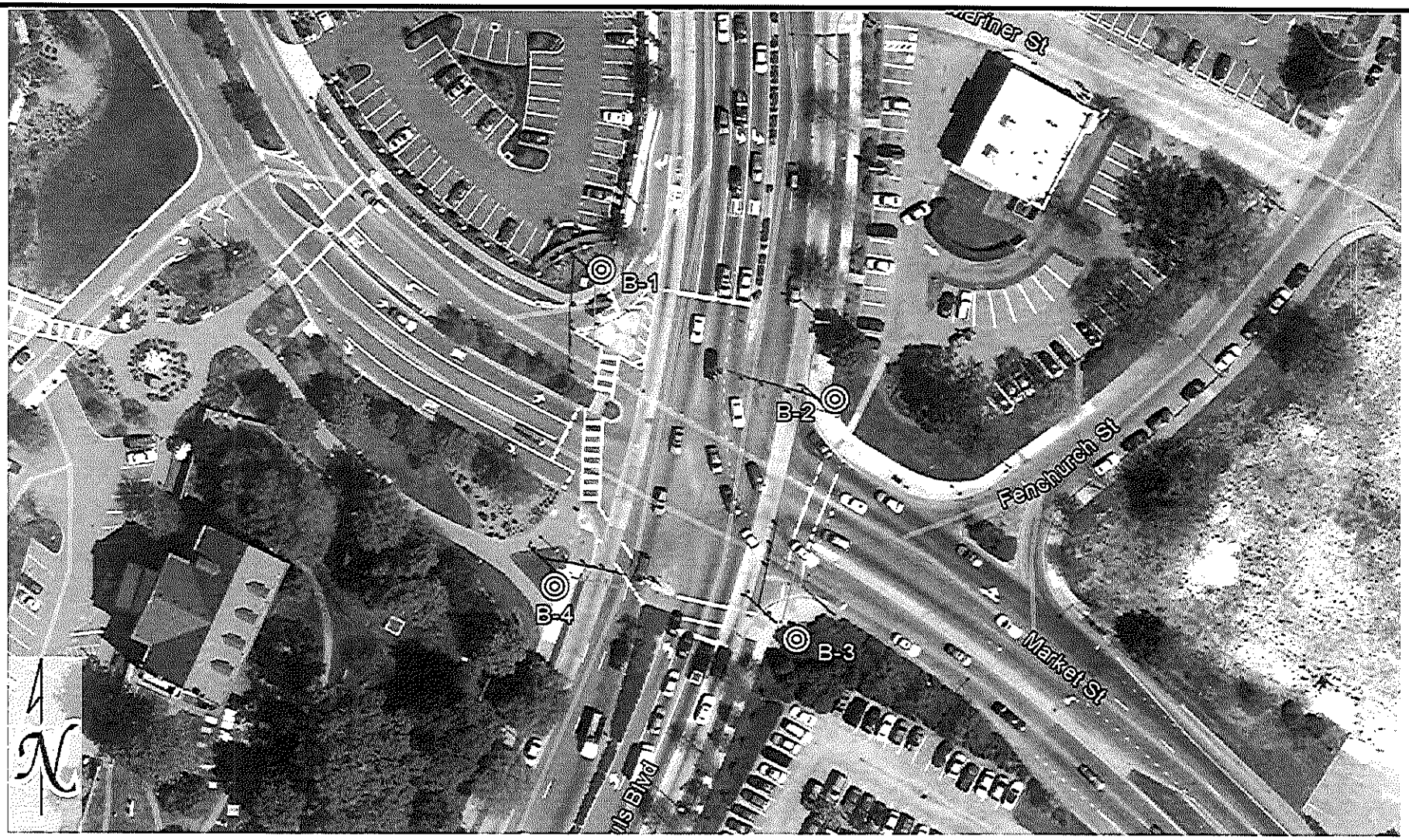
APPENDIX II

BORING/TEST PIT LOCATION PLANS



BORING LOCATION PLAN

St. Pauls Boulevard and Market Street

PROJECT:	Norfolk Signal Poles Various Intersections	DATE:	3/4/2013
		DRAWN BY:	K. Martin
PROJECT LOCATION:	Norfolk, Virginia	PAGE:	1 of 4
PROJECT NO:	VB12-344G		
CLIENT:	Kimley-Horn & Associates, Inc.		

GET Solutions, Inc.

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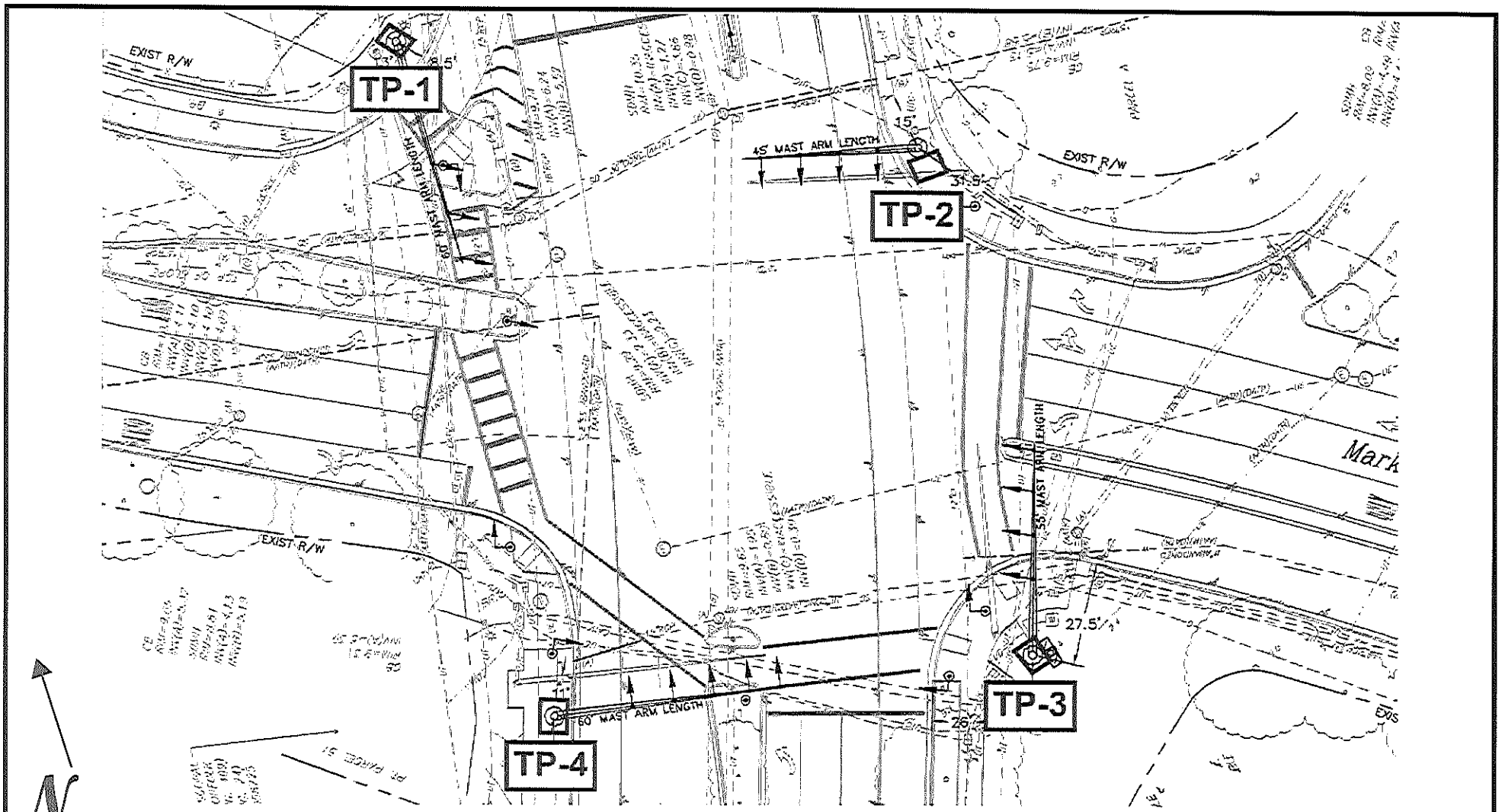

See Report for Dimensions to Center of Test Pits

TEST PIT LOCATION PLAN

St. Pauls Boulevard and Market Street

PROJECT:	**Norfolk Signal Poles Various Intersections**	**DATE:**	**3/5/2013**
		DRAWN BY:	**K. Martin**
PROJECT LOCATION:	**Norfolk, Virginia**	**PAGE:**	**1 of 4**
PROJECT NO:	**VB12-344G**		
CLIENT:	**Kimley-Horn & Associates, Inc.**		

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Geotechnical - Environmental - Testing

BORING LOCATION PLAN

Chesapeake Boulevard and Johnstons Road

PROJECT:	Norfolk Signal Poles Various Intersections	DATE:	3/4/2013
		DRAWN BY:	K. Martin
PROJECT LOCATION:	Norfolk, Virginia	PAGE:	2 of 4
PROJECT NO:	VB12-344G		
CLIENT:	Kimley-Horn & Associates, Inc.		

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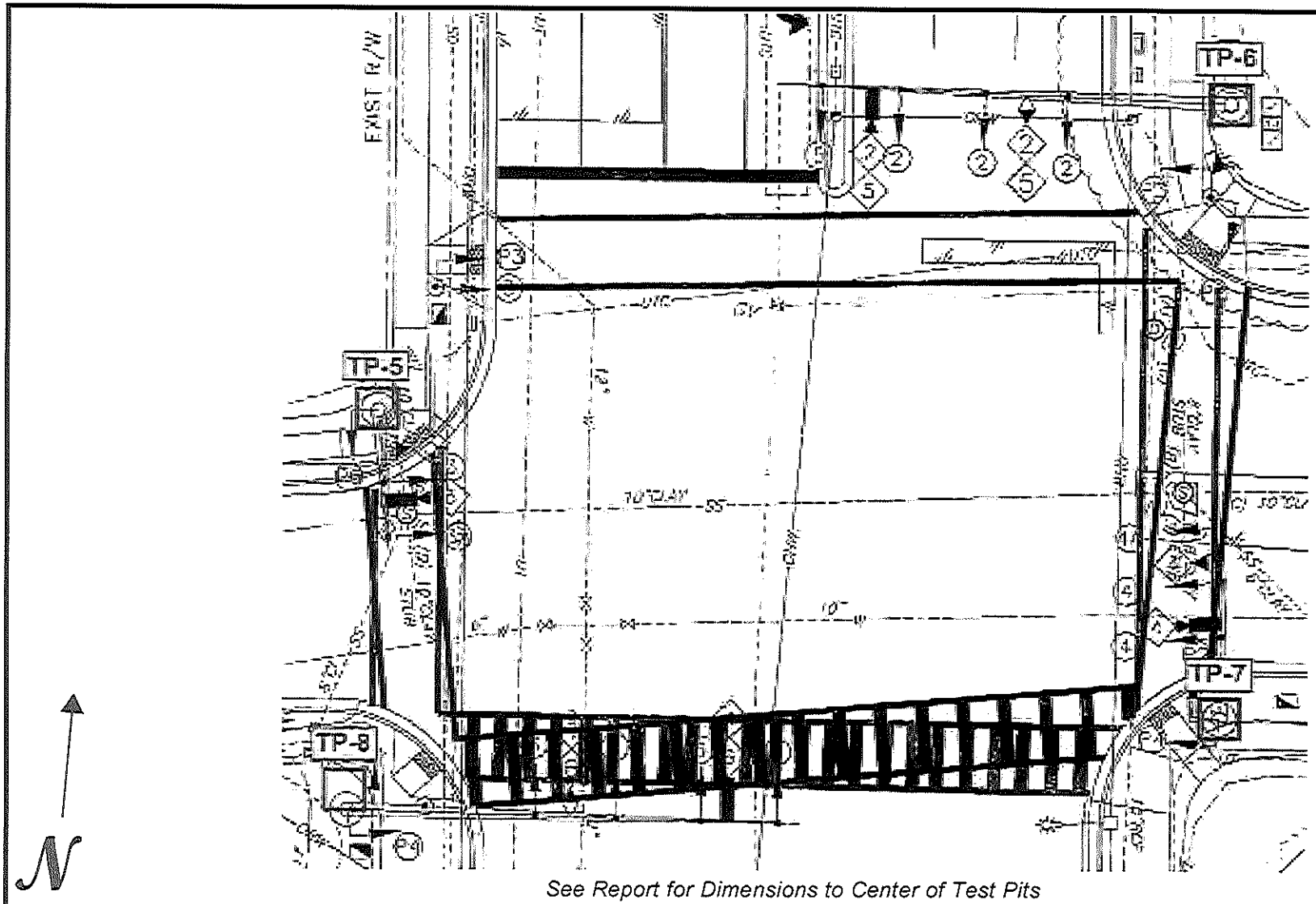

See Report for Dimensions to Center of Test Pits

TEST PIT LOCATION PLAN

Chesapeake Boulevard and Johnstons Road

PROJECT:	**Norfolk Signal Poles Various Intersections**	**DATE:**	**3/5/2013**
		DRAWN BY:	**K. Martin**
PROJECT LOCATION:	**Norfolk, Virginia**	**PAGE:**	**2 of 4**
PROJECT NO:	**VB12-344G**		
CLIENT:	**Kimley-Horn & Associates, Inc.**		

GET Solutions, Inc.

Geotechnical - Environmental - Testing

BORING LOCATION PLAN

Monticello Avenue and East 27th Street

PROJECT:	Norfolk Signal Poles Various Intersections	DATE:	3/4/2013
		DRAWN BY:	K. Martin
PROJECT LOCATION:	Norfolk, Virginia	PAGE:	3 of 4
PROJECT NO:	VB12-344G		
CLIENT:	Kimley-Horn & Associates, Inc.		

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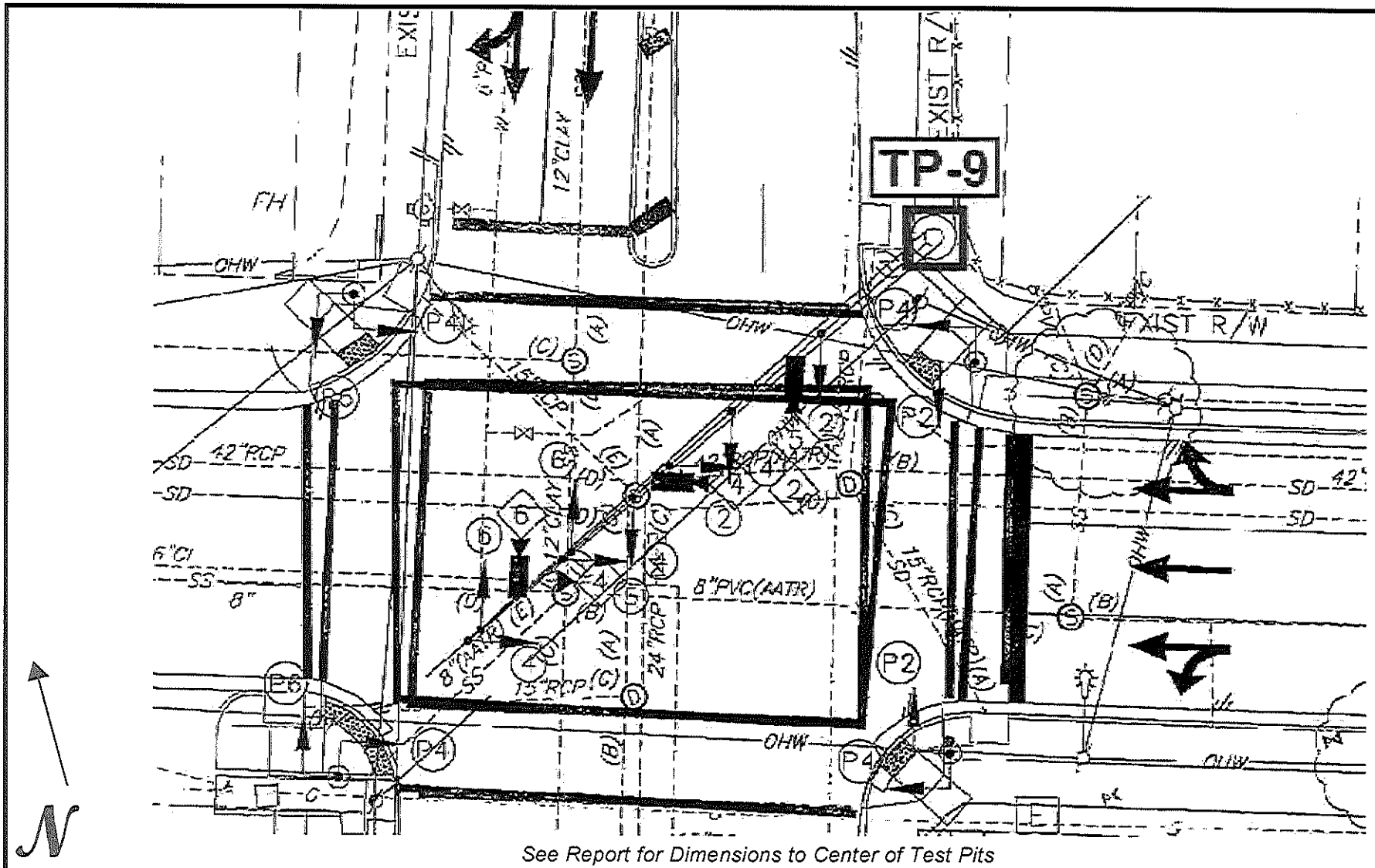
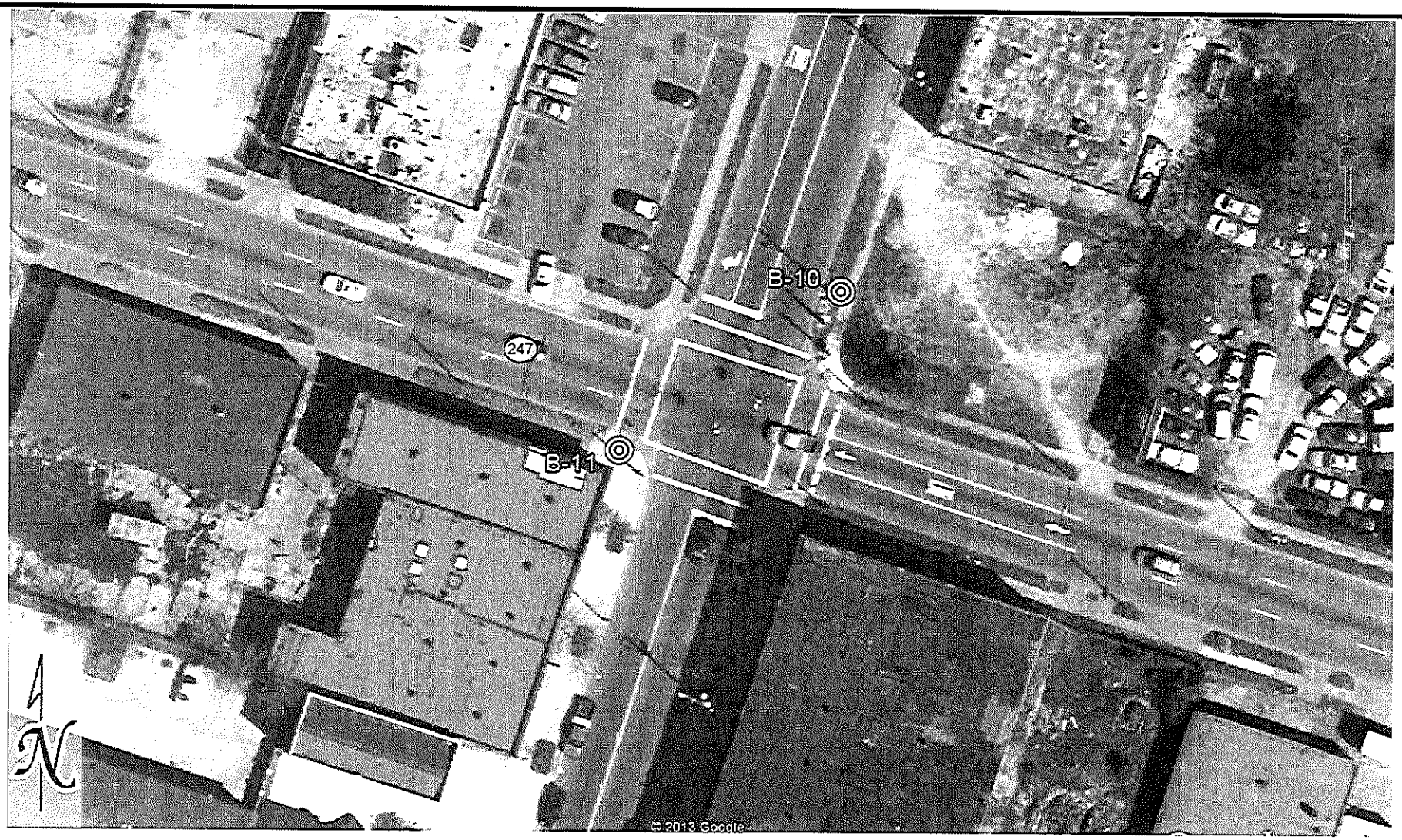


See Report for Dimensions to Center of Test Pits

TEST PIT LOCATION PLAN
Monticello Avenue and East 27th Street

PROJECT:	**Norfolk Signal Poles Various Intersections**	**DATE:**	**3/5/2013**
		DRAWN BY:	**K. Martin**
PROJECT LOCATION:	**Norfolk, Virginia**	**PAGE:**	**3 of 4**
PROJECT NO:	**VB12-344G**		
CLIENT:	**Kimley-Horn & Associates, Inc.**		

GET Solutions, Inc.
Geotechnical - Environmental - Testing



BORING LOCATION PLAN
Granby Street and East 27th Street

PROJECT:	Norfolk Signal Poles Various Intersections	DATE:	3/4/2013
		DRAWN BY:	K. Martin
PROJECT LOCATION:	Norfolk, Virginia	PAGE:	4 of 4
PROJECT NO:	VB12-344G		
CLIENT:	Kimley-Horn & Associates, Inc.		

GET Solutions, Inc.
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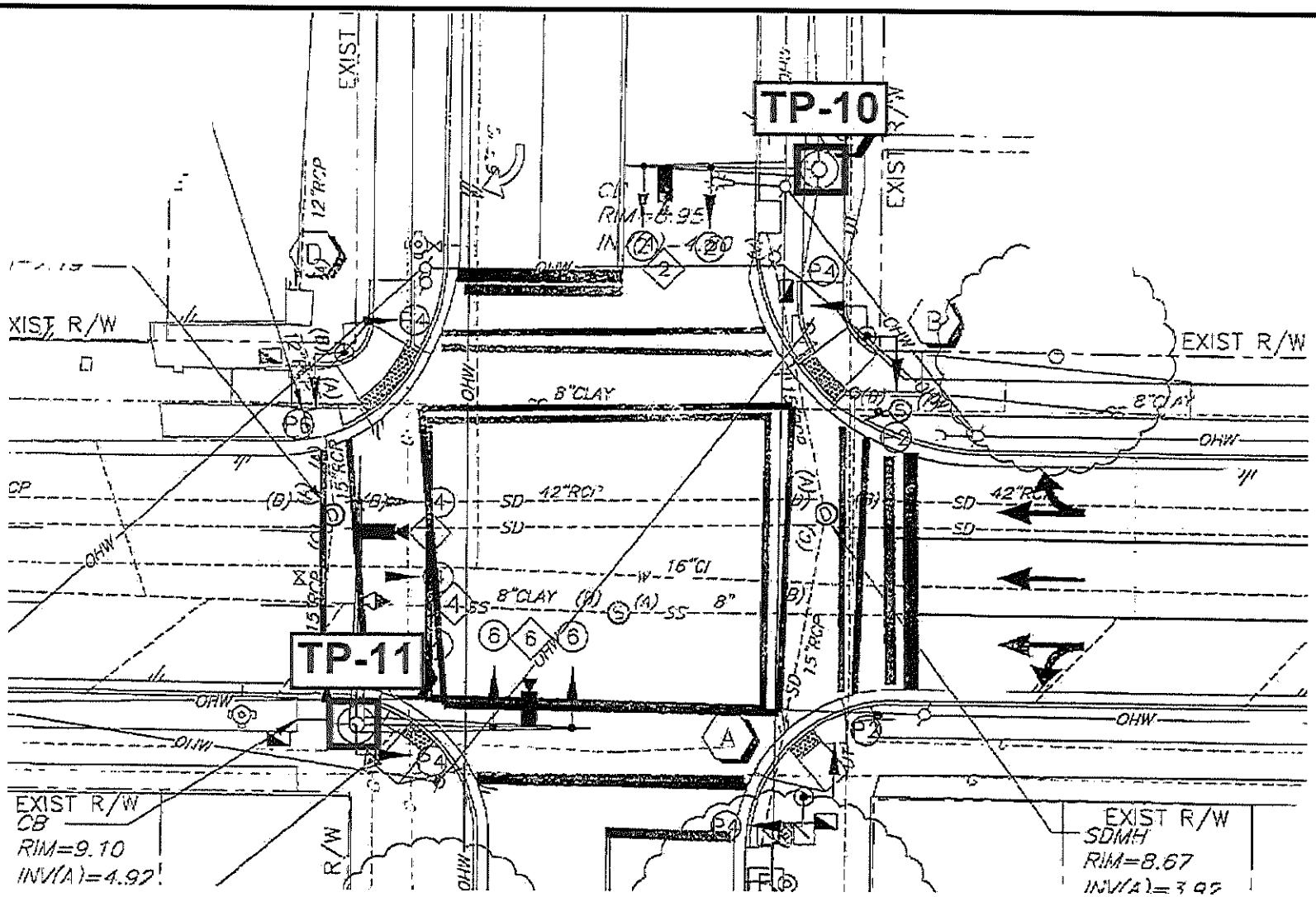

See Report for Dimensions to Center of Test Pits

TEST PIT LOCATION PLAN
Granby Street and East 27th Street

PROJECT:	**Norfolk Signal Poles Various Intersections**	**DATE:**	**3/5/2013**
		DRAWN BY:	**K. Martin**
PROJECT LOCATION:	**Norfolk, Virginia**	**PAGE:**	**4 of 4**
PROJECT NO:	**VB12-344G**		
CLIENT:	**Kimley-Horn & Associates, Inc.**		

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APPENDIX III

SUMMARY OF SOIL CLASSIFICATION

GET Solutions, Inc.
Geotechnical • Environmental • Testing

Virginia Beach
204 Grayson Road
Virginia Beach, VA 23462
(757) 518-1703

Williamsburg
1592 Penniman Rd. Suite E
Williamsburg, Virginia 23185
(757) 564-6452

Elizabeth City
504 East Elizabeth St. Suite 2
Elizabeth City, NC 27909
(252) 335-9765

CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

Standard Penetration Test (SPT), N-value

Standard Penetration Tests (SPT) were performed in the field in general accordance with ASTM D 1586. The soil samples were obtained with a standard 1.4" I.D., 2" O.D., 30" long split-spoon sampler. The sampler was driven with blows of a 140 lb. hammer falling 30 inches. The number of blows required to drive the sampler each 6-inch increment (4 increments for each soil sample) of penetration was recorded and is shown on the boring logs. The sum of the second and third penetration increments is termed the SPT N-value.

NON COHESIVE SOILS

(SILT, SAND, GRAVEL and Combinations)

Relative Density

Very Loose	4 blows/ft. or less
Loose	5 to 10 blows/ft.
Medium Dense	11 to 30 blows/ft.
Dense	31 to 50 blows/ft.
Very Dense	51 blows/ft. or more

Particle Size Identification

Boulders	8 inch diameter or more	
Cobbles	3 to 8 inch diameter	
Gravel	Coarse	1 to 3 inch diameter
	Medium	$^1/_2$ to 1 inch diameter
	Fine	$^1/_4$ to $^1/_2$ inch diameter
Sand	Coarse	2.00 mm to $^1/_4$ inch (diameter of pencil lead)
	Medium	0.42 to 2.00 mm (diameter of broom straw)
	Fine	0.074 to 0.42 mm (diameter of human hair)
Silt		0.002 to 0.074 mm (cannot see particles)

COHESIVE SOILS

(CLAY, SILT and Combinations)

Consistency

Very Soft	2 blows/ft. or less
Soft	3 to 4 blows/ft.
Medium Stiff	5 to 8 blows/ft.
Stiff	9 to 15 blows/ft.
Very Stiff	16 to 30 blows/ft.
Hard	31 blows/ft. or more

Relative Proportions

Descriptive Term	Percent
Trace	0-5
Few	5-10
Little	15-25
Some	30-45
Mostly	50-100

Strata Changes

In the column "Description" on the boring log, the horizontal lines represent approximate strata changes.

Groundwater Readings

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as tidal influences and man-made influences, such as existing swales, drainage ponds, underdrains and areas of covered soil (paved parking lots, side walks, etc.).

CLASSIFICATION SYMBOLS (ASTM D 2487 and D 2488)

Coarse Grained Soils

More than 50% retained on No. 200 sieve

GW - Well-graded Gravel
GP - Poorly graded Gravel
GW-GM - Well-graded Gravel w/Silt
GW-GC - Well-graded Gravel w/Clay
GP-GM - Poorly graded Gravel w/Silt
GP-GC - Poorly graded Gravel w/Clay
GM - Silty Gravel
GC - Clayey Gravel
GC-GM - Silty, Clayey Gravel
SW - Well-graded Sand
SP - Poorly graded Sand
SW-SM - Well-graded Sand w/Silt
SW-SC - Well-graded Sand w/Clay
SP-SM - Poorly graded Sand w/Silt
SP-SC - Poorly graded Sand w/Clay
SM - Silty Sand
SC - Clayey Sand
SC-SM - Silty, Clayey Sand

Fine-Grained Soils

50% or more passes the No. 200 sieve

CL - Lean Clay
CL-ML - Silty Clay
ML - Silt
OL - Organic Clay/Silt
Liquid Limit 50% or greater
CH - Fat Clay
MH - Elastic Silt
OH - Organic Clay/Silt

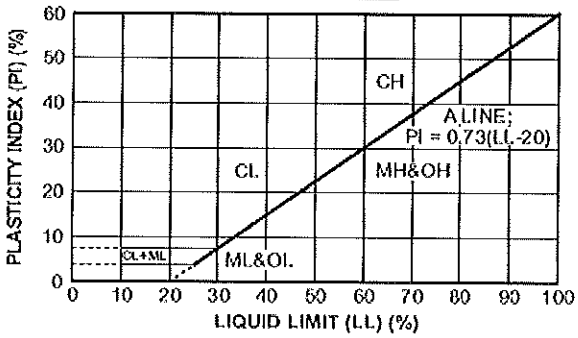
Highly Organic Soils

PT - Peat

Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent	GW, GP, SW,SP
More than 12 percent	GM, GC, SM, SC
5 to 12 percent	Borderline cases requiring dual symbols

Plasticity Chart



APPENDIX IV

BORING LOGS

GET Solutions, Inc.
Geotechnical • Environmental • Testing

BORING LOG B-1

PROJECT: Norfolk Signal Poles - Various Intersections
CLIENT: Kimley-Horn & Associates, Inc.
PROJECT LOCATION: Norfolk, Virginia
BORING LOCATION: See Attached Boring Location Plan
DRILLER: GET Solutions, Inc
DRILLING METHOD: Rotary Wash "mud"
DEPTH TO WATER - INITIAL*: ▽ 7.5' **AFTER 24 HOURS:** ▽

PROJECT NO.: VB12-344G
SURFACE ELEVATION:
LOGGED BY: E. Alshoufy, E.I.T.
DATE: 1-23-13
CAVING> C.

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	4" Topsoil (0.33)		1	15	SS	1 2 3 3	5	
			Brown, moist, Sandy Lean CLAY (CL) with brick fragments, medium stiff to stiff "fill" (3.7)		2	24	SS	3 5 7 8	12	
		5	Brown/Gray, moist to wet, Silty fine to medium SAND (SM), medium dense		3	24	SS	7 6 7 8	13	
	2		▽		4	24	SS	7 6 6 7	12	
			Mottled Gray to Orange, wet, Poorly graded fine to medium SAND (SP-SM) with silt, loose (8)		5	24	SS	6 5 4 3	9	
		10	Mottled Gray to Orange, wet, Silty fine to medium SAND (SM), loose (10)		6	15	SS	2 3 2 4	5	
	4		Gray, wet, Poorly graded fine to medium SAND (SP-SM) with silt, loose (13)		7	18	SS	3 4 5 6	9	
		15								
			Gray, wet, Silty fine to medium SAND (SM), very loose (18)		8	18	SS	2 1 2 2	3	
	6	20								
			Gray, wet, Fat CLAY (CH) with trace fine sand and trace to few marine shell fragments, very soft to soft (23)		9	20	SS	1 2 1 1	3	
		25								
	8				10	24	SS	1 1 1 1	2	
		30								
	10				11	24	SS	1 2 2 2	4	
		35	Boring terminated at 35 ft.							

TEST RESULTS
Plastic Limit Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes: Northwest Quadrant of St. Paul's Boulevard and Market Street

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

*The initial groundwater reading may not be indicative of the static groundwater level.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

GET Solutions, Inc.
Geotechnical • Environmental • Testing

BORING LOG B-2

PROJECT: Norfolk Signal Poles - Various Intersections
CLIENT: Kimley-Horn & Associates, Inc.
PROJECT LOCATION: Norfolk, Virginia
BORING LOCATION: See Attached Boring Location Plan
DRILLER: GET Solutions, Inc
DRILLING METHOD: Rotary Wash "mud"
DEPTH TO WATER - INITIAL*: ▽ 8' **AFTER 24 HOURS:** ▽

PROJECT NO.: VB12-344G
SURFACE ELEVATION:
LOGGED BY: E. Alshoufy, E.I.T.
DATE: 1-23-13
CAVING> ⊂

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value
	0	0	6" Topsoil (0.5)					
			Brown/Gray, moist, Silty fine to medium SAND (SM) with trace clay and brick fragments, medium dense "fill" (3.9)	1	10	SS	3 5 6 6	11
				2	24	SS	5 8 7 10	15
		5	Mottled Gray to Orange, moist, Silty fine to medium SAND (SM), medium dense (4)	3	24	SS	9 7 7 7	14
	2		Mottled Gray to Orange, moist, Poorly graded fine to medium SAND (SP-SM) with silt, medium dense (6)	4	24	SS	7 6 6 6	12
			▽ Brown, moist to wet, Silty fine to medium SAND (SM), very loose to medium dense	5	15	SS	4 3 4 3	7
		10		6	12	SS	3 2 2 2	4
	4		Gray, wet, Poorly graded fine to medium SAND (SP-SM) with silt, loose (13)	7	15	SS	5 5 4 3	9
		15						
			Gray, wet, Silty fine SAND (SM), very loose (18)	8	12	SS	WOH WOH WOH WOH	0
	6	20						
			Gray, wet, Fat CLAY (CH) with trace fine sand and trace to few marine shell fragments, very soft (23)	9	24	SS	1 1 1 1	2
		25						
	8							
				10	24	SS	1 1 1 2	2
		30						
	10							
				11	24	SS	1 1 2 3	3
		35	Boring terminated at 35 ft.					

TEST RESULTS
Plastic Limit — Liquid Limit
Moisture Content - ●
N-Value - ▨
% < #200: 10 20 30 40 50 60 70

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Notes: Northeast Quadrant of St. Paul's Boulevard and Market Street

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

The initial groundwater reading may not be indicative of the static groundwater level.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

GET Solutions, Inc.
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BORING LOG B-3

PROJECT: Norfolk Signal Poles - Various Intersections
CLIENT: Kimley-Horn & Associates, Inc.
PROJECT LOCATION: Norfolk, Virginia
BORING LOCATION: See Attached Boring Location Plan
DRILLER: GET Solutions, Inc
DRILLING METHOD: Rotary Wash "mud"
DEPTH TO WATER - INITIAL*: 8' **AFTER 24 HOURS:**

PROJECT NO.: VB12-344G
SURFACE ELEVATION:
LOGGED BY: E. Alshoufy, E.I.T.
DATE: 1-23-13
CAVING>

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	4" Topsoil (0.33)		1	18	SS	3 3 4 4	7	
			Brown, moist, Silty fine to medium SAND (SM) with few clay and brick fragments, loose "fill" (2)		2	22	SS	2 3 3 5	6	
		5	Mottled Gray to Orange, moist, Lean CLAY (CL) with trace fine sand, medium stiff to stiff (5)		3	24	SS	4 5 5 7	10	
	2		Gray/Brown, moist to wet, Poorly graded fine to medium SAND (SP-SM) with silt, loose to medium dense (8)		4	24	SS	4 6 6 8	12	
		10	Gray, wet, Silty fine to medium SAND (SM), loose (10)		5	24	SS	3 3 4 5	7	
	4	15	Mottled Gray to Orange, wet, Poorly graded fine to medium SAND (SP-SM) with silt, loose (18)		6	15	SS	2 3 3 3	6	
					7	12	SS	3 4 4 6	8	
	6	20	Gray, wet, Silty fine SAND (SM), very loose (23)		8	24	SS	2 1 1 1	2	
		25	Gray, wet, Fat CLAY (CH) with trace fine sand and few marine shell fragments, very soft to soft		9	24	SS	1 1 1 2	2	
	8	30			10	24	SS	WOH WOH WOH WOH	0	
	10	35			11	24	SS	1 2 2 3	4	
			Boring terminated at 35 ft.							

TEST RESULTS
Plastic Limit Liquid Limit
Moisture Content - ●
N-Value -
10 20 30 40 50 60 70

Notes: Southeast Quadrant of St. Paul's Boulevard and Market Street

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

*The initial groundwater reading may not be indicative of the static groundwater level.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG B-4

PROJECT: Norfolk Signal Poles - Various Intersections
CLIENT: Kimley-Horn & Associates, Inc.
PROJECT LOCATION: Norfolk, Virginia
BORING LOCATION: See Attached Boring Location Plan
DRILLER: GET Solutions, Inc
DRILLING METHOD: Rotary Wash "mud"
DEPTH TO WATER - INITIAL*: 8' **AFTER 24 HOURS:**

PROJECT NO.: VB12-344G
SURFACE ELEVATION:
LOGGED BY: E. Alshoufy, E.I.T.
DATE: 1-23-13
CAVING> C

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value
	0	0	3" Topsoil (0.25)	1	20	SS	2 2 2 2	4
			Gray, moist, Silty fine to medium SAND (SM) with clay nodules and brick fragments, very loose "fill" (2)	2	18	SS	2 2 2 4	4
		5	Mottled Gray to Orange, moist, Lean CLAY (CL) with trace fine sand, soft to stiff (5.5)	3	24	SS	6 5 5 5	10
	2		Gray, moist, Poorly graded fine to medium SAND (SP), loose to medium dense (8)	4	20	SS	5 5 6 7	11
		10	Gray/Orange, wet, Silty fine to medium SAND (SM), very loose to loose	5	12	SS	4 4 3 4	7
				6	18	SS	3 2 2 2	4
	4	15	Mottled Gray to Orange, wet, Poorly graded fine to medium SAND (SP-SM) with silt, loose (13)	7	15	SS	6 4 4 4	8
	6	20	Gray, wet, Silty fine to medium SAND (SM), very loose (18)	8	24	SS	WOH WOH WOH WOH	0
	8	25	Gray, wet, Fat CLAY (CH) with trace fine sand and trace to few marine shell fragments, very soft to soft (23)	9	24	SS	1 1 2 1	3
		30		10	24	SS	WOH WOH WOH WOH	0
	10	35		11	24	SS	1 1 2 3	3
			Boring terminated at 35 ft.					

TEST RESULTS
Plastic Limit — Liquid Limit
Moisture Content - ●
N-Value - ▨
% < #200
10 20 30 40 50 60 70

Notes: Southwest Quadrant of St. Paul's Boulevard and Market Street

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

The initial groundwater reading may not be indicative of the static groundwater level.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

GET Solutions, Inc.
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BORING LOG B-5

PROJECT: Norfolk Signal Poles - Various Intersections
CLIENT: Kimley-Horn & Associates, Inc.
PROJECT LOCATION: Norfolk, Virginia
BORING LOCATION: See Attached Boring Location Plan
DRILLER: GET Solutions, Inc
DRILLING METHOD: Rotary Wash "mud"
DEPTH TO WATER - INITIAL*: 4' **AFTER 24 HOURS:**

PROJECT NO.: VB12-344G
SURFACE ELEVATION:
LOGGED BY: E. Alshoufy, E.I.T.
DATE: 1-21-13
CAVING>

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	6.5" Topsoil (0.54)						
			Gray, moist, Sandy Lean CLAY (CL), medium stiff (3)	1	20	SS	2 3 3 3	6	
			Gray/Orange, moist to wet, Poorly graded fine to medium SAND (SP), very loose to medium dense	2	20	SS	3 3 5 7	8	
		5		3	24	SS	4 6 7 8	13	
	2			4	24	SS	5 4 4 5	8	
				5	20	SS	1 2 3 3	5	
		10		6	12	SS	2 2 2 2	4	
	4		Gray, wet, Poorly graded fine to medium SAND (SP-SM) with silt, very loose (13)	7	12	SS	1 2 1 1	3	
		15							
			Gray, wet, Silty fine to medium SAND (SM), very loose (18)	8	20	SS	1 1 1 1	2	
	6	20							
			Gray, wet, Fat CLAY (CH) with trace to few fine sand, very soft (23)	9	20	SS	WOH WOH WOH WOH	0	
		25							
	8								
				10	24	SS	WOH WOH WOH WOH	0	
		30							
	10								
			Gray, wet, Clayey fine to medium SAND (SC) with little marine shell fragments, loose (34.5)	11	20	SS	1 4 5 4	9	
		35							
			Boring terminated at 35 ft.						

TEST RESULTS
Plastic Limit — Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes: Northwest Quadrant of Chesapeake Boulevard and Johnstons Road

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

The initial groundwater reading may not be indicative of the static groundwater level.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG B-6

PROJECT: Norfolk Signal Poles - Various Intersections
CLIENT: Kimley-Horn & Associates, Inc.
PROJECT LOCATION: Norfolk, Virginia
BORING LOCATION: See Attached Boring Location Plan
DRILLER: GET Solutions, Inc
DRILLING METHOD: Rotary Wash "mud"
DEPTH TO WATER - INITIAL*: ▽ 4' **AFTER 24 HOURS:** ▼

PROJECT NO.: VB12-344G
SURFACE ELEVATION:
LOGGED BY: E. Alshoufy, E.I.T.
DATE: 1-21-13
CAVING> ⊏

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	9.5" Topsoil (0.79)		1	24	SS	4 5 6 6	11	
			Gray, moist, Lean CLAY (CL) with trace fine sand, stiff (3)		2	24	SS	5 4 5 6	9	
			Brown, moist, Silty fine to medium SAND (SM), loose (4)							
		5	Orange, wet, Poorly graded fine to medium SAND (SP-SM) with silt, medium dense (6)		3	24	SS	6 7 7 9	14	
	2		Gray, wet, Poorly graded fine to medium SAND (SP), very loose to loose		4	24	SS	5 5 4 4	9	
					5	12	SS	1 2 2 2	4	
		10			6	12	SS	2 2 2 1	4	
	4				7	12	SS	1 2 2 1	4	
		15								
			Gray, wet, Silty fine to medium SAND (SM) with few marine shell fragments, very loose (18)		8	24	SS	WOH WOH WOH 1	0	
	6	20								
			Gray, wet, Fat CLAY (CH) with trace fine sand, very soft to soft (23)		9	24	SS	WOH WOH WOH WOH	0	
		25								
	8									
					10	24	SS	WOH WOH WOH WOH	0	
		30								
	10									
					11	24	SS	1 2 2 2	4	
		35	Boring terminated at 35 ft.							

TEST RESULTS
Plastic Limit — Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes: Northeast Quadrant of Chesapeake Boulevard and Johnstons Road

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

*The initial groundwater reading may not be indicative of the static groundwater level.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG B-7

PROJECT: Norfolk Signal Poles - Various Intersections
CLIENT: Kimley-Horn & Associates, Inc.
PROJECT LOCATION: Norfolk, Virginia
BORING LOCATION: See Attached Boring Location Plan
DRILLER: GET Solutions, Inc
DRILLING METHOD: Rotary Wash "mud"
DEPTH TO WATER - INITIAL*: ▽ 4' **AFTER 24 HOURS:** ▼

PROJECT NO.: VB12-344G
SURFACE ELEVATION:
LOGGED BY: E. Alshoufy, E.I.T.
DATE: 1-21-13
CAVING> ⊥

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	8" Topsoil							
			0.67 Gray, moist, Lean CLAY (CL) with few fine sand, medium stiff		1	20	SS	4 3 4 3	7	
			3 Gray/Orange, moist to wet, Poorly graded fine to medium SAND (SP-SM) with silt, loose		2	18	SS	3 3 3 4	6	
		5			3	24	SS	6 5 5 6	10	
	2				4	24	SS	3 4 3 4	7	
			8 Gray, wet, Poorly graded fine to medium SAND (SP), very loose to loose		5	20	SS	1 2 1 2	3	
		10			6	24	SS	2 3 2 3	5	
	4				7	24	SS	1 2 2 1	4	
		15								
					8	24	SS	WOH WOH 1 1	1	
	6	20	19.5 Gray, wet, Silty fine to medium SAND (SM), very loose							
			23 Gray, wet, Fat CLAY (CH) with trace fine sand, very soft		9	24	SS	WOH WOH WOH WOH	0	
		25								
	8									
					10	24	SS	WOH WOH WOH WOH	0	
		30								
	10									
			34 Gray, wet, Poorly graded fine to medium SAND (SP-SM) with silt, medium dense		11	18	SS	4 7 7 9	14	
		35	Boring terminated at 35 ft.							

TEST RESULTS
Plastic Limit — Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes: Southeast Quadrant of Chesapeake Boulevard and Johnstons Road

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

The initial groundwater reading may not be indicative of the static groundwater level.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG B-8

PROJECT: Norfolk Signal Poles - Various Intersections
CLIENT: Kimley-Horn & Associates, Inc.
PROJECT LOCATION: Norfolk, Virginia
BORING LOCATION: See Attached Boring Location Plan
DRILLER: GET Solutions, Inc
DRILLING METHOD: Rotary Wash "mud"
DEPTH TO WATER - INITIAL*: ▽ 4' **AFTER 24 HOURS:** ▽

PROJECT NO.: VB12-344G
SURFACE ELEVATION:
LOGGED BY: E. Alshoufy, E.I.T.
DATE: 1-21-13
CAVING> C

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	7" Topsoil (0.58)		1	15	SS	1 1 2 2	3	
			Gray, moist, Lean Clay (CL) with trace fine sand, soft (2)		2	12	SS	1 1 1 1	2	
			Gray, moist, Silty fine to medium SAND (SM) with clay nodules, very loose (4)		3	24	SS	4 6 6 7	12	
	2	5	Gray/Orange, wet, poorly graded fine to medium SAND (SP-SM) with silt, very loose to medium dense		4	24	SS	6 5 4 4	9	
					5	18	SS	2 3 4 3	7	
		10			6	15	SS	3 3 4 4	7	
	4				7	12	SS	2 2 2 2	4	
		15								
			Gray, wet, Silty fine SAND (SM), very loose (18)		8	20	SS	WOH WOH WOH 1	0	
	6	20								
			Gray, wet, Fat CLAY (CH) with trace fine sand, very soft (23)		9	24	SS	WOH WOH WOH WOH	0	
		25								
	8				10	24	SS	WOH WOH WOH 1	0	
		30								
	10		Gray, wet, Silty fine to medium SAND (SM) with trace fine gravel and trace marine shell fragments, medium dense (33)		11	18	SS	4 5 8 8	13	
		35	Boring terminated at 35 ft.							

TEST RESULTS
Plastic Limit — Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes: Southwest Quadrant of Chesapeake Boulevard and Johnstons Road

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

The initial groundwater reading may not be indicative of the static groundwater level.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG B-9

PROJECT: Norfolk Signal Poles - Various Intersections
CLIENT: Kimley-Horn & Associates, Inc.
PROJECT LOCATION: Norfolk, Virginia
BORING LOCATION: See Attached Boring Location Plan
DRILLER: GET Solutions, Inc
DRILLING METHOD: Rotary Wash "mud"
DEPTH TO WATER - INITIAL*: ▽ 5' **AFTER 24 HOURS:** ▼

PROJECT NO.: VB12-344G
SURFACE ELEVATION:
LOGGED BY: E. Alshoufy, E.I.T.
DATE: 1-22-13
CAVING> ⊥

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	2" Topsoil (0.17)							
			Gray, moist, Silty fine to medium SAND (SM), very loose		1	15	SS	3 2 2 3	4	
			Brown, moist, Silty fine to medium SAND (SM), loose (3)		2	22	SS	2 4 5 5	9	
		5	Gray, moist to wet, Poorly graded fine to medium SAND (SP), very loose to medium dense (4) ▽		3	24	SS	5 6 7 7	13	
	2				4	24	SS	3 3 1 1	4	
			Orange/Gray, wet, Silty fine to medium SAND (SM), very loose to loose (8)		5	15	SS	1 1 2 4	3	
		10			6	12	SS	2 3 3 2	6	
	4				7	18	SS	2 1 1 1	2	
		15	Gray, wet, Fat CLAY (CH) with trace fine sand and trace marine shell fragments, very soft (15)							
	6	20	Gray, wet, Fat CLAY (CH) with trace fine sand and mostly marine shell fragments, soft (18)		8	20	SS	1 1 2 1	3	
	8	25	Gray, wet, Fat CLAY (CH) with trace fine sand and trace marine shell fragments, very soft to soft (23)		9	15	SS	WOH WOH WOH WOH	0	
		30			10	18	SS	WOH WOH WOH WOH	0	
	10	35			11	24	SS	2 2 2 2	4	
			Boring terminated at 35 ft.							

TEST RESULTS
Plastic Limit — Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Notes: Northeast Quadrant of Monticello Avenue and East 27th Street

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

*The initial groundwater reading may not be indicative of the static groundwater level.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG B-10

PROJECT: Norfolk Signal Poles - Various Intersections
CLIENT: Kimley-Horn & Associates, Inc.
PROJECT LOCATION: Norfolk, Virginia
BORING LOCATION: See Attached Boring Location Plan
DRILLER: GET Solutions, Inc
DRILLING METHOD: Rotary Wash "mud"
DEPTH TO WATER - INITIAL*: ▽ 5' **AFTER 24 HOURS:** ▼

PROJECT NO.: VB12-344G
SURFACE ELEVATION:
LOGGED BY: E. Alshoufy, E.I.T.
DATE: 1-22-13
CAVING> C

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	2" Topsoil (0.17)						
			Gray, moist, Silty fine to medium SAND (SM) with few clay, very loose to loose	1	15	SS	2 2 2 2	4	
				2	18	SS	2 3 2 2	5	
		5 ▽	Mottled Gray to Orange, moist to wet, Poorly graded fine to medium SAND (SP-SM) with silt, loose to medium dense (4)	3	24	SS	2 2 3 6	5	
	2			4	24	SS	5 6 8 8	14	
		10		5	20	SS	3 5 6 7	11	
			Gray, wet, Silty fine to medium SAND (SM), very loose to medium dense (10)	6	18	SS	4 5 8 7	13	
	4			7	24	SS	2 2 2 2	4	
		15							
			Gray, wet, Fat CLAY (CH) with marine shell fragments, medium stiff (18)	8	24	SS	2 3 2 3	5	
	6	20							
			Gray, wet, Silty fine to medium SAND (SM) with some marine shell fragments, very loose (23)	9	24	SS	WOH WOH WOH 1	0	
		25							
	8								
			Gray, wet, Fat CLAY (CH) with trace fine sand and trace to few marine shell fragments, very soft to medium stiff (28)	10	24	SS	WOH WOH WOH WOH	0	
		30							
	10			11	10	SS	2 2 3 2	5	
		35	Boring terminated at 35 ft.						

TEST RESULTS
Plastic Limit — Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes: Northeast Quadrant of Granby Street and East 27th Street

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

The initial groundwater reading may not be indicative of the static groundwater level.

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG B-11

PROJECT: Norfolk Signal Poles - Various Intersections
CLIENT: Kimley-Horn & Associates, Inc.
PROJECT LOCATION: Norfolk, Virginia
BORING LOCATION: See Attached Boring Location Plan
DRILLER: GET Solutions, Inc
DRILLING METHOD: Rotary Wash "mud"
DEPTH TO WATER - INITIAL*: ▽ 5' **AFTER 24 HOURS:** ▽

PROJECT NO.: VB12-344G
SURFACE ELEVATION:
LOGGED BY: E. Alshoufy, E.I.T.
DATE: 1-22-13
CAVING> C

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	5" Concrete (0.42)							
			Gray/Orange, moist, Silty fine to medium SAND (SM) with few clay, medium dense		1	15	SS	4 5 6 5	11	
					2	24	SS	4 5 6 7	11	
		5 ▽	Gray, moist to wet, Poorly graded fine to medium SAND (SP-SM) with silt, very loose to medium dense (4)		3	24	SS	6 6 6 7	12	
	2				4	24	SS	3 3 2 2	5	
					5	20	SS	1 1 1 1	2	
		10			6	18	SS	1 1 3 2	4	
	4		Gray, wet, Silty fine to medium SAND (SM), very loose (13)		7	20	SS	1 2 1 1	3	
		15								
			Gray, wet, Fat CLAY (CH) with trace fine sand and some marine shell fragments, very soft to soft (18)		8	12	SS	1 2 2 1	4	
	6	20								
		25			9	12	SS	WOH WOH WOH WOH	0	
	8									
			Gray, wet, Silty fine to medium SAND (SM) with little to some marine shell fragments, very loose (28)		10	20	SS	WOH WOH WOH WOH	0	
		30								
	10									
			Gray, wet, Fat CLAY (CH) with trace fine sand and trace marine shell fragments, very soft (33)		11	24	SS	1 1 1 2	2	
		35	Boring terminated at 35 ft.							

TEST RESULTS
Plastic Limit — Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes: Southwest Quadrant of Granby Street and East 27th Street

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

*The initial groundwater reading may not be indicative of the static groundwater level.

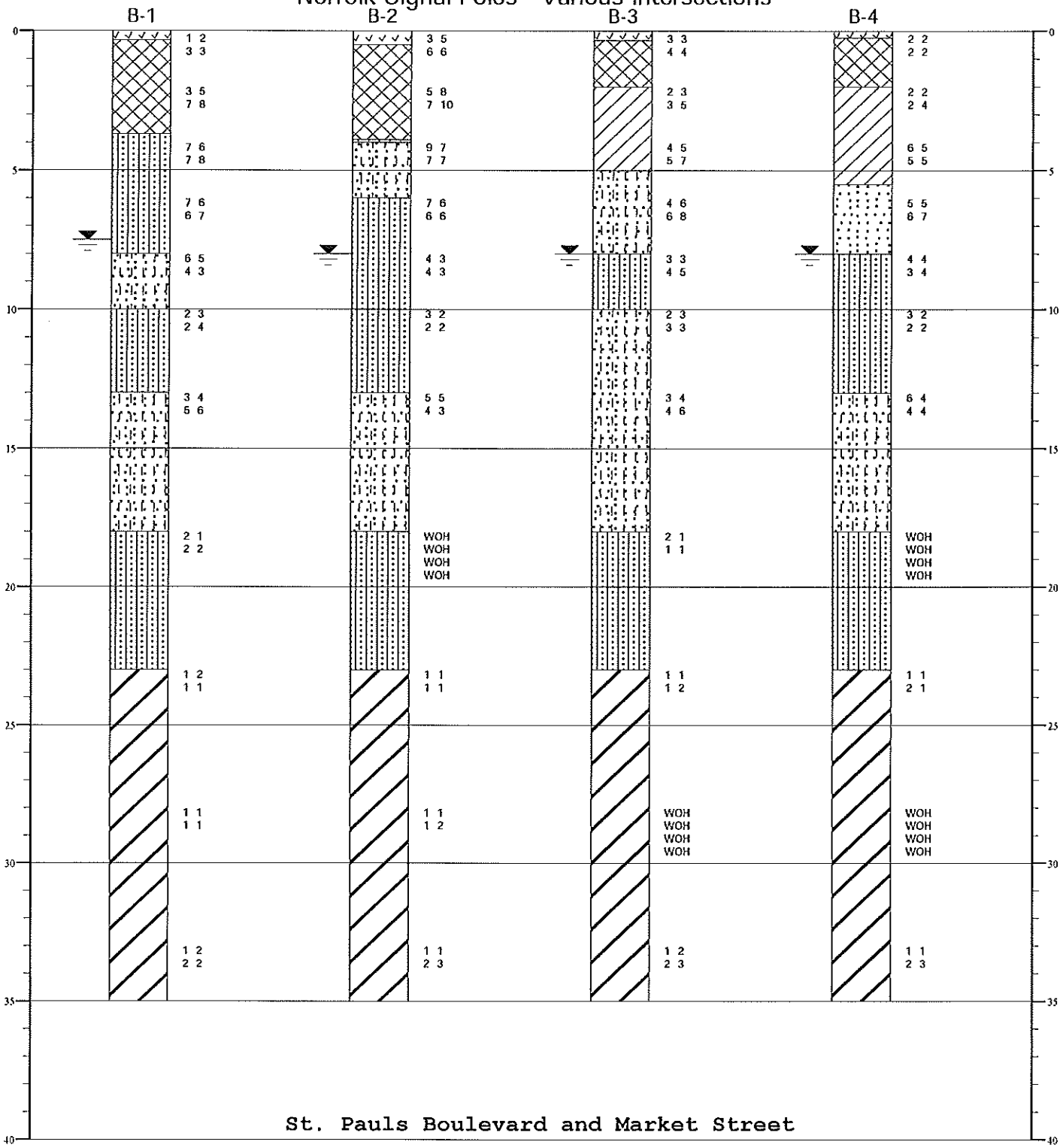
Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

APPENDIX V

GENERALIZED SOIL PROFILES

SUBSURFACE SOIL PROFILE

Norfolk Signal Poles - Various Intersections



Topsoil

Fill

Silty Sand

Poorly graded Sand with Silt

Fat Clay

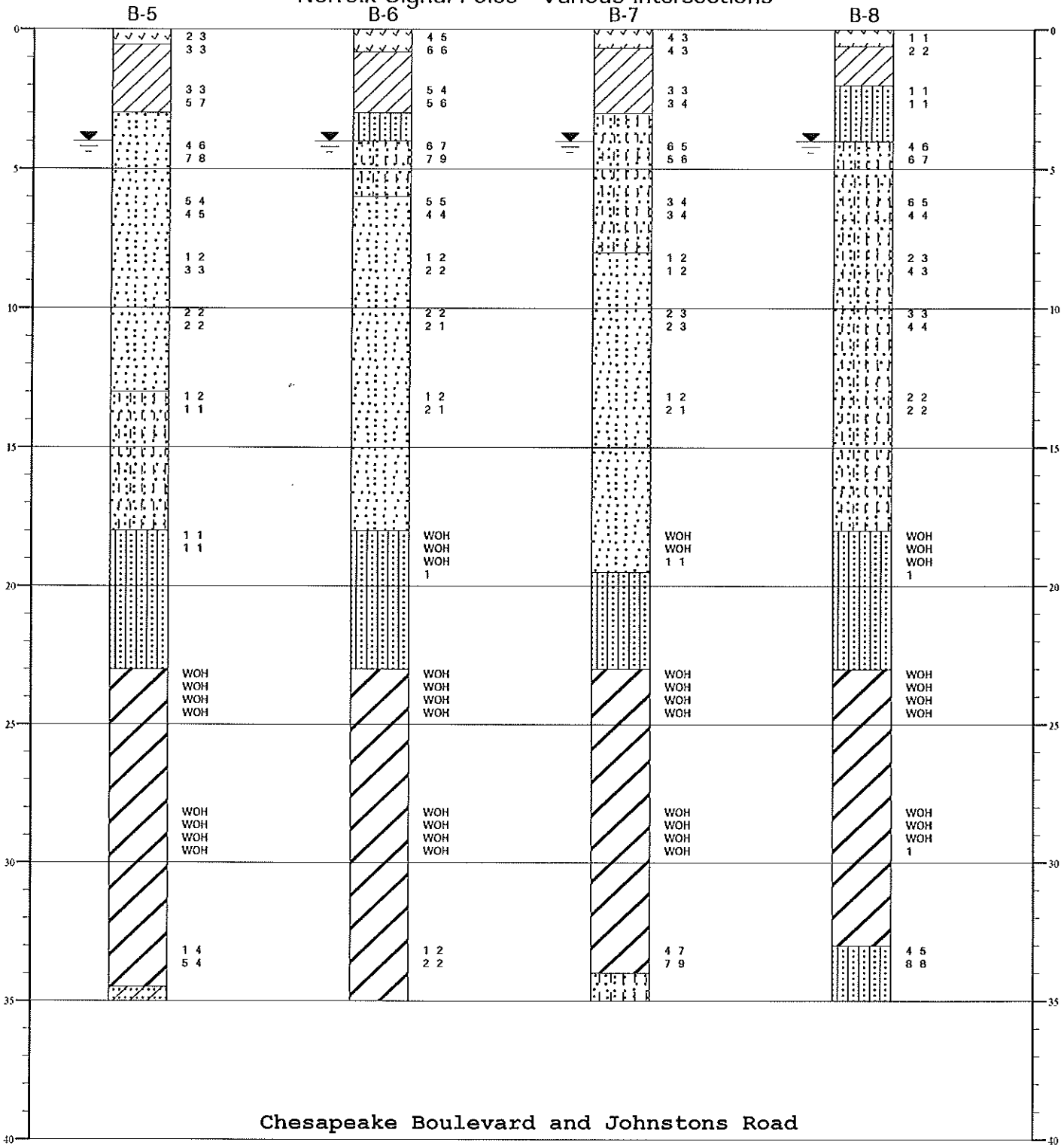
Lean Clay

Poorly graded Sand

GET Solutions, Inc.

SUBSURFACE SOIL PROFILE

Norfolk Signal Poles - Various Intersections



Topsoil

Lean Clay

Poorly graded Sand

Poorly graded Sand with Silt

Silty Sand

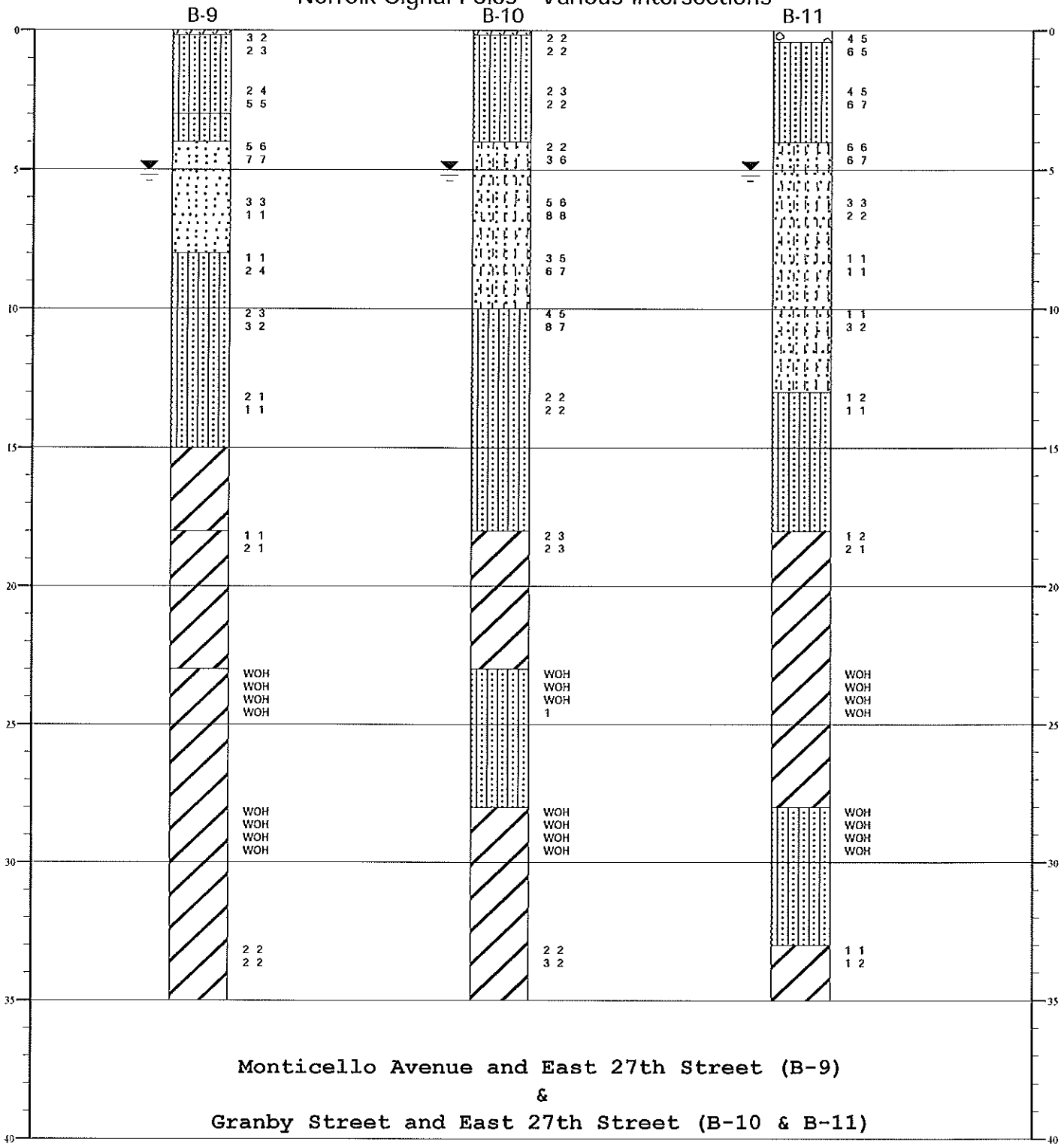
Fat Clay

Clayey Sand

GET Solutions, Inc.

SUBSURFACE SOIL PROFILE

Norfolk Signal Poles - Various Intersections



Monticello Avenue and East 27th Street (B-9)

&

Granby Street and East 27th Street (B-10 & B-11)

Topsoil

Silty Sand

Poorly graded Sand

Fat Clay

Poorly graded Sand with Silt

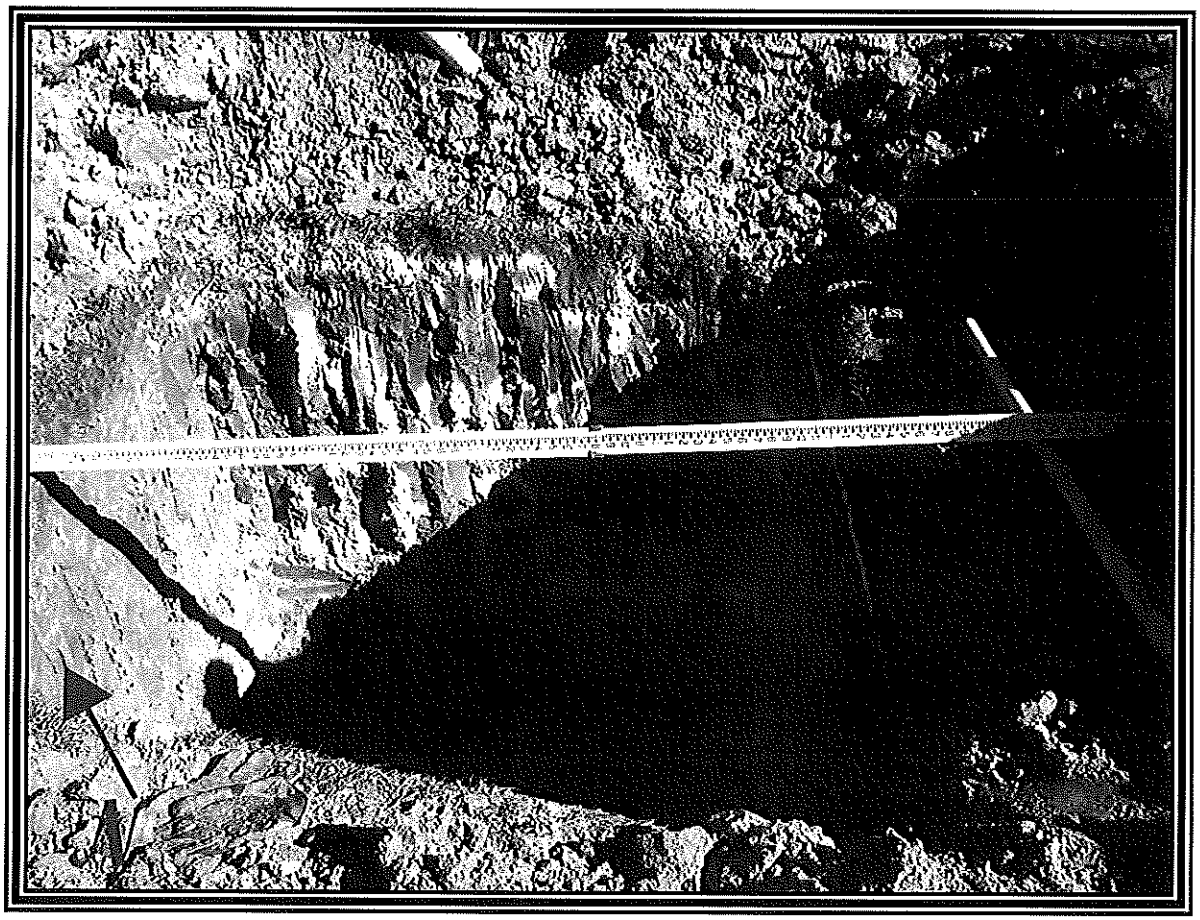
Fine gravel

APPENDIX VI

PHOTOGRAPHS OF EXCAVATED TEST PITS

Photographs of Excavated Test Pits

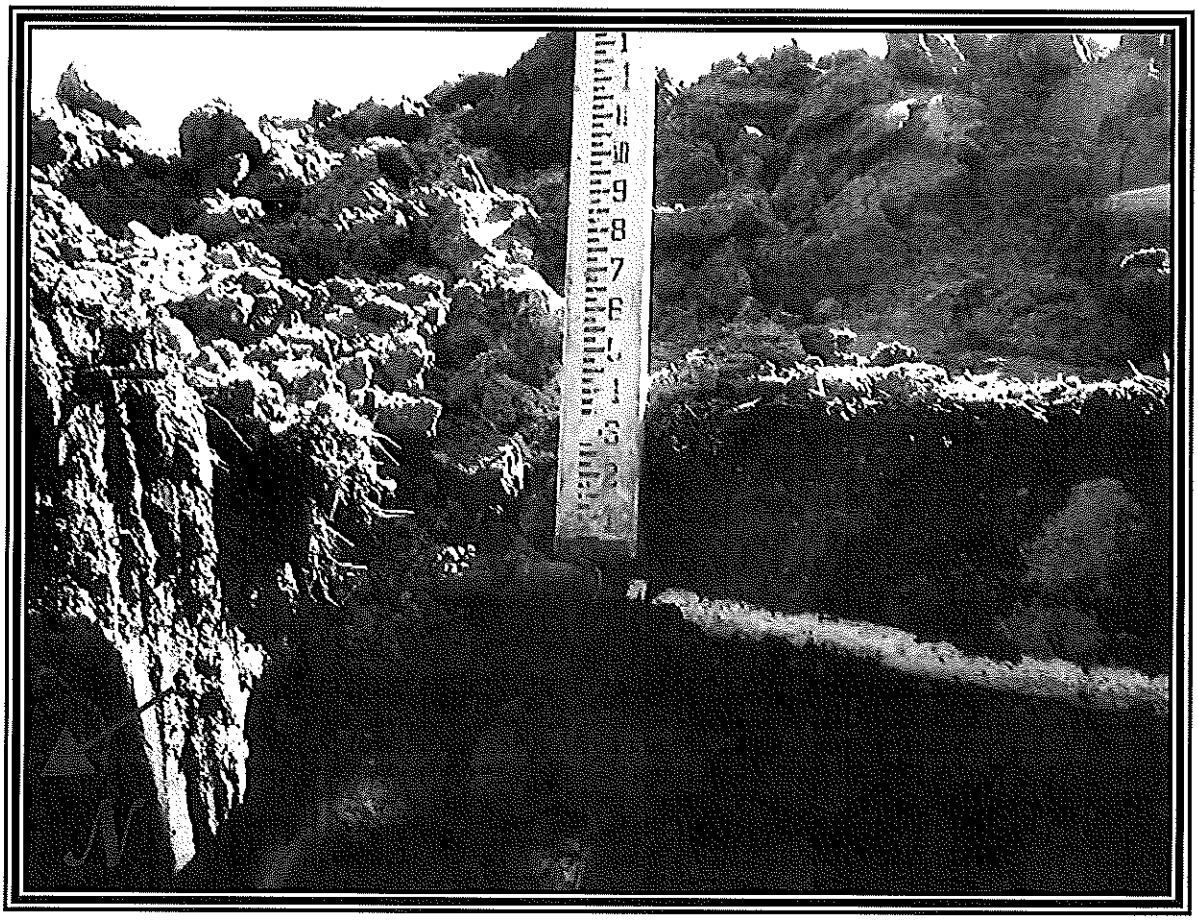
Test Pit: TP-1
Intersection of St. Paul's Boulevard and Market Street



Norfolk Signal Poles
Various Intersections
Norfolk, Virginia
G E T Project No. VB12-344G

Photographs of Excavated Test Pits

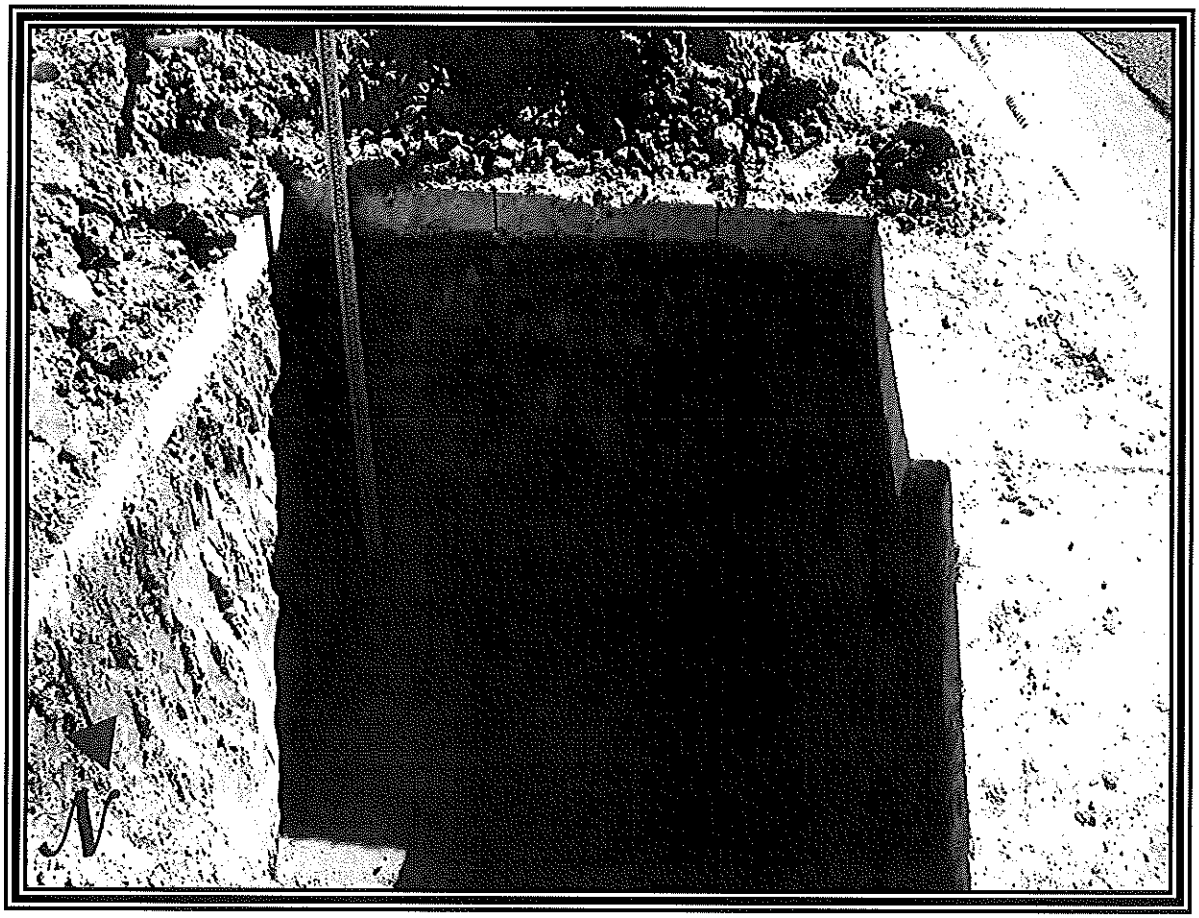
Test Pit: TP-1
Intersection of St. Paul's Boulevard and Market Street



Norfolk Signal Poles
Various Intersections
Norfolk, Virginia
G E T Project No. VB12-344G

Photographs of Excavated Test Pits

Test Pit: TP-2
Intersection of St. Paul's Boulevard and Market Street



Norfolk Signal Poles
Various Intersections
Norfolk, Virginia
G E T Project No. VB12-344G

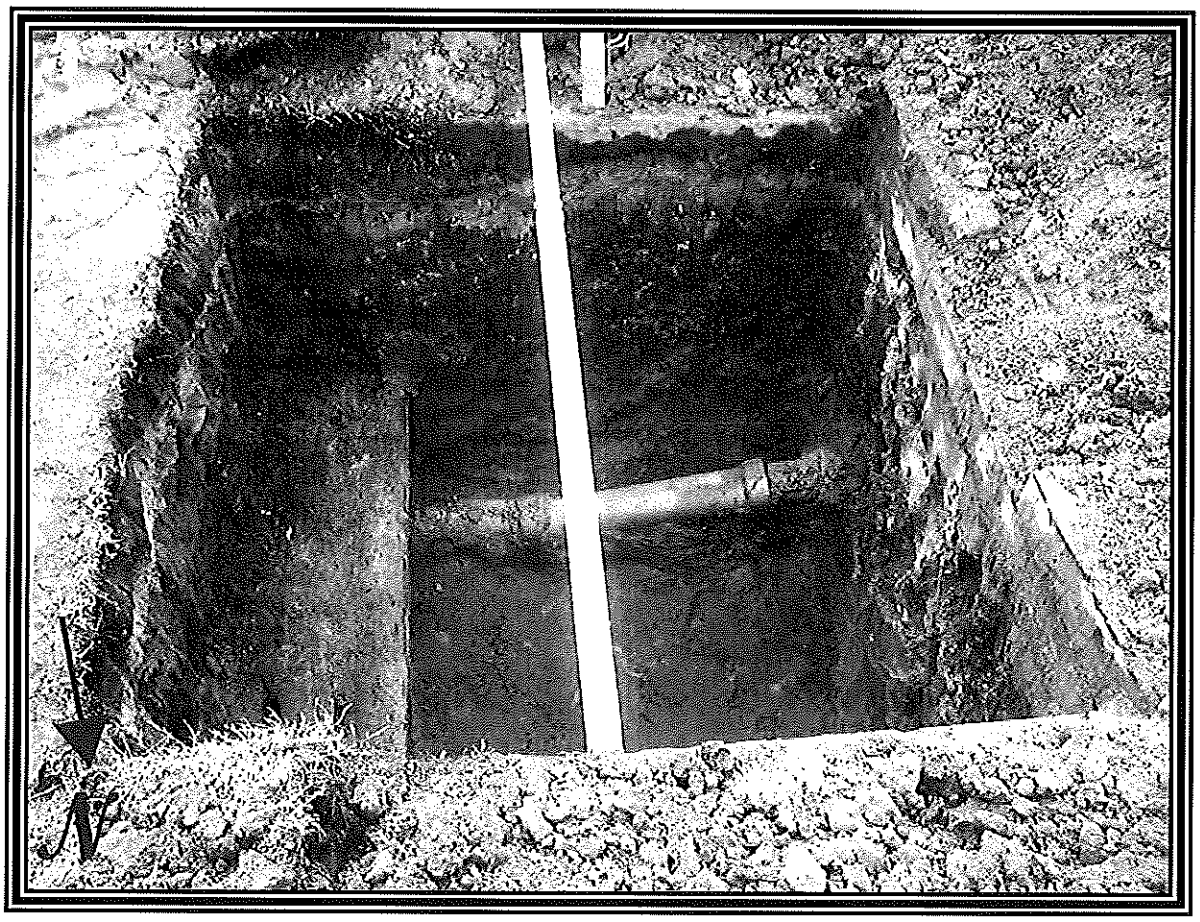
Photographs of Excavated Test Pits

Test Pit: TP-3
Intersection of St. Paul's Boulevard and Market Street

Norfolk Signal Poles
Various Intersections
Norfolk, Virginia
G E T Project No. VB12-344G

Photographs of Excavated Test Pits

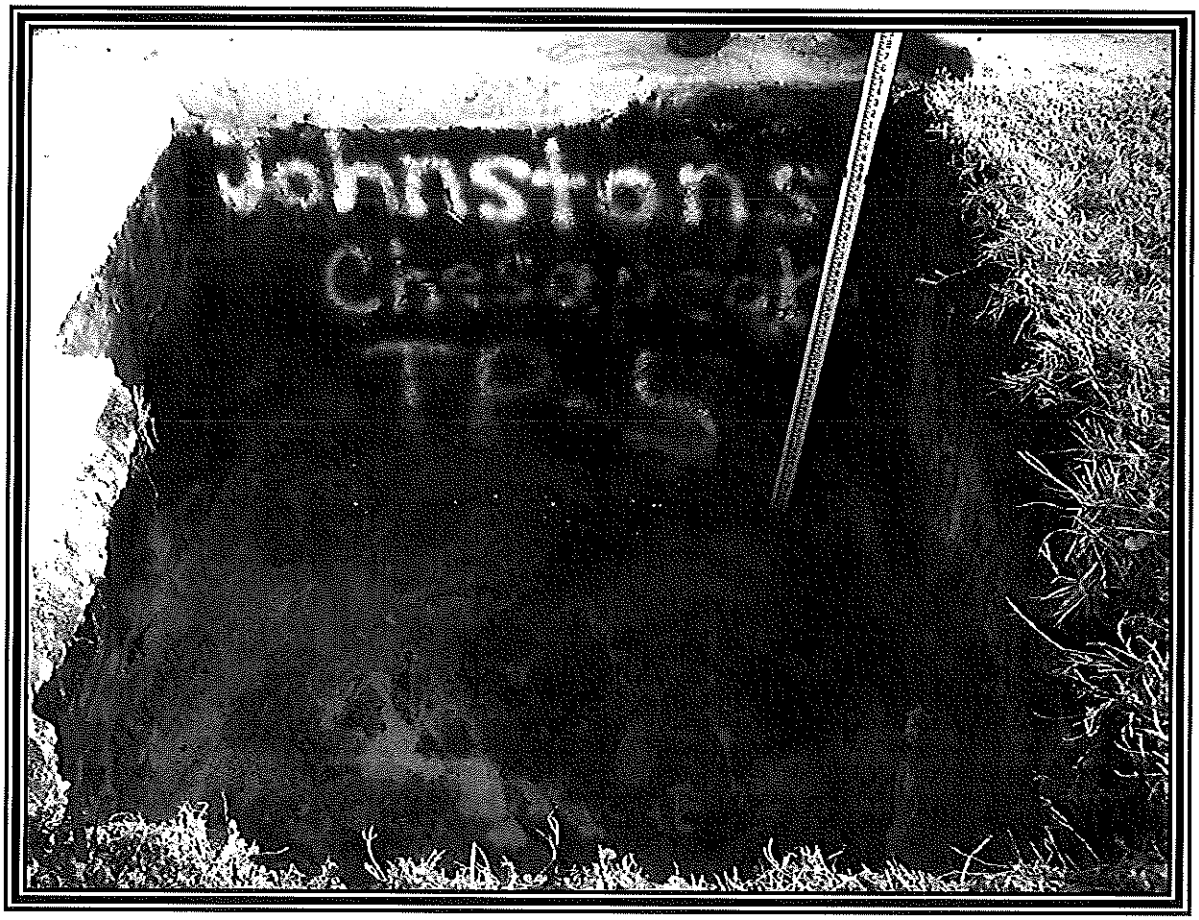
Test Pit: TP-4
Intersection of St. Paul's Boulevard and Market Street



Norfolk Signal Poles
Various Intersections
Norfolk, Virginia
G E T Project No. VB12-344G

Photographs of Excavated Test Pits

Test Pit: TP-5
Intersection of Chesapeake Boulevard and Johnstons Road



Norfolk Signal Poles
Various Intersections
Norfolk, Virginia
G E T Project No. VB12-344G

Photographs of Excavated Test Pits

Test Pit: TP-6
Intersection of Chesapeake Boulevard and Johnstons Road

Norfolk Signal Poles
Various Intersections
Norfolk, Virginia
G E T Project No. VB12-344G

Photographs of Excavated Test Pits

Test Pit: TP-6
Intersection of Chesapeake Boulevard and Johnstons Road

Norfolk Signal Poles
Various Intersections
Norfolk, Virginia
G E T Project No. VB12-344G

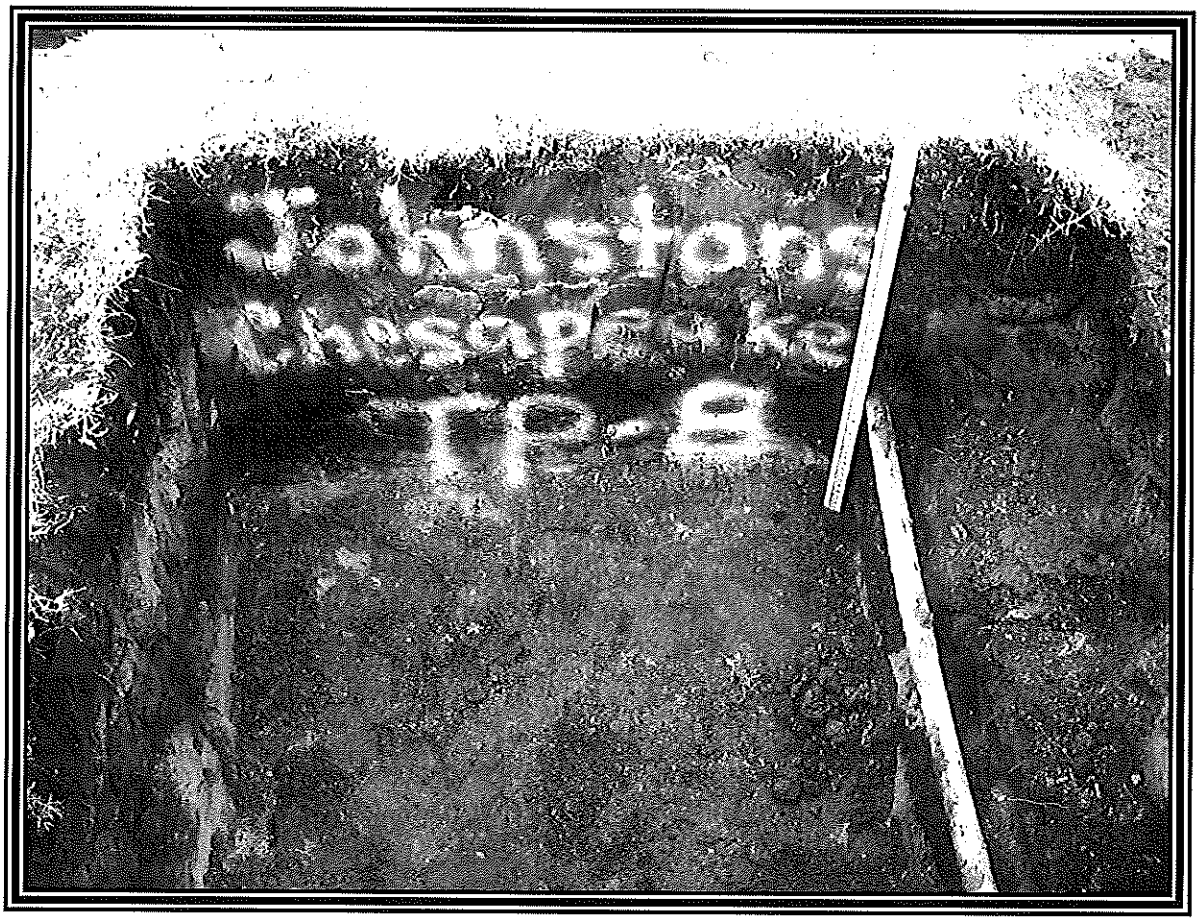
Photographs of Excavated Test Pits

Test Pit: TP-7
Intersection of Chesapeake Boulevard and Johnstons Road

Norfolk Signal Poles
Various Intersections
Norfolk, Virginia
G E T Project No. VB12-344G

Photographs of Excavated Test Pits

Test Pit: TP-8
Intersection of Chesapeake Boulevard and Johnstons Road



Norfolk Signal Poles
Various Intersections
Norfolk, Virginia
G E T Project No. VB12-344G

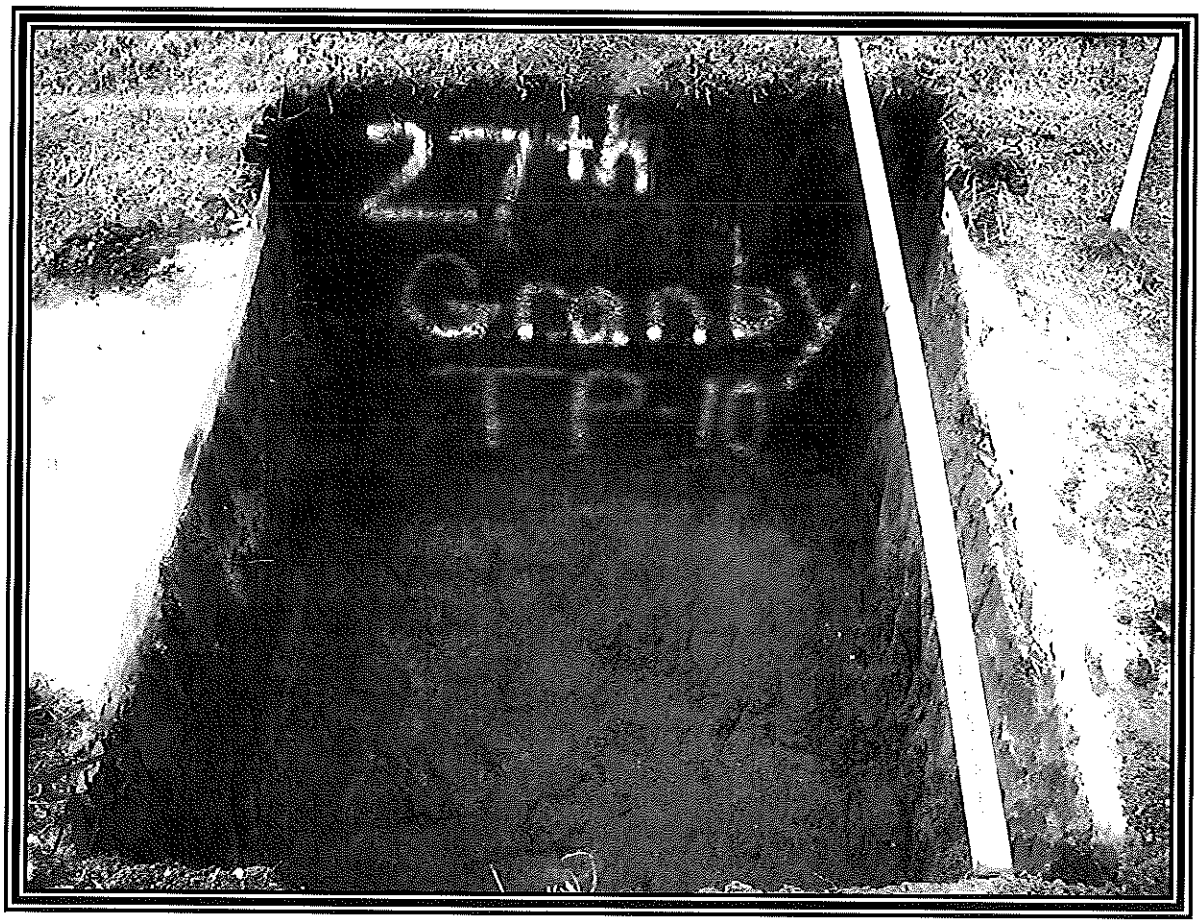
Photographs of Excavated Test Pits

Test Pit: TP-9
Intersection of Monticello Avenue and East 27th Street

Norfolk Signal Poles
Various Intersections
Norfolk, Virginia
G E T Project No. VB12-344G

Photographs of Excavated Test Pits

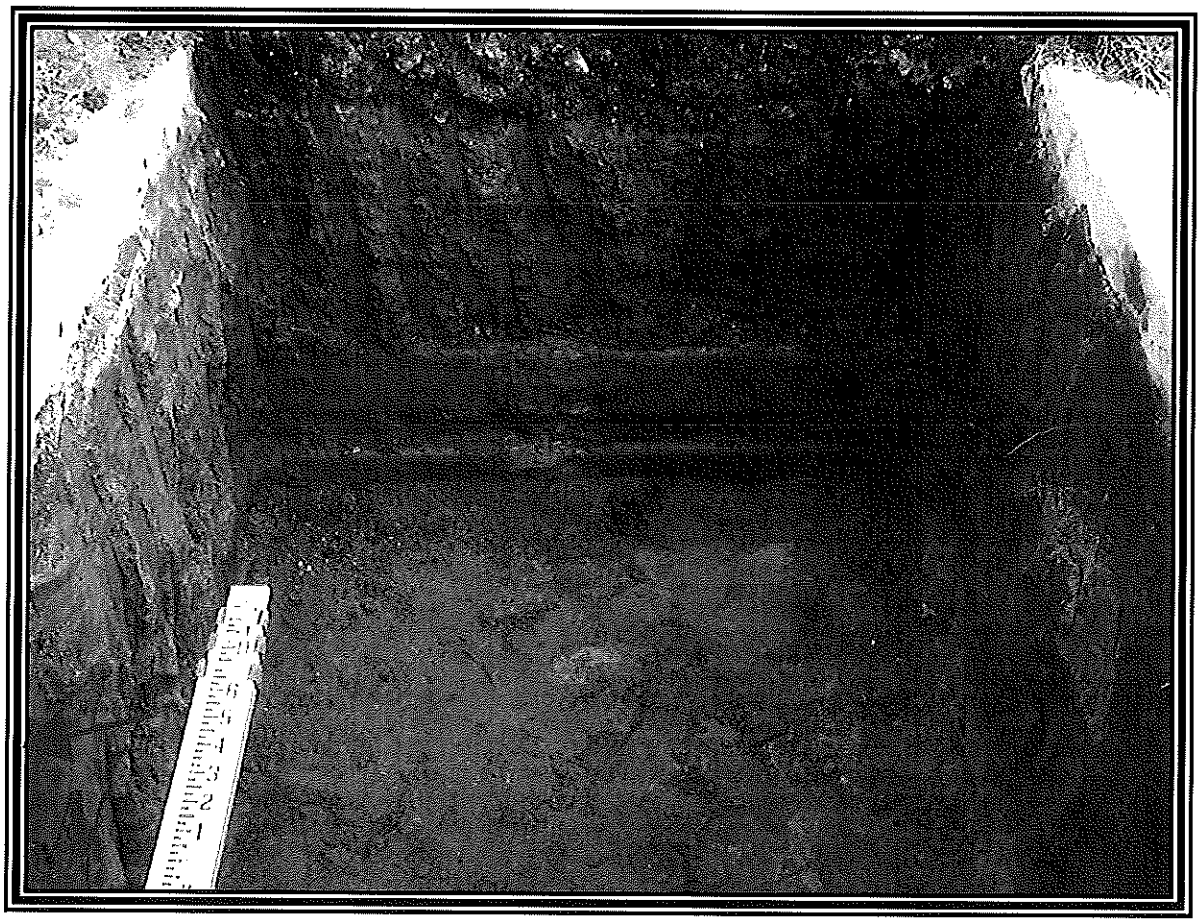
Test Pit: TP-10
Intersection of Granby Street and East 27th Street



Norfolk Signal Poles
Various Intersections
Norfolk, Virginia
G E T Project No. VB12-344G

Photographs of Excavated Test Pits

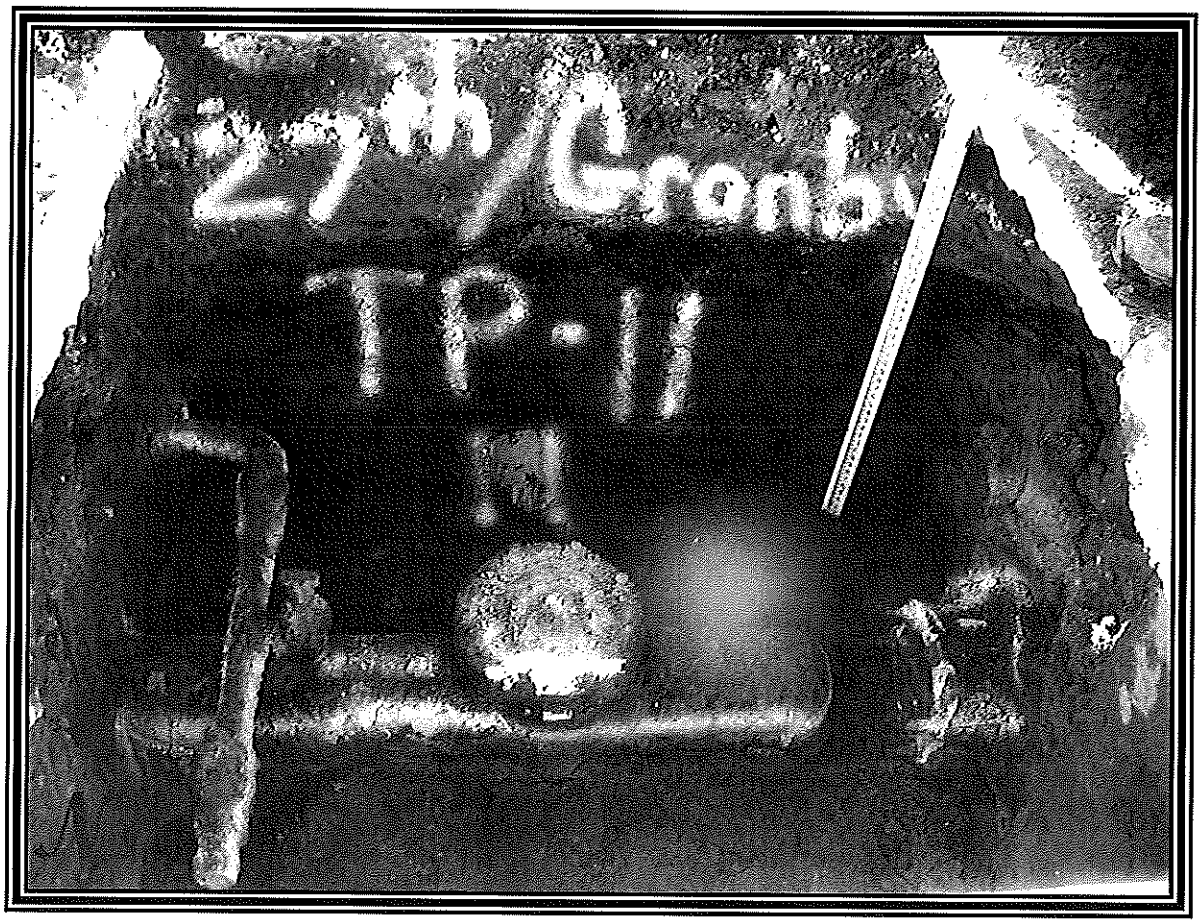
Test Pit: TP-10
Intersection of Granby Street and East 27th Street



Norfolk Signal Poles
Various Intersections
Norfolk, Virginia
G E T Project No. VB12-344G

Photographs of Excavated Test Pits

Test Pit: TP-11
Intersection of Granby Street and East 27th Street



Norfolk Signal Poles
Various Intersections
Norfolk, Virginia
G E T Project No. VB12-344G