

III. TECHNICAL SPECIFICATIONS

DIVISION 45

BRIDGES

45.01 SCOPE: The Virginia Department of Transportation Road and Bridge Specifications, including applicable Special Provisions and copied notes, as modified herein shall apply as the technical specification for the bridge portion of the Public Facilities Manual Volume III.

45.02 SECTIONS DELETED OR SUPERSEDED: The General Conditions and Special Conditions in the first portion of these Contract Documents shall supersede similar sections in the VDOT Specifications.

45.03 SUPPLEMENTAL SPECIFICATIONS: The following Virginia Department of Transportation Special Provisions, Supplemental Specifications, and Special Provision Copied Notes are applicable:

219B	Hydraulic Cement Concrete	12-22-88
232C	Structural Steel	09-04-90
247B	Bedding Material and Bearing Pads	07-30-87
401A	Structure Excavation	10-26-87
403A	Bearing Piles	06-15-88
404B	Concrete Masonry (Sealing Expansion Joints)	04-01-87
404B	Concrete Masonry (Expansion Joints)	04-01-87
404D	Concrete Masonry (Penetrate Sealer)	04-01-87
404E	Concrete Masonry (Forms)	09-21-87
410A	Steel Structures (High Strength Bolts)	09-04-90
411A	Adhesive Anchors	05-10-90
413A	Railings and Parapets	08-23-90
414D	Protective Coating of Metal in Structures	03-05-90
416C	Widening, Repairing Concrete Deck and Reconstruction of Existing Structures	08-14-89
CN 219 (j)	Sec. 219.07 Classification and Proportioning of Concrete Ad Mixtures	11-01-90
CN 219 (k)	Sec. 219.02 Course Aggregate	10-18-90
CN 219 (l)	Sec. 219.12 (b) Ready Mixed	11-20-90
CN 228 (a0)	Sec. 228 (a)8 Wiremesh	10-12-88
CN 232 (a)	Sec. 232 Notch Toughness Requirements	06-10-87
CN 232 (b)	Sec. 232 (a) Structural Carbon Steel	09-13-88

CN 232 (c)	Sec. 232 Structural Steel	12-15-89
CN 247 (a)	Sec. 247.02 Elastomeric Bearing Pads	06-23-88
CN 401 (b)	Sec. 401.01 Description	04-13-89
CN 404 (a)	Sec. 404 Concrete Masonry	07-01-87
CN 404 (b)	Sec. 404.02 (a) Concrete	07-01-87
CN 404 (c)	Sec 404.16 Bridge Deck Construction	07-01-87
CN 404 (d)	Sec. 404.19 (f) Class 6, Bridge Deck Finish	09-30-88
CN 404 (e)	Sec. 404.13 Curing of Concrete	03-15-88
CN 404 (g)	Sec. 404.14 Linseed Oil Treatment	01-25-88
CN 404 (h)	Sec. 404.13 Curing of Concrete	08-09-88
CN 404 (j)	Sec. 404.05 Placement and Consolidation	12-15-88
CN 404 (k)	Sec. 404.19 (f) Class 6 Bridge Deck Finish	04-04-89
CN 404 (l)	Sec. 404.16 Bridge Deck Construction	12-22-88
CN 404 (m)	Sec. 404.04 False Work and Centering	12-17-90
CN 405 (a)	Sec. 405.14 Tolerances	07-13-87
CN 405 (b)	Sec. 405.03 Requirements for Plant Review	04-11-88
CN 405 (c)	Sec. 405.06 Placement of Strands and Wires	07-13-88
CN 405 (d)	Sec. 405.10 (e) Protection and Curing	04-03-89
CN 406 (a)	Sec. 406.08 Placing and Fastening	08-20-87
CN 410 (a)	Sec. 410.24 Pin Clearances	06-12-87
CN 410 (e)	Sec. 410.27 Finish	03-13-89
CN 410 (g)	Sec. 410.04 (a) Fabrication	01-29-90
CN 410 (h)	Sec. 410.05 Inspection	01-26-90
CN 410 (j)	Sec. 410.08 Camber	12-04-90
CN 410 (k)	Sec. 410.34 Falsework	11-14-90
CN 411 (a)	Sec. 411.10 Anchors	04-18-89
CN 418 (b)	Sec. 418 Erosion Control Treatment	05-23-88
CN 418 (c)	Sec. 418.03, .04, .05 Dry Rip Rap	09-05-90

45.04 VDOT SECTION MODIFICATIONS: The VDOT Specifications shall be supplemented or modified as follows:

A. Section 401 Structure Excavation add the following to section 401.11

1. Filter fabric conforming to Division 30 shall be wrapped around the aggregate behind weep holes. Fabric shall have sufficient overlap to prevent openings that could contaminate the aggregate. Filter fabric for weep holes will not be measured for payment, but will be incidental to the contract price for Structure Excavation.

B. Section 403 Bearing Pile

1. Add the following to Section 403.07 - Accuracy of Driving: After driving of

piles is completed and before any concrete is poured, Contractor shall provide the Engineer with a survey showing actual location of each pile. Contractor shall not proceed until the Engineer has reviewed the survey and verified safe loads for piles as driven.

The survey, which shall be furnished and paid for by the Contractor, shall identify the pile location, and provide information as follows:

- a. Tip elevation
- b. Head elevation
- c. Pile length
- d. Pile head location as coordinates from the plan dimensions
- e. Rejected and added piles

2. Add the following to Section 403.10 Determination of Bearing Capacities. (a) Loading tests:

If the Contractor chooses to apply the test load to the test pile by jacking against temporary tension piles driven in an adjacent location, the tension piles shall be driven not closer than 8 feet from the test pile (measured between centerlines of piles). The Contractor may use water jets to aid in the installation of temporary tension piles.

The apparatus for applying the test loadings shall conform to Section 2 of ASTM D1143.

Four approved dial gages shall be furnished and mounted on steel angles welded to a steel collar bolted to the pile. A suitable "wire, mirror, and scale" apparatus shall also be furnished and mounted for measuring movements.

If adequate blow counts are achieved during the driving of permanent piles, the Engineer may direct that load tests be deleted from the work. In this event only those load tests actually performed will be included in the items measured for payment.

3. Add the following to Section 403.10 Determination of Bearing Capacities. (c) Bearing value of piles.

For precast concrete piles the following formulas will be used to determine allowable pile loads:

- a. For single-acting steam hammers:

- 1) If weight of ram is greater than weight of pile

$$P = \frac{2WH}{S+0.1}$$

- 2) If weight or ram is less than weight of pile

$$P = \frac{2WH}{S+0.1} \frac{W_p}{W}$$

- b. For double-acting steam hammers

- 1) If weight of ram is greater than weight of pile

$$P = \frac{2E}{S+0.1}$$

- 2) If weight or ram is less than weight of pile

$$P = \frac{2E}{S+0.1} \frac{W_p}{W}$$

4. Add the following to Section 403.11 Determination of Pile Lengths and other requirements:

- a. The Contractor shall order piles (to be furnished) in two steps:

- 1) First Step: Order piles for the Pile Driving Tests and drive these piles. Allow fourteen calendar days following the installation of the Driving Tests for the Engineer to evaluate the driving data.
- 2) Second step: Order the remaining piles in lengths as directed by the Engineer.

- b. The Engineer may direct that, during the Driving Tests, pile driving be stopped (leaving tops of piles above the final location shown on the plans). In this event, the Contractor shall cut off piles at the proper elevation leaving prestressing strands extending for embedment into the concrete structure above. The cost for cutting off these piles will not be a separate pay item, but will be included in the cost of the Driving Tests.

5. Add the following to Section 403.14 Precast Concrete piles (h) Finish Piles to be used in tidal water or exposed to stormwater flows shall be epoxy coated in accordance with section 404.11.

C. Section 404 - Concrete Masonry

1. Section 404.03 Forms - To completely replace the first paragraph with the following:

H On concrete bridges, the Contractor shall have the option of utilizing
O prestressed deck panels or wood forms, to form that portion of bridge
L decks between beams unless otherwise specified. On steel bridges
D the Contractor shall utilize wood forms to form that portion of bridge
I decks between beams or girders unless otherwise specified.
N Corrugated metal bridge forms are generally not acceptable unless
G otherwise specified or approved by the engineer. Corrugated metal
! forms and prestressed deck panels shall not be used to form
! overhangs or portions of slabs where a longitudinal joint occurs
! between beams or girders.

2. Add the following to Section 404.11. Concrete structures used in tidal water or exposed to stormwater flows shall be epoxy coated as specified herein.

3. Add the following to Section 404.05:

- a. The contractor shall make concrete cylinder test specimens in the field in accordance with ASTM C31. These cylinders shall be cured in the field under conditions similar to concrete in the finished work.
- b. The Contractor shall hire an approved testing laboratory to perform standard compressive cylinder tests in accordance with ASTM C 39. Test reports shall be sent directly to the City. The testing of cylinders (number tested and age in days) will be done only with approval of the Engineer.
- c. A compression test consisting of four standard cylinders, one tested at an age of seven days and three tested at an age of 28 days, will be required for the following quantities:
 - 1) Test for each 50 cubic yards of each class of concrete placed in one day.
 - 2) Tests for any quantity of each class of concrete less than 50 cubic yards placed in one day.

- d. The compression test report submitted to the City shall include the following:
 - 1) The name of individual making the test cylinders.
 - 2) The placed location of the batch of concrete from which the cylinder was made.
 - 3) The proportions of the ingredients used in the concrete mix.
 - 4) The water-cement ratio of the batch in place.
 - 5) The information included under "Report" ASTM C 39.
- e. Slump test shall be made as required by the Engineer. The slump test shall conform to ASTM C 143.
- f. The cost of providing concrete test specimens, curing, handling, testing and reports shall be included in the cost of the appropriate bid items.

45.05 SECTIONS ADDED: The VDOT Specifications shall be amended with the following:
Section 428 - Brick Masonry.

- A. Section 428.01 Description - This work shall consist of furnishing all labor, materials, and other incidentals to place brick masonry in accordance with these specifications and in reasonably close conformity with the dimensions, lines and grades shown on the plans.
- B. Section 428.02 Materials - The materials for the work shall conform to the following requirements:
 - 1. Masonry Units: Provide units of size indicated and in special shapes for applications where forms, size or finish cannot be produced from standard shapes. Provide uncured or unfrosted units with all exposed surfaces finished for sills, caps and similar applications exposing surfaces otherwise concealed from view.
 - 2. Facing brick shall conform to ASTM C 216, Grade SW, Type FBS. Brick shall be #1604SS standard size by Webster Brick Co., Inc., or approved similar.
 - 3. Mortar materials and mixes shall conform to ASTM C 270, proportion specification for materials and mortar types of composition indicated below.

- a. Cementitious material shall be Portland Cement and shall conform to ASTM C150, Type I or Type II, white, combined with hydrated lime.
 - b. Hydrated lime shall conform to ASTM C 270, Type S.
 - c. Aggregate shall conform to ASTM C 144, natural or manufactured sand.
 - d. Color shall be white.
 - e. Type of mortar shall be Type M. Do not add admixtures.
4. Joint reinforcement, ties and anchoring devices shall comply with requirements indicated below for basic materials and with those requirements indicated under each item.
- a. Zinc-coated (galvanized) steel sheet shall be carbon steel with zinc coating complying with ASTM A 525, Coating Designation G90. Use for devetail slots.
 - b. Hot-dip galvanized carbon steel sheet shall conform to ASTM A 366, Class 2 or ASTM A 635; hot-dip galvanized after fabrication to comply with ASTM A 153, Class B. Use for anchors.
 - c. Masonry wire ties shall be 3/16" cold-drawn steel wire, with 1.5 oz. hot-dip zinc coating, Z-shaped for solid unit masonry or rectangular shape for hollow unit masonry.
 - d. Joint reinforcement: Provide welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10', complying with requirements indicated below:
 - 1) Width: Fabricated joint reinforcement in units with widths of approximately 2" less than nominal width of walls and partitions as required to provide mortar coverage of not less than 5/8" on joint faces exposed to exterior and 1/2" elsewhere.
 - 2) Wire size for side rods: 0.1483" diameter.
 - 3) Wire size for cross rods: 0.1483" diameter.
 - 4) Provide truss design with continuous diagonal cross rods spaced not more than 16" o.c.

C. Section 428.03 Execution:

1. Comply with recommendations of Brick Institute of America (BIA), and National Concrete Masonry Assoc. (NCMA).
2. Submit product data for masonry units, cementitious products for mortar and grout and masonry accessories. Submit samples of exposed masonry units.
3. Cut exposed masonry units, where necessary, with a power saw. Avoid the use (by proper layout) of less than half size units. Wet brick of high absorption, prior to laying. Hold uniform joint sizes to suit modular size of masonry units as indicated on drawings. cut joints flush and tool slightly concave.
4. Install ties spaced maximum of 16" vertically and 24" horizontally. Install ties in dovetail anchor slots.
5. Provide control and expansion joints at locations shown, and keep clean of mortar droppings.
6. Build other work into the masonry work as shown, fitting masonry units around other work, and grouting four secure anchorage. Protect newly laid masonry from exposure to precipitation, excessive drying, freezing, soiling, backfill and other harmful elements. Dry-brush masonry work at end of each day's work.
7. Final cleaning: After mortar is thoroughly set and cured, clean masonry as follows: Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels. Test cleaning methods on sample panels before proceeding with cleaning of entire masonry work. Clean brick masonry by bucket and brush hand cleaning method described in BIA "Technical Note No. 20 Revised" using detergent. Clean concrete unit masonry to comply with masonry manufacturer's directions and applicable NCMA "Tek" bulletins.

D. Section 428.04 Measurement and Payment: Brick masonry will not be measured but will be included in the lump sum bid price for Brick Masonry. The lump sum price shall be full compensation for all materials, labor and equipment necessary to complete this work.