Project B-2515 **Buncombe County**

Project Special Provisions
Structure

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NORTH CAROLINA PROFESSIONAL SEAL 025516 ENGINEER EMILY E. MURRAY

Emily E. Murray

5/9/09

except for micropiles and Electrical Conduit System

PROJECT SPECIAL PROVISIONS
STRUCTURES

PROJECT B-2515 **BUNCOMBE COUNTY**

SAND LIGHTWEIGHT CONCRETE (7-18-06)

Use sand lightweight concrete, as noted on the plans, that meets the requirements of this Special Provision.

Sand lightweight concrete is composed of portland cement, fine aggregate, lightweight coarse aggregate, water, and admixtures. Provide sand lightweight concrete that complies with the applicable requirements of Sections 420, 1000, and 1024 of the Standard Specifications and the additional requirements herein.

Submit a mix design from a testing laboratory approved by the NC Division of Highways for approval at least 35 days prior to the proposed use. Provide a mix meeting Table 1000-1 of the Standard Specifications and the following design criteria:

TEST	TEST METHOD	REQUIREMENT
Max. Unit Weight, plastic, lbs/ft^3 (kg/m^3)	AASHTO T121	120 (1925)
Max. Unit Weight, dry, lbs/ft^3 (kg/m^3)	ASTM C567 using equilibrium air dried unit weight	115 (1845)
Min. Relative Dynamic Modulus, (percent)	AASHTO T161 Procedure A	80

When submitting the mix design, include the source of the aggregates, cement, and admixtures and the gradation, specific gravity and fineness modulus (fine aggregate only) of the aggregates. Submit test results showing the mix design conforms to the criteria, including the 28 day compressive strength of a minimum of six cylinders. Provide a mix design that produces an average compressive strength sufficient to ensure that a minimum strength of 4500 psi (31.0 MPa) is achieved in the field.

Produce an additional mix in accordance with AASHTO M195 to determine the drying shrinkage. The maximum drying shrinkage for this mix is 0.07%.

For lightweight aggregate, use expanded shale or slate that meets the requirements of AASHTO M195. Grade the lightweight aggregate in accordance with 1014-2(E)(6).

Determine the soundness in accordance with AASHTO T104. Loss of more than 10% of the lightweight aggregate in five cycles of the accelerated soundness test using sodium sulfate is not permitted.

Ensure the lightweight aggregate is in a saturated surface-dry condition when it is proportioned and incorporated into the mix.

EVAZOTE JOINT SEALS (8-13-04)

1.0 SEALS

Use preformed seals compatible with concrete and resistant to abrasion, oxidation, oils, gasoline, salt and other materials that are spilled on or applied to the surface. Use a low-density closed cell, cross-linked ethylene vinyl acetate polyethylene copolymer nitrogen blown material for the seal.

Use seals manufactured with grooves 1/8" (3 mm) ± wide by 1/8" (3 mm) ± deep and spaced between 1/4 (6 mm) and 1/2 inch (13 mm) apart along the bond surface running the length of the joint. Use seals sized so that the depth of the seal meets the manufacturer's recommendation, but is not less than 70% of the uncompressed width. Provide a seal designed so that, when compressed, the center portion of the top does not extend upward above the original height of the seal by more than 1/4 inch (6 mm). Splice the seal using the heat welding method by placing the joint material ends against a teflon heating iron of 350°F (177°C) for 7 - 10 seconds, then pressing the ends together tightly. Do not test the welding until the material has completely cooled. Use material that resists weathering and ultraviolet rays. Provide a seal that has a working range of 30% tension and 60% compression and is watertight along its entire length including the ends.

Provide seals that meet the requirements given below.

TEST	TEST METHOD	REQUIREMENT
Elongation at break	ASTM D3575	210 ± 15%
Tensile strength, psi (kPa)	ASTM D3575	110 ± 15 (755 ± 100)
Compression Recovery (% of original width)	AASHTO T42 50% compr. for 22 hr. @ 73°F (23°C) 1/2 hr. recovery	87 ± 3
Weather/Deterioration	AASHTO T42 Accelerated Weathering	No deterioration for 10 years min.
Compression/Deflection	@ 50% deflection of original width @ 50% deflection of original width	10 psi (69 kPa) min. 60 psi (414 kPa) max.
Tear Strength, psi (kPa)	ASTM D624	16 ± 3 (110 ± 20)
Density	ASTM D545	2.8 to 3.4
Water Absorption (% vol/vol)	ASTM D3575 Total immersion for 3 months	3

Have the top of the evazote seal clearly shop marked. Inspect the evazote seals upon receipt to ensure that the marks are clearly visible upon installation.

2.0 ADHESIVES

Use a two component, 100% solid, modified epoxy adhesive with the seal that meets the requirements of ASTM C881, Type 1, Grade 3, Class B & C and has the following physical properties:

Tensile strength ..... 3500 psi (24.1 MPa) min.
Compressive strength ..... 7000 psi (48.3 MPa) min.
Shore D Hardness ..... 75 psi (0.5 MPa) min.
Water Absorption ..... 0.25% by weight

Use an adhesive that is workable to 40°F (4°C). When installing in temperatures below 40°F (4°C) or for application on moist, difficult to dry concrete surfaces, use an adhesive specified by the manufacturer of the joint material.

3.0 SAWING THE JOINTS

When the plans call for sawing the joints, the joints shall be initially formed to a width as shown on the plans including the blockout for the elastomeric concrete. Complete placement of the elastomeric concrete after the reinforced concrete deck slab has cured for seven full days and reached a minimum strength of 3000 psi (20.7 Mpa).

Cure the elastomeric concrete for a minimum of 2 days prior to sawing the elastomeric concrete to the final width and depth as specified in the plans.

When sawing the joint to receive the evazote seal, always use a rigid guide to control the saw in the desired direction. To control the saw and to produce a straight line as indicated on the plans, anchor and positively connect a template or a track to the bridge deck. Do not saw the joint by visual means such as a chalk line. Fill the holes used for holding the template or track to the deck with an approved, flowable non-shrink, non-metallic grout.

Saw cut to the desired width and depth in one or two passes of the saw by placing and spacing two metal blades on the saw shaft to the desired width for compression seals.

The desired depth is the depth of the seal plus 1/4 inch (6 mm) above the top of the seal plus approximately 1 inch (25 mm) below the bottom of the seal. An irregular bottom of sawed joint is permitted as indicated on the plans. Grind exposed corners on saw cut edges to a 1/4" (6 mm) chamfer.

Remove any staining or deposited material resulting from sawing with a wet blade to the satisfaction of the Engineer.

Use extreme care to saw the joint straight to the desired width and to prevent any chipping or damage to sawed edges of the joint.

4.0 PREPARATIONS FOR SAWED JOINTS

When the plans call for sawing the joint, the Engineer thoroughly inspects the sawed joint opening for spalls, popouts, cracks, etc. Make all necessary repairs prior to blast cleaning and installing the seal.

Immediately before sealing, clean the joints by sandblasting with clean dry sand. Sandblast to provide a firm, clean joint surface free of curing compound, loose material and any foreign matter. Sandblast without causing pitting or uneven surfaces. The aggregate in the elastomeric concrete may be exposed after sandblasting.

After blasting, either brush the surface with clean brushes made of hair, bristle or fiber, blow the surface with compressed air, or vacuum the surface until all traces of blast products and abrasives are removed from the surface, pockets, and corners.

If nozzle blasting, use compressed air that does not contain detrimental amounts of water or oil.

Examine the blast cleaned surface and remove any traces of oil, grease or smudge deposited in the cleaning operations.

Bond the seal to the blast cleaned surface on the same day the surface is blast cleaned.

5.0 PREPARATIONS FOR ARMORED JOINTS

When the plans call for armored joints, form the joint and blockout openings in accordance with the plans. If preferred, wrap the temporary form with polyethylene sheets to allow for easier removal. Do not use form release agents.

A. Submittals

Submitting detailed working drawings is not required; however, submitting catalog cuts of the proposed material is required. In addition, direct the joint supplier to provide an angle segment placing plan.

B. Surface Preparation

Prepare the surface within the 48 hours prior to placing the elastomeric concrete. Do not place the elastomeric concrete until the surface preparation is completed and approved.

1. Angle Assembly

Clean and free metallized steel of all foreign contaminants and blast the non-metallized steel surfaces to SSPC SP-10. Blast-cleaning anchor studs is not required.

2. Concrete

Prior to placing the elastomeric concrete, thoroughly clean and dry all concrete surfaces. Sandblast the concrete surface in the blockout and clear the surface of all loose debris.

C. Elastomeric Concrete Placement

Make sure that a manufacturer's representative is present when placing elastomeric concrete. Do not place elastomeric concrete if the ambient air temperature is below 45°F (7°C).

Prepare and apply a primer, as per manufacturer's recommendations, to all vertical concrete faces, all steel components to be in contact with elastomeric concrete, and to areas specified by the manufacturer. Align the angles with the joint opening.

Prepare, batch, and place the elastomeric concrete in accordance with the manufacturer's instructions. Place the elastomeric concrete in the areas specified on the plans while the primer is still tacky and within 2 hours after applying the primer. Pay careful attention to properly consolidate the concrete around the steel and anchors. Trowel the elastomeric concrete to a smooth finish.

D. Joint Preparation

Prior to installing the seal, the Engineer thoroughly inspects the armored joint opening for proper alignment and full consolidation of elastomeric concrete under the angle assemblies. Make all necessary repairs prior to cleaning the joint opening and installing the seal.

Clean the armored joint opening with a pressure washer rated at 3000 psi (20.7 MPa) minimum at least 24 hours after placing the elastomeric concrete. Dry the cleaned surface prior to installing the seal.

Examine the cleaned surface and remove traces of oil, grease or smudge deposited during the cleaning operations.

Bond the seal to the cleaned surface on the same day the surface is cleaned.

6.0 SEAL INSTALLATION

Install the joint seal according to the manufacturer's procedures and recommendations and as recommended below. Do not install the joint seal if the ambient air temperature is below 45°F (7°C). Have a manufacturer's representative present during the installation of the first seal of the project.

Begin installation at the low end of the joint after applying the mixed epoxy to the sides of both the joint material and both sides of the joint, making certain to completely fill the grooves with epoxy. With gloved hands, compress the material and with the help of a blunt probe, push it down into the joint until it is recessed approximately 1/4 inch (6 mm) below the surface. Do not push the seal at an angle that would stretch the material. Once work on a joint begins, do not stop until it is completed. Clean the excess epoxy off the surface of the joint material *quickly* and *thoroughly*. Do not use solvents to remove excess epoxy. Remove excess epoxy in accordance with the joint manufacturer's recommendations.

Install the seal so that it is watertight. Testing of the joint seal is not required, but it is observed until final inspection.

7.0 BASIS OF PAYMENT

Payment for all evazote joint seals will be at the lump sum contract price bid for "Evazote Joint Seals" which prices and payment will be full compensation for furnishing all material, including elastomeric concrete when required, labor, tools and equipment necessary for installing these units in place and accepted.

ELASTOMERIC CONCRETE (10-12-01)

1.0 DESCRIPTION

Elastomeric concrete is a mixture of a two-part polymer consisting of polyurethane and/or epoxy, and kiln-dried aggregate. Have the manufacturer supply it as a unit. Use the concrete in the blocked out areas on both sides of the bridge deck joints as indicated on the plans.

2.0 MATERIALS

Provide materials that comply with the following minimum requirements at 14 days.

CONCRETE PROPERTIES	TEST METHOD	MINIMUM REQUIREMENT
Bond Strength to Concrete, psi (MPa)	ASTM D638 (D638M)	450 (3.1)
Brittleness by Impact, ft-lb (kg-m)	Ball Drop	7 (0.97)
Compressive Strength, psi (MPa)	ASTM D695 (D695M)	2800 (19.3)

BINDER PROPERTIES (without aggregate)	TEST METHOD	MINIMUM REQUIREMENT
Tensile Strength, psi (MPa)	ASTM D638 (D638M)	800 (5.5)
Ultimate Elongation	ASTM D638 (D638M)	150%
Tear Resistance, lb/in (kN/m)	ASTM D624	90 (15.7)

In addition to the requirements above, use elastomeric concrete that also resists water, chemical, UV, and ozone exposure and withstands extreme temperature (freeze-thaw) changes.

Furnish a manufacturer's certification verifying that the materials satisfy the above requirements. Provide samples of elastomeric concrete to the Engineer, if requested, to independently verify conformance with the above requirements.

Require a manufacturer's representative to be present on site during the installation of the elastomeric concrete.

3.0 BASIS OF PAYMENT

No separate payment will be made for elastomeric concrete. The lump sum contract price bid for "Evazote Joint Seals" will be full compensation for furnishing and placing the Elastomeric Concrete.

FALSEWORK AND FORMWORK (7-18-06)

1.0 DESCRIPTION

Use this Special Provision as a guide to develop temporary works submittals required by the Standard Specifications or other provisions; no additional submittals are required herein. Such temporary works include, but are not limited to, falsework and formwork.

Falsework is any temporary construction used to support the permanent structure until it becomes self-supporting. Formwork is the temporary structure or mold used to retain plastic or fluid concrete in its designated shape until it hardens. Access scaffolding is a temporary structure that functions as a work platform that supports construction personnel, materials, and tools, but is not intended to support the structure. Scaffolding systems that are used to temporarily support permanent structures (as opposed to functioning as work platforms) are considered to be falsework under the definitions given. Shoring is a component of falsework such as horizontal, vertical, or inclined support members. Where the term "temporary works" is used, it includes all of the temporary facilities used in bridge construction that do not become part of the permanent structure.

Design and construct safe and adequate temporary works that will support all loads imposed and provide the necessary rigidity to achieve the lines and grades shown on the plans in the final structure.

2.0 MATERIALS

Select materials suitable for temporary works; however, select materials that also ensure the safety and quality required by the design assumptions. The Engineer has authority to reject material on the basis of its condition, inappropriate use, safety, or nonconformance with the plans. Clearly identify allowable loads or stresses for all materials or manufactured devices on the plans. Revise the plan and notify the Engineer if any change to materials or material strengths is required.

3.0 DESIGN REQUIREMENTS

A. Working Drawings

Provide working drawings for items as specified in the contract, or as required by the Engineer, with design calculations and supporting data in sufficient detail to permit a structural and safety review of the proposed design of the temporary work.

When concrete placement is involved, include data such as the drawings of proposed sequence, rate of placement, direction of placement, and location of all construction joints. Submit the number of copies as called for by the contract.

When required, have the drawings and calculations prepared under the guidance of, and sealed by, a North Carolina Registered Professional Engineer who is knowledgeable in temporary works design.

Design falsework and formwork requiring submittals in accordance with the 1995 AASHTO *Guide Design Specifications for Bridge Temporary Works* except as noted herein.

1. Wind Loads

Table 2.2 of Article 2.2.5.1 is modified to include wind velocities up to 110 mph (177 km/hr). In addition, Table 2.2A is included to provide the maximum wind speeds by county in North Carolina.

Table 2.2 - Wind Pressure Values

Height Zone feet (m) above ground	Pressure, lb/ft^2 (kPa) for Indicated Wind Velocity, mph (km/hr)				
	70 (112.7)	80 (128.7)	90 (144.8)	100 (160.9)	110 (177.0)
0 to 30 (0 to 9.1)	15 (0.72)	20 (0.96)	25 (1.20)	30 (1.44)	35 (1.68)
30 to 50 (9.1 to 15.2)	20 (0.96)	25 (1.20)	30 (1.44)	35 (1.68)	40 (1.92)
50 to 100 (15.2 to 30.5)	25 (1.20)	30 (1.44)	35 (1.68)	40 (1.92)	45 (2.15)
over 100 (30.5)	30 (1.44)	35 (1.68)	40 (1.92)	45 (2.15)	50 (2.39)

2. Time of Removal

The following requirements replace those of Article 3.4.8.2.

Do not remove forms until the concrete has attained strengths required in Article 420-16 of the Standard Specifications and these Special Provisions.

Do not remove forms until the concrete has sufficient strength to prevent damage to the surface.

Table 2.2A - Steady State Maximum Wind Speeds by Counties in North Carolina

COUNTY	25 YR (mph) (km/hr)	COUNTY	25 YR (mph) (km/hr)	COUNTY	25 YR (mph) (km/hr)
Alamance	70 (112.7)	Franklin	70 (112.7)	Pamlico	100 (160.9)
Alexander	70 (112.7)	Gaston	70 (112.7)	Pasquotank	100 (160.9)
Alleghany	70 (112.7)	Gates	90 (144.8)	Pender	100 (160.9)
Anson	70 (112.7)	Graham	80 (128.7)	Perquimans	100 (160.9)
Ashe	70 (112.7)	Granville	70 (112.7)	Person	70 (112.7)
Avery	70 (112.7)	Greene	80 (128.7)	Pitt	90 (144.8)
Beaufort	100 (160.9)	Guilford	70 (112.7)	Polk	80 (128.7)
Bertie	90 (144.8)	Halifax	80 (128.7)	Randolph	70 (112.7)
Bladen	90 (144.8)	Harnett	70 (112.7)	Richmond	70 (112.7)
Brunswick	100 (160.9)	Haywood	80 (128.7)	Robeson	80 (128.7)
Buncombe	80 (128.7)	Henderson	80 (128.7)	Rockingham	70 (112.7)
Burke	70 (112.7)	Hertford	90 (144.8)	Rowan	70 (112.7)
Cabarrus	70 (112.7)	Hoke	70 (112.7)	Rutherford	70 (112.7)
Caldwell	70 (112.7)	Hyde	110 (177.0)	Sampson	90 (144.8)
Camden	100 (160.9)	Iredell	70 (112.7)	Scotland	70 (112.7)
Carteret	110 (177.0)	Jackson	80 (128.7)	Stanley	70 (112.7)
Caswell	70 (112.7)	Johnston	80 (128.7)	Stokes	70 (112.7)
Catawba	70 (112.7)	Jones	100 (160.9)	Surry	70 (112.7)
Cherokee	80 (128.7)	Lee	70 (112.7)	Swain	80 (128.7)
Chatham	70 (112.7)	Lenoir	90 (144.8)	Transylvania	80 (128.7)
Chowan	90 (144.8)	Lincoln	70 (112.7)	Tyrell	100 (160.9)
Clay	80 (128.7)	Macon	80 (128.7)	Union	70 (112.7)
Cleveland	70 (112.7)	Madison	80 (128.7)	Vance	70 (112.7)
Columbus	90 (144.8)	Martin	90 (144.8)	Wake	70 (112.7)
Craven	100 (160.9)	McDowell	70 (112.7)	Warren	70 (112.7)
Cumberland	80 (128.7)	Mecklenburg	70 (112.7)	Washington	100 (160.9)
Currituck	100 (160.9)	Mitchell	70 (112.7)	Watauga	70 (112.7)
Dare	110 (177.0)	Montgomery	70(112.7)	Wayne	80 (128.7)
Davidson	70 (112.7)	Moore	70 (112.7)	Wilkes	70 (112.7)
Davie	70 (112.7)	Nash	80 (128.7)	Wilson	80 (128.7)
Duplin	90 (144.8)	New Hanover	100 (160.9)	Yadkin	70 (112.7)
Durham	70 (112.7)	Northampton	80 (128.7)	Yancey	70 (112.7)
Edgecombe	80 (128.7)	Onslow	100 (160.9)		
Forsyth	70 (112.7)	Orange	70 (112.7)		

Note on the working drawings any anchorages, connectors, inserts, steel sleeves or other such devices used as part of the falsework or formwork that remains in the permanent structure. If the plan notes indicate that the structure contains the necessary corrosion protection required for a Corrosive Site, epoxy coat, galvanize, metallize or otherwise protect these devices as directed by the Engineer. Any coating required by the Engineer will be considered incidental to the various pay items requiring temporary works.

B. Review and Approval

The Engineer is responsible for the review and approval of temporary works' drawings.

Submit the working drawings sufficiently in advance of proposed use to allow for their review, revision (if needed), and approval without delay to the work.

Do not start construction of any temporary work for which working drawings are required until the drawings have been approved. Such approval does not relieve the Contractor of the responsibility for the accuracy and adequacy of the working drawings.

The time period for review of the working drawings does not begin until complete drawings and design calculations, when required, are received by the Engineer.

On the drawings, show all information necessary to allow the design of any component to be checked independently as determined by the Engineer.

If requested by the Engineer, submit with the working drawings manufacturer's catalog data listing the weight of all construction equipment that will be supported on the temporary work. Show anticipated total settlements and/or deflections of falsework and forms on the working drawings. Include falsework footing settlements, joint take-up, and deflection of beams or girders. Falsework hangers that support concentrated loads and are installed at the edge of thin top flange concrete girders (such as bulb tee girders) shall be spaced so as not to exceed 75% of the manufacturer's stated safe working load. Use of dual leg hangers (such as Meadow Burke HF-42 and HF-43) are not allowed. Design the falsework and forms supporting deck slabs and overhangs on girder bridges so that there will be no differential settlement between the girders and the deck forms during placement of deck concrete.

4.0 CONSTRUCTION REQUIREMENTS

All requirements of Section 420 of the Standard Specifications apply.

Construct temporary works in conformance with the approved working drawings. Ensure that the quality of materials and workmanship employed is consistent with that assumed in the design of the temporary works. Do not weld falsework members to any portion of the permanent structure unless approved. Show any welding to the permanent structure on the approved construction drawings.

Provide tell-tales attached to the forms and extending to the ground, or other means, for accurate measurement of falsework settlement. Make sure that the anticipated compressive settlement and/or deflection of falsework does not exceed 1 inch (25 mm). For cast-in-place concrete structures, make sure that the calculated deflection of falsework flexural members does not exceed 1/240 of their span regardless of whether or not the deflection is compensated by camber strips.

A. Maintenance and Inspection

Inspect and maintain the temporary work in an acceptable condition throughout the period of its use. Certify that the manufactured devices have been maintained in a condition to allow them to safely carry their rated loads. Clearly mark each piece so that its capacity can be readily determined at the job site.

Perform an in-depth inspection of an applicable portion(s) of the temporary works, in the presence of the Engineer, not more than 24 hours prior to the beginning of each concrete placement. Inspect other temporary works at least once a month to ensure that they are functioning properly. Have a North Carolina Registered Professional Engineer inspect the cofferdams, shoring, sheathing, support of excavation structures, and support systems for load tests prior to loading.

B. Foundations

Determine the safe bearing capacity of the foundation material on which the supports for temporary works rest. If required by the Engineer, conduct load tests to verify proposed bearing capacity values that are marginal or in other high-risk situations.

The use of the foundation support values shown on the contract plans of the permanent structure is permitted if the foundations are on the same level and on the same soil as those of the permanent structure.

Allow for adequate site drainage or soil protection to prevent soil saturation and washout of the soil supporting the temporary works supports.

If piles are used, the estimation of capacities and later confirmation during construction using standard procedures based on the driving characteristics of the pile is permitted. If preferred, use load tests to confirm the estimated capacities; or, if required by the Engineer conduct load tests to verify bearing capacity values that are marginal or in other high risk situations.

The Engineer reviews and approves the proposed pile and soil bearing capacities.

5.0 REMOVAL

Unless otherwise permitted, remove and keep all temporary works upon completion of the work. Do not disturb or otherwise damage the finished work.

Remove temporary works in conformance with the contract documents. Remove them in such a manner as to permit the structure to uniformly and gradually take the stresses due to its own weight.

6.0 METHOD OF MEASUREMENT

Unless otherwise specified, temporary works will not be directly measured.

7.0 BASIS OF PAYMENT

Payment at the contract unit prices for the various pay items requiring temporary works will be full compensation for the above falsework and formwork.

SUBMITTAL OF WORKING DRAWINGS (9-16-08)

1.0 GENERAL

Submit working drawings in accordance with Article 105-2 of the *Standard Specifications* and this provision. For this provision, "submittals" refers to only those listed in this provision. The list of submittals contained herein does not represent a list of required submittals for the project. Submittals are only necessary for those items as required by the contract. Make submittals that are not specifically noted in this provision directly to the Resident Engineer. Either the Structure Design Unit or the Geotechnical Engineering Unit or both units will jointly review submittals.

If a submittal contains variations from plan details or specifications or significantly affects project cost, field construction or operations, discuss the submittal with and submit all copies to the Resident Engineer. State the reason for the proposed variation in the submittal. To minimize review time, make sure all submittals are complete when initially submitted. Provide a contact name and information with each submittal. Direct any questions regarding submittal requirements to the Resident Engineer, Structure Design Unit contacts or the Geotechnical Engineering Unit contacts noted below.

In order to facilitate in-plant inspection by NCDOT and approval of working drawings, provide the name, address and telephone number of the facility where fabrication will actually be done if different than shown on the title block of the submitted working drawings. This includes, but is not limited to, precast concrete items, prestressed concrete items and fabricated steel or aluminum items.

2.0 ADDRESSES AND CONTACTS

For submittals to the Structure Design Unit, use the following addresses:

Via US mail:

Mr. G. R. Perfetti, P. E.
State Bridge Design Engineer
North Carolina Department
of Transportation
Structure Design Unit
1581 Mail Service Center
Raleigh, NC 27699-1581

Attention: Mr. P. D. Lambert, P. E.

Via other delivery service:

Mr. G. R. Perfetti, P. E.
State Bridge Design Engineer
North Carolina Department
of Transportation
Structure Design Unit
1000 Birch Ridge Drive
Raleigh, NC 27610

Attention: Mr. P. D. Lambert, P. E.

For submittals to the Geotechnical Engineering Unit, use the following addresses:

For projects in Divisions 1-7, use the following Eastern Regional Office address:

Via US mail:

Mr. K. J. Kim, Ph. D., P. E.
Eastern Regional Geotechnical
Manager
North Carolina Department
of Transportation
Geotechnical Engineering Unit
Eastern Regional Office
1570 Mail Service Center
Raleigh, NC 27699-1570

Via other delivery service:

Mr. K. J. Kim, Ph. D., P. E.
Eastern Regional Geotechnical
Manager
North Carolina Department
of Transportation
Geotechnical Engineering Unit
Eastern Regional Office
3301 Jones Sausage Road, Suite 100
Garner, NC 27529

For projects in Divisions 8-14, use the following Western Regional Office address:

Via US mail:

Mr. John Pilipchuk, L. G., P. E.
Western Regional Geotechnical
Manager
North Carolina Department
of Transportation
Geotechnical Engineering Unit
Western Regional Office
5253 Z Max Boulevard
Harrisburg, NC 28075

Via other delivery service:

Mr. John Pilipchuk, L. G., P. E.
Western Region Geotechnical
Manager
North Carolina Department
of Transportation
Geotechnical Engineering Unit
Western Regional Office
5253 Z Max Boulevard
Harrisburg, NC 28075

Direct any questions concerning submittal review status, review comments or drawing markups to the following contacts:

Primary Structures Contact:
Paul Lambert
(919) 250 – 4041
(919) 250 – 4082 facsimile
plambert@ncdot.gov

Secondary Structures Contacts:
James Gaither
(919) 250 – 4042
David Stark
(919) 250 – 4044

Eastern Regional Geotechnical Contact (Divisions 1-7):
K. J. Kim
(919) 662 – 4710
(919) 662 – 3095 facsimile
kkim@ncdot.gov

Western Regional Geotechnical Contact (Divisions 8-14):
John Pilipchuk
(704) 455 – 8902
(704) 455 – 8912 facsimile
jpilipchuk@ncdot.gov

3.0 SUBMITTAL COPIES

Furnish one complete copy of each submittal, including all attachments, to the Resident Engineer. At the same time, submit the number of hard copies shown below of the same complete submittal directly to the Structure Design Unit and/or the Geotechnical Engineering Unit.

The first table below covers "Structure Submittals". The Resident Engineer will receive review comments and drawing markups for these submittals from the Structure Design Unit. The second table in this section covers "Geotechnical Submittals". The Resident Engineer will receive review comments and drawing markups for these submittals from the Geotechnical Engineering Unit.

Unless otherwise required, submit one set of supporting calculations to either the Structure Design Unit or the Geotechnical Engineering Unit unless both units require submittal copies in which case submit a set of supporting calculations to each unit. Provide additional copies of any submittal as directed by the Engineer.

STRUCTURE SUBMITTALS

Submittal	Copies Required by Structure Design Unit	Copies Required by Geotechnical Engineering Unit	Contract Reference Requiring Submittal [1]
Arch Culvert Falsework	5	0	Plan Note, SN Sheet & "Falsework and Formwork"
Box Culvert Falsework [7]	5	0	Plan Note, SN Sheet & "Falsework and Formwork"
Cofferdams	6	2	Article 410-4
Evazote Joint Seals [6]	9	0	"Evazote Joint Seals"
Expansion Joint Seals (hold down plate type with base angle)	9	0	"Expansion Joint Seals"
Expansion Joint Seals (modular)	2, then 9	0	"Modular Expansion Joint Seals"
Expansion Joint Seals (strip seals)	9	0	"Strip Seals"
Falsework & Forms [2] (substructure)	8	0	Article 420-3 & "Falsework and Formwork"
Falsework & Forms (superstructure)	8	0	Article 420-3 & "Falsework and Formwork"
Girder Erection over Railroad	5	0	Railroad Provisions
Maintenance and Protection of Traffic Beneath Proposed Structure	8	0	"Maintenance and Protection of Traffic Beneath Proposed Structure at Station ___"
Metal Bridge Railing	8	0	Plan Note
Metal Stay-in-Place Forms	8	0	Article 420-3
Metalwork for Elastomeric Bearings [4,5]	7	0	Article 1072-10

Miscellaneous Metalwork [4,5]	7	0	Article 1072-10
Optional Disc Bearings [4]	8	0	"Optional Disc Bearings"
Overhead Signs	13	0	Article 903-3(C) & Applicable Provisions
Pile Splicers	7	2	Subarticle 450-7(C) & "Piles"
Pile Points	7	2	Subarticle 450-7(D) & "Piles"
Placement of Equipment on Structures (cranes, etc.)	7	0	Article 420-20
Pot Bearings [4]	8	0	"Pot Bearings"
Precast Concrete Box Culverts	2, then 1 reproducible	0	"Optional Precast Reinforced Concrete Box Culvert at Station ___"
Precast Retaining Wall Panels	10	1	Article 1077-2
Prestressed Concrete Cored Slab (detensioning sequences) [3]	6	0	Article 1078-11
Prestressed Concrete Deck Panels	6 and 1 reproducible	0	Article 420-3
Prestressed Concrete Girder (strand elongation and detensioning sequences)	6	0	Articles 1078-8 and 1078-11
Removal of Existing Structure over Railroad	5	0	Railroad Provisions
Revised Bridge Deck Plans (adaptation to prestressed deck panels)	2, then 1 reproducible	0	Article 420-3
Revised Bridge Deck Plans (adaptation to modular expansion joint seals)	2, then 1 reproducible	0	"Modular Expansion Joint Seals"
Sound Barrier Wall Casting Plans	10	0	Article 1077-2 & "Sound Barrier Wall"
Sound Barrier Wall Steel Fabrication Plans [5]	7	0	Article 1072-10 & "Sound Barrier Wall"
Structural Steel [4]	2, then 7	0	Article 1072-10

Temporary Detour Structures	10	2	Article 400-3 & "Construction, Maintenance and Removal of Temporary Structure at Station ____"
TFE Expansion Bearings [4]	8	0	Article 1072-10

FOOTNOTES

1. References are provided to help locate the part of the contract where the submittals are required. References in quotes refer to the provision by that name. Articles and subarticles refer to the *Standard Specifications*.
2. Submittals for these items are necessary only when required by a note on plans.
3. Submittals for these items may not be required. A list of pre-approved sequences is available from the producer or the Materials & Tests Unit.
4. The fabricator may submit these items directly to the Structure Design Unit.
5. The two sets of preliminary submittals required by Article 1072-10 of the *Standard Specifications* are not required for these items.
6. Submittals for Fabrication Drawings are not required. Submittals for Catalogue Cuts of Proposed Material are required. See Section 5.A of the referenced provision.
7. Submittals are necessary only when the top slab thickness is 18" or greater.

GEOTECHNICAL SUBMITTALS

Submittal [1]	Copies Required by Geotechnical Engineering Unit	Copies Required by Structure Design Unit	Contract Reference Requiring Submittal [2]
Crosshole Sonic Logging (CSL) Reports	1	0	"Crosshole Sonic Logging"
Drilled Pier Construction Sequence Plans	1	0	"Drilled Piers"
Pile Driving Analyzer (PDA) Reports	2	0	"Pile Driving Analyzer"
Pile Driving Equipment Data [3]	1	0	Article 450-5 & "Piles"
Retaining Walls	8	2	Applicable Provisions
Contractor Designed Shoring	7	2	"Temporary Shoring", "Anchored Temporary Shoring" & "Temporary Soil Nail Walls"

FOOTNOTES

1. With the exception of "Pile Driving Equipment Data", electronic copies of geotechnical submittals are required. See referenced provision.

2. References are provided to help locate the part of the contract where the submittals are required. References in quotes refer to the provision by that name. Articles refer to the *Standard Specifications*.

3. Download Pile Driving Equipment Data Form from following link:
http://www.ncdot.org/doh/preconstruct/highway/geotech/formdet/
Submit one hard copy of the completed form to the Resident Engineer. Submit a second copy of the completed form electronically, by facsimile or via US Mail or other delivery service to the Geotechnical Engineering Unit. Electronic submission is preferred. See second page of form for submittal instructions.

CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STATION 13+90.00-L- (11-17-06)

1.0 GENERAL

Construct, maintain, and remove the temporary access required to provide the working area necessary for construction of the new bridge, construction of the temporary detour structure, or for the removal of an existing bridge, as applicable. Temporary access may include other methods than those outlined in this Special Provision; however, all types of temporary access are required to meet the requirements of all permits, the Standard Specifications, and this Special Provision.

2.0 TEMPORARY ROCK CAUSEWAY [WORKPAD]

Construction of a temporary rock causeway [workpad] within the limits shown on the plans is permitted. Build the causeway [workpad] with Class II riprap topped by a layer of Class A riprap or as otherwise designated on the plans or approved by the Engineer. If desired, recycle the Class II riprap used in the causeway [workpad] for placement in the final riprap slope protection as directed by the Engineer. No payment will be made for recycled riprap as this material is considered incidental to the causeway [workpad] placement and removal. If this option is exercised, no adjustment in contract bid price will be allowed due to an underrun in the quantity of "Plain Rip Rap Class II (2'-0" (600 mm) Thick)".

Completely remove all causeway [workpad] material including pipes and return the entire causeway [workpad] footprint to the original contours and elevations within 90 days of the completion of the deck slab or as otherwise required by permits.

For sites affected by moratoriums or restrictions on in-stream work: Do not construct or remove causeway [workpad] during the moratorium period shown on the permit. If the completion of the deck slab falls within the prohibitive dates for causeway [workpad] construction or removal, begin causeway [workpad] removal immediately following the prohibitive dates.

3.0 TEMPORARY WORK BRIDGE

At the contractor's option, construction of a temporary work bridge in lieu of the causeway(s) [workpad] is acceptable, provided the temporary work bridge satisfies all permits. Submit details of the temporary work bridge to the Engineer prior to constructing the work bridge to ensure conformance with the plans and all permits. Completely remove the temporary bridge prior to final acceptance or as otherwise required by the permits.

4.0 BASIS OF PAYMENT

The lump sum price bid for "Construction, Maintenance and Removal of Temporary Access at Station _____" will be full compensation for the above work, or other methods of access, including all material, pipes, work bridge components, equipment, tools, labor, disposal, and incidentals necessary to complete the work.

CRANE SAFETY **(8-15-05)**

Comply with the manufacturer specifications and limitations applicable to the operation of any and all cranes and derricks. Prime contractors, sub-contractors, and fully operated rental companies shall comply with the current Occupational Safety and Health Administration regulations (OSHA).

Submit all items listed below to the Engineer prior to beginning crane operations involving critical lifts. A critical lift is defined as any lift that exceeds 75 percent of the manufacturer's crane chart capacity for the radius at which the load will be lifted or requires the use of more than one crane. Changes in personnel or equipment must be reported to the Engineer and all applicable items listed below must be updated and submitted prior to continuing with crane operations.

CRANE SAFETY SUBMITTAL LIST

A. **Competent Person:** Provide the name and qualifications of the "Competent Person" responsible for crane safety and lifting operations. The named competent person will have the responsibility and authority to stop any work activity due to safety concerns.

B. **Riggers:** Provide the qualifications and experience of the persons responsible for rigging operations. Qualifications and experience should include, but not be limited to, weight calculations, center of gravity determinations, selection and inspection of sling and rigging equipment, and safe rigging practices.

C. **Crane Inspections:** Inspection records for all cranes shall be current and readily accessible for review upon request.

D. **Certifications:** **By July 1, 2006**, crane operators performing critical lifts shall be certified by NC CCO (National Commission for the Certification of Crane Operators), or satisfactorily complete the Carolinas AGC's Professional Crane Operator's Proficiency Program. Other approved nationally accredited programs will be considered upon request. All crane operators shall also have a current CDL medical card. Submit a list of anticipated critical lifts and corresponding crane operator(s). Include current certification for the type of crane operated (small hydraulic, large hydraulic, small lattice, large lattice) and medical evaluations for each operator.

SHIPPING STEEL STRUCTURAL MEMBERS (7-18-06)

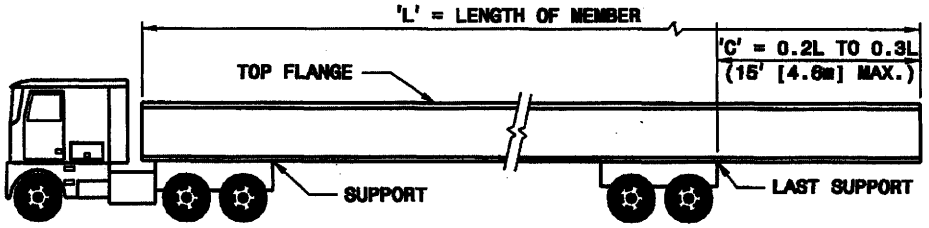
Section 1072-23 Marking and Shipping

Add the following paragraphs after the third paragraph of the Section.

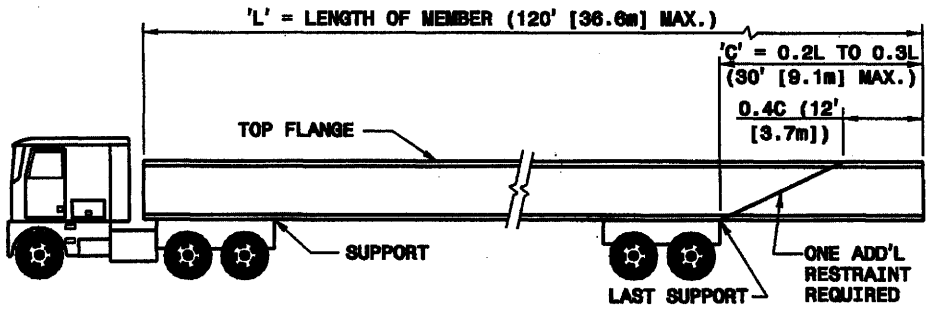
Load and ship steel beams and girders in accordance with the Figure below for all types of transportation.

Below is the sketches provided to Materials and Tests Unit on May 8, 1991. When the contractor wishes to place members on trucks not in accordance with these limits, to ship by rail, to attach shipping restraints to the members, to ship horizontally curved steel members, or to invert members, he shall submit a shipping plan prior to shipping. See also Article 1072-11.

LIMITS FOR PLACEMENT OF BEAMS AND GIRDERS DURING SHIPMENT



WHEN 'C' = 15' (4.6m) OR LESS



WHEN 'C' = OVER 15' (4.6m) THRU 30' (9.1m)

L		MIN. 'C'		MAX 'C'
75 (22.9m)		15 (4.6m)		22½(6.9m)
80 (24.4m)		16 (4.9m)		24 (7.3m)
85 (25.9m)		17 (5.2m)	0.3L	25½(7.8m)
90 (27.4m)		18 (5.5m)		27 (8.2m)
95 (29.0m)	0.2L	19 (5.8m)		28½(8.7m)
100 (30.5m)		20 (6.1m)		30 (9.1m)
105 (32.0m)		21 (6.4m)		30 (9.1m)
110 (33.5m)		22 (6.7m)		30 (9.1m)
115 (35.1m)		23 (7.0m)		30 (9.1m)
120 (36.6m)		24 (7.3m)		30 (9.1m)

NOTES: ALL DIMENSIONS ARE IN FEET (METERS).
TRUCK LOADING SHOWN FOR SIMPLICITY
DIMENSIONS APPLY TO ALL TYPES OF SHIPMENTS.

GROUT FOR STRUCTURES (7-12-07)

1.0 DESCRIPTION

This special provision addresses grout for use in structures, including continuous flight auger (CFA) piles, micropiles, soil nail and anchored retaining walls and backfilling crosshole sonic logging (CSL) tubes or grout pockets, shear keys, dowel holes and recesses for cored slabs and box beams. This provision does not apply to grout placed in post-tensioning ducts for bridge beams, girders, or decks. Provide grout composed of portland cement, water and at the Contractor's option, fine aggregate and/or pozzolan. If necessary, use set controlling admixtures. Proportion, mix and place grout in accordance with the plans, the applicable section of the *Standard Specifications* or special provision for the application and this provision.

2.0 MATERIALS

Refer to Division 10 of the *Standard Specifications*:

Item	Article
Portland Cement	1024-1
Water	1024-4
Fine Aggregate	1014-1
Fly Ash	1024-5
Ground Granulated Blast Furnace Slag	1024-6
Admixtures	1024-3

At the Contractor's option, use an approved packaged grout in lieu of the materials above with the exception of the water. Contact the Materials and Tests (M&T) Unit for a list of approved packaged grouts. Consult the manufacturer to determine if the packaged grout selected is suitable for the application and meets the compressive strength and shrinkage requirements.

3.0 REQUIREMENTS

Unless required elsewhere in the Contract, provide non-metallic grout with minimum compressive strengths as follows:

Property	Requirement
Compressive Strength @ 3 days	2500 psi (17.2 MPa)
Compressive Strength @ 28 days	4500 psi (31.0 MPa)

For applications other than micropiles, soil nails and ground anchors, use non-shrink grout with shrinkage of less than 0.15%.

When using approved packaged grout, a grout mix design submittal is not required. Submit grout mix designs in terms of saturated surface dry weights on M&T Form 312U in accordance with the applicable section of the *Standard Specifications* or special provision for the structure. Use an approved testing laboratory to determine the grout mix proportions. Adjust proportions to compensate for surface moisture contained in the aggregates at the time of mixing. Changes in the saturated surface dry mix proportions will not be permitted unless a revised grout mix design submittal is accepted.

For each grout mix design, provide laboratory test results for compressive strength, density, flow and if applicable, aggregate gradation and shrinkage. Submit compressive strength for at least 3 cube and 2 cylinder specimens at the age of 3, 7, 14 and 28 days for a total of at least 20 specimens tested. Perform laboratory tests in accordance with the following:

Property	Test Method
Compressive Strength	AASHTO T106 and T22
Density	AASHTO T133
Flow for Sand Cement Grout	ASTM C939 (as modified below)
Flow for Neat Cement Grout (no fine aggregate)	Marsh Funnel and Cup API RP 13B-1, Section 2.2
Aggregate Gradation for Sand Cement Grout	AASHTO T27
Shrinkage for Non-shrink Grout	ASTM C1090

When testing grout for flow in accordance with ASTM C939, modify the flow cone outlet diameter from ½ to ¾ inch (13 to 19 mm).

When grout mix designs are submitted, the Engineer will review the mix designs and notify the Contractor as to their acceptability. Do not use grout mix designs until written acceptance has been received. Acceptance of grout mix designs or use of approved packaged grouts does not relieve the Contractor of responsibility to furnish a product that meets the Contract requirements.

Upon written request from the Contractor, a grout mix design accepted and used satisfactorily on a Department project may be accepted for use on other projects.

4.0 SAMPLING AND PLACEMENT

The Engineer will determine the locations to sample grout and the number and type of samples collected for field and laboratory testing. Use API RP 13B-1 for field testing grout flow and density of neat cement grout. The compressive strength of the grout will be considered the average compressive strength test results of 3 cube or 2 cylinder specimens at 28 days.

Do not place grout if the grout temperature is less than 50°F (10°C) or more than 90°F (32°C) or if the air temperature measured at the location of the grouting operation in the shade away from artificial heat is below 40°F (4°C).

Provide grout at a rate that permits proper handling, placing and finishing in accordance with the manufacturer's recommendations unless directed otherwise by the Engineer. Use grout free of any lumps and undispersed cement. Agitate grout continuously before placement.

Control grout delivery so the interval between placing batches in the same component does not exceed 20 minutes. Place grout before the time between adding the mixing water and placing the grout exceeds that in the table below.

ELAPSED TIME FOR PLACING GROUT (with continuous agitation)		
Air or Grout Temperature Whichever is Higher	Maximum Elapsed Time	
	No Set Retarding Admixture Used	Set Retarding Admixture Used
90°F (32°C) or above	30 min.	1 hr. 15 min.
80°F (27°C) through 89°F (31°C)	45 min.	1 hr. 30 min.
79°F (26°C) or below	60 min.	1 hr. 45 min.

5.0 MISCELLANEOUS

Comply with Articles 1000-9 through 1000-12 of the *Standard Specifications* to the extent applicable for grout in lieu of concrete.

HIGH STRENGTH BOLTS

(11-17-06)

In Section 440-8(A) of the Standard Specifications, revise the third paragraph and insert a new paragraph four, respectively, as follows:

"Make sure that plain bolts and washers have a thin coat of lubricant at the time of installation."

"Use nuts that are pre-waxed by the producer/supplier prior to shipping to the project."

ARCHITECTURAL TREATMENT FOR LAMP POST BASES (SPECIAL)

1.0 General

This work shall consist of providing architectural treatment on structures such as bridge end posts. The architectural treatment shall be in accordance with the details shown in the plans and this special provision.

The Lamp Post Bases are to imitate the pattern used on the parapets of the existing bridge. The configuration shall conform to the details shown in the plans. No configurations will be permitted that create joints in the Lamp Post Base. Any fabrication or creation of any Lamp Post Base element that is a deviation, and is made prior to written approval from the engineer, is done so at the risk of the Contractor.

The Contractor's workmanship shall be demonstrated by constructing a sample panel using a Form Liner pattern that is intended for use on the finished structure.

2.0 Submittals

Shop Drawings – Submit product data for all materials used and show formwork construction including form supports and tie location and patterns, inserts and embedments, cutouts, cleanout panels, and any other items that visually affect cast-in-place architecturally treated concrete as applicable. The drawings should indicate how the form liner of each face of the lamp post base ties into each adjacent face of the lamp post base.

Shop drawings shall be reviewed and accepted prior to fabrication of form liners.

Sample Panels – After the shop drawings have been reviewed and accepted by the Engineer, the Contractor shall construct a sample panel at the project site. The materials used in construction of the sample panel shall comply with Section 420 of the Standard Specifications and this special provision. The sample panel shall be constructed using approved form liners. Any sample panel that is not accepted by the Engineer is to be removed from the project site and a new sample panel produced at no additional expense to the Department

3.0 Material Requirements

Form Liner – The form liner shall be a high quality, re-useable product manufactured of high strength urethane rubber or other approved material which attaches easily to the form work system, and shall not compress more than ¼" when concrete is poured at a rate of 10 vertical feet per hour. The form liners shall be removable without causing deteriorations of the surface or underlying concrete.

Form Release Agent – Form release agent shall be a non-staining petroleum distillate free from water, asphaltic, and other insoluble residue, or an equivalent product. Form release agents shall be compatible with the color system applied and any special surface finish.

Form Ties – Form ties shall be set back a minimum of 2" from the finished concrete surface. The ties shall be designed so that all material in the device to a depth of at least 2" back of the concrete face can be disengaged and removed without spalling or damaging the concrete. The Contractor shall submit the type of form ties to the Engineer for approval.

Quality Standards – Manufacturer of form liners shall have at least five years experience making architectural treatment form liners. The Contractor shall schedule a pre-installation conference with manufacturer representative and the Engineer to assure understanding of form liner use, requirements for construction of sample panel and to coordinate the work. The Contractor shall disclose the name of their form liner manufacturer at the Preconstruction Conference.

4.0 Construction

Form Liner Preparation – Prior to each concrete pour, the form liners shall be clean and free of build-up. Each liner shall be visually inspected for blemishes and tears. Repairs shall be made in accordance with the manufacturer's recommendations. Repairs shall be accepted by the Engineer before being used. Form liner panels that do not perform as intended or are no longer repairable shall be replaced.

Form Liner Attachment – Form liners shall be securely attached to forms in accordance with the manufacturer's recommendations, with less than a ¼" seam.

Form liners shall be installed to withstand anticipated concrete placement pressures without leakage and without causing physical or visual defects. Wall ties shall be coordinated with the form liner system.

Install and remove form liners in accordance with the manufacturer's instructions.

Form Release – Form release agent shall be applied in accordance with the manufacturer's recommendations. The material shall be compatible with the form liner material and in accordance with this special provision. Form release agent should be worked into all areas, especially pattern recesses.

Patching – All form tie holes and other defects in finished surface shall be filled or repaired within 48 hours of form removal. Use patching materials and procedures in accordance with the manufacturer's recommendations.

Final surface shall be free of blemishes, discolorations, surface voids, and other irregularities. All patterns should be continuous without visual disruption.

Reinforced concrete shall be finished in accordance with the Standard Specifications.

Following the completion of all work, repairs of any damage made by other construction operations shall be made to the form lined surfaces as directed by the Engineer.

5.0 Ownership of Form Liners for Future Repair Work

Upon acceptable completion of the lamp post bases, provide NCDOT with form liners capable of reconstructing the lamp post bases along with manufacturer's instructions and installation guidelines. If NCDOT determines the form liners used to construct the lamp post bases are in good reusable condition, then these form liners may become the property of NCDOT; otherwise, new form liners will be required.

6.0 Method of Measurement and Payment

No separate measurement will be made. All costs associated with providing the architectural treatment to the lamp post bases shall be included in the lump sum price bid for "Architectural Treatment for Lamp Post Bases." Such price and payment shall include but not be limited to development and preparation of shop drawings, the furnishing of all form liners, the construction and finishing of the sample panel, any patching or rework, the services of the manufacturer's representative, and all labor, tools, equipment and incidentals necessary to complete the work.

MICROPILES (SPECIAL)

1.0 GENERAL

A. Description

Micropiles are small diameter, drilled and grouted non-displacement piles with reinforcing casings and bars. Permanent casings are required when noted on the plans. Design and construct micropiles with the required resistance in accordance with the contract and accepted submittals. For this provision, "pile" refers to a micropile and "pile bent" refers to an interior bent (not an end bent) with micropiles connected directly to a cap.

B. Prequalification Requirements

The Micropile Subcontractor is responsible for the design, installation, and monitoring of the micropiles. Use a Micropile Subcontractor prequalified by the NCDOT Contractual Services Unit for micropile work (work code 3100).

2.0 SUBMITTALS

Three submittals are required. These submittals include (1) Micropile Subcontractor personnel and experience, (2) micropile design and (3) micropile installation plan. Provide 4 hard copies and an electronic copy (PDF on CD or DVD) of each submittal. Allow 10 calendar days for the review of the Micropile Subcontractor personnel and experience submittal. After the personnel and experience submittal is accepted, submit the remaining submittals at least 30 calendar days before starting micropile construction. Do not begin micropile construction until the installation plan is accepted.

A. Micropile Subcontractor Personnel and Experience Submittal

Submit documentation that the Micropile Subcontractor has successfully completed at least 5 micropile projects and 250 micropiles within the last 3 years with micropile diameters and lengths similar to those anticipated for this project. Documentation should include the General Contractor and Owner's name and current contact information with descriptions of each past project. Also, submit documentation of experience with construction in subsurface conditions similar to those for this project.

Provide verification of employment with the Micropile Subcontractor for the Superintendent, Drill Rig Operators and Project Manager assigned to this project. Submit documentation that these personnel each have a minimum of 5 years experience in micropile construction with past projects of scope and complexity similar to that anticipated for this project. Documentation should include resumes, references, certifications, project lists, experience descriptions and details, etc. Perform work with the personnel submitted and accepted. If personnel changes are required during construction, suspend micropile construction until replacement personnel are submitted and accepted.

A Design Engineer is required to design the micropiles. Submit documentation that the Design Engineer is registered as a Professional Engineer in North Carolina and has at least 5 years experience in designing micropiles with capacities and in subsurface conditions similar to those for this project. Documentation should include resumes, references, certifications, project lists, experience descriptions and details, etc. The Design Engineer may also act as the Project Manager provided the Design Engineer meets the Project Manager requirements above.

B. Micropile Design Submittal

The micropile layout, inclination, minimum reinforcing casing, pile to cap/footing connection, top of micropile elevation and resistances are shown on the plans. Verify existing site conditions and survey information before designing micropiles.

Design micropiles in accordance with the *AASHTO LRFD Bridge Design Specifications,* with the following exceptions. Use the AASHTO minimum presumptive grout-to-ground nominal resistance for the project rock type and a resistance factor of 0.55 for design of the bond length. The "bond length" is defined as the micropile length below the reinforcing casing tip elevation noted on the plans. Determine the bond length and reinforcement for the factored resistance noted on the plans. Use a minimum bond length of 10 ft (3 m).

Either extend the reinforcing casing below the required tip elevation or use a center reinforcing bar for reinforcement. Extend the bar or casing full length of the pile and provide a minimum 1/2" grout cover outside the casing. Design and locate reinforcing casing joints in accordance with the plans.

Submit working drawings and design calculations including estimated unit nominal resistances for review and acceptance in accordance with Article 105-2 of the *Standard Specifications*. Include all dimensions, quantities, elevations and cross-sections necessary to construct the micropiles. Have piles designed, detailed and sealed by the Design Engineer. When design changes occur due to varying site conditions or other reasons, a revised micropile design submittal is required.

C. Micropile Installation Plan Submittal

Submit detailed project specific information including the following.

1. List and sizes of proposed equipment including micropile drilling rigs and tools, tremies and grouting equipment.

2. Sequence of micropile construction and step-by-step description of micropile installation including details of casing installation, drilling methods and flushing.

3. List of reinforcement and casings including grades or yield strengths and sizes.

4. Methods for placing reinforcement with procedures for supporting and positioning the reinforcement including centralizers.

5. Welding procedure and details, if any, in accordance with Article 1072-20 of the *Standard Specifications*. Special welding procedures are required for steel with yield strengths greater than 50 ksi (345 MPa).

6. Grout placement details including how the grout will be initially placed in the drill hole and acceptable ranges for grout pressures and volumes.

7. Equipment and procedures for monitoring and recording grout levels, pressures and volumes with calibration certificates within one year of submittal date.

8. Examples of construction records to be provided in accordance with Section 8.0.

9. Procedures for containment and disposal of drilling spoils, drill flush and excess waste grout in accordance with Section 802 of the *Standard Specifications*.

10. Grout mix design including laboratory test results in accordance with the *Grout for Structures* provision and acceptable ranges for grout flow and density.

11. Other information shown on the plans or requested by the Engineer.

If alternate installation procedures are proposed or necessary, a revised installation plan submittal may be required. If the work deviates from the accepted submittal without prior approval, the Engineer may suspend micropile construction until a revised plan is submitted and accepted.

3.0 MATERIALS

Steel casings may be new "Structural Grade", i.e., "Mill Secondary", steel pipe free from dents, cracks, cuts or any other defects.

A. Reinforcement

Store steel reinforcement on blocking a minimum of 12" (300 mm) above the ground and protect it at all times from damage; and when placing in the work make sure it is free from dirt, dust, loose mill scale, loose rust, paint, oil or other foreign materials. Damaged or bent materials will be rejected.

1. Reinforcing Casings

Provide Type 4 Certified Test Reports in accordance with Article 106-3 of the *Standard Specifications*. For testing yield strength, a lot is defined as each truckload delivered and 2 samples and tests are required per lot. Use steel casings with the minimum wall thickness shown on the plans and outside diameters ranging from the minimum shown on the plans to 3" (75 mm) larger. Provide casings meeting the tensile requirements of ASTM A252, Grade 3, except with a minimum elongation of 15% and a minimum yield strength of 80 ksi (550 MPa) unless noted otherwise on the plans.

2. Reinforcing Bars

Provide Type 3 Manufacturer's Certifications in accordance with Article 106-3 of the *Standard Specifications*. Use deformed steel bars meeting the requirements of AASHTO M275 or M31, Grade 60 or 75 (420 or 520).

Splice reinforcing bars in accordance with Article 1070-10 of the *Standard Specifications*. Locate reinforcing casing joints at least 2 ft (0.6 m) from any bar splice.

B. Centralizers

Fabricate bar centralizers from schedule 40 polyvinyl chloride (PVC) plastic pipe or tube, steel or other material not detrimental to steel reinforcement (no wood). Size centralizers to position reinforcement within 1 inch (25 mm) of the drill hole center and allow a tremie to be inserted to the bottom of the hole. Use centralizers that do not interfere with grout placement or flow around reinforcement.

C. Grout

Use grout in accordance with the contract.

D. Permanent and Temporary Casings

Use clean smooth non-corrugated steel casings with inside diameters a minimum of 4" (100 mm) larger than the outside diameter of the reinforcing casing.

4.0 CORROSION PROTECTION

Galvanize exposed reinforcing and permanent casings that connect directly to caps in accordance with Section 1076 of the *Standard Specifications*. After pile installation is complete, clean exposed galvanized surfaces of casings with a 2500 psi (17.2 MPa) pressure washer. Apply organic-zinc repair paint to exposed casing joints. Repair galvanized surfaces that are exposed and damaged in accordance with Article 1076-6 of the *Standard Specifications*.

5.0 DEMONSTRATION MICROPILES

When shown on the plans or as directed by the Engineer, construct demonstration micropiles in accordance with the accepted submittals and this provision. The inclination, minimum reinforcing casing and locations of demonstration micropiles are shown on the plans. Install demonstration micropiles to the depth of the longest pile on the project.

The purpose of demonstration piles is to demonstrate the Micropile Subcontractor's ability to successfully install micropiles. The demonstration micropile results will be used to evaluate the grout mix design and possibly revise acceptable ranges for grouting pressures established with the micropile installation plan.

The Engineer will determine if demonstration micropiles are satisfactory or not within 24 hours of receiving the demonstration pile construction records in accordance with Section 8.0 of this provision. If the Engineer determines a demonstration micropile is unsatisfactory, a replacement pile is required at no additional cost to the Department. Do not begin construction of any production micropiles until all demonstration piles are accepted in accordance with Section 9.0 of this provision.

6.0 MICROPILE PRECONSTRUCTION MEETING

Before starting micropile construction, conduct a preconstruction meeting to discuss the installation, and monitoring of the piles. Schedule this meeting after all micropile submittals have been accepted and the Micropile Subcontractor has mobilized to the site. The Resident or Bridge Maintenance Engineer, Bridge Construction Engineer, Geotechnical Operations Engineer, Contractor and Micropile Subcontractor Superintendent, Project Manager and Design Engineer will attend this preconstruction meeting.

7.0 CONSTRUCTION METHODS

Use equipment and methods reviewed and accepted in the micropile installation plan or approved by the Engineer. Inform the Engineer of any deviations from the accepted plan. Install production micropiles in the same way as satisfactory demonstration micropiles, if applicable. Micropiles shall be covered after installation in such a manner that no axial force is realized in the micropiles prior to end bent construction.

Drilling spoils, drill flush and excess waste grout shall be contained and disposed of in accordance with Section 802 of the *Standard Specifications* and as directed by the Engineer. Drilling spoils consist of all excavated material including water removed from drill holes.

Control drilling and grouting to prevent excessive ground movements, damaging structures and fracturing rock and soil formations. If ground heave or subsidence occurs, suspend micropile construction and take action to minimize movement. If structures are damaged, suspend micropile construction and repair structures at no additional cost to the Department with a method proposed by the Contractor and accepted by the Engineer. The Engineer may require a revised micropile installation plan when corrective action is necessary.

A. Drilling and Reinforcement

Use micropile drilling rigs capable of drilling through whatever materials are encountered to the dimensions and elevations required for the micropile design. When required, install permanent casings to the elevations shown on the plans or revised elevations authorized by the Engineer.

Install reinforcing casings to a tip elevation no higher than that noted on the plans. Also, when noted on the plans, install reinforcing casings with a minimum penetration of 5 ft (1.5 m) into rock as determined by the Engineer. Construct reinforcing casing joints in accordance with the accepted submittals. Perform any welding in accordance with Article 1072-20 of the *Standard Specifications*, this provision and the accepted submittals.

Use drilling methods that result in the annulus between reinforcing casings and the ground filled with grout. For pile bents, demonstrate grout flow return around reinforcing casings.

Check for correct micropile location and plumbness or proper inclination before beginning drilling. Do not drill within 6 pile diameters, center to center, or 5 ft (1.5 m), whichever is greater, of any micropiles until the grout in all adjacent micropiles reaches initial set as determined by the Engineer. More clearance may be necessary if micropile construction affects adjacent micropiles.

Stabilize drill holes with casings from beginning of drilling through grouting if unstable material is anticipated or encountered. After drilling, flush drill holes with water or air to remove drill cuttings and other loose materials.

Use centralizers to center reinforcement in drill holes. Securely attach bar centralizers at maximum 10 ft (3 m) intervals along reinforcing bars. Attach upper and lowermost centralizers 5 ft (1.5 m) from the top and bottom of micropiles.

Place reinforcing bars before grouting or after while grout is still fluid. Do not vibrate or drive reinforcement. Reinforcing bars may be gently pushed into grout. If reinforcement can only be partially inserted, redrill or clean drill holes to permit complete insertion.

B. Grouting

Remove oil, rust inhibitors, residual drilling fluids and similar foreign materials from holding tanks/hoppers, stirring devices, pumps, lines, tremie pipes and all other equipment in contact with grout before use. Size grouting equipment to grout each micropile in one continuous operation. Field calibrate grout pumps at the beginning of construction.

Grout micropiles the same day the bond length is drilled and do not leave drill holes open overnight. Place grout with a tremie in accordance with the contract and accepted submittals until uncontaminated grout flows from the top of the micropile. Extend

tremie pipe into grout a minimum of 5 ft (1.5 m) at all times except when grout is initially placed in drill holes. Provide grout free of segregation, intrusions, contamination, structural damage or inadequate consolidation (honeycombing). Do not extract temporary casings until the grout level reaches the ground surface.

Monitor and record grout levels, pressures and volumes during placement. To monitor grout pressure, use pumps equipped with a pressure gauge and locate a second pressure gauge at the point of injection into the drill hole. Use pressure gauges that can measure pressures of at least 150 psi (1.0 MPa) or twice the actual grout pressures, whichever is greater.

8.0 CONSTRUCTION RECORDS

Provide 2 original hard copies of micropile construction records including the following within 24 hours of completing each pile.

1. Names of Micropile Subcontractor, Superintendent, Drill Rig Operator, Project Manager and Design Engineer
2. Bridge description, county, NCDOT contract, TIP and WBS element number
3. Bent station and number, micropile location and identifier and required resistance
4. Micropile diameters, length and tip elevation and top of micropile and ground surface elevations
5. Reinforcement and casing types, grades or yield strengths, sizes and elevations
6. Date and time drilling begins and ends, reinforcement is placed, grout is mixed and/or arrives on-site and grout placement begins and ends
7. Grout level, pressure, volume, temperature, flow and density records
8. Ground and surface water conditions and elevations, if applicable
9. Weather conditions including air temperature at time of grout placement
10. All other pertinent details related to micropile construction

After completing micropiles for each structure or stage of a structure, submit electronic copies (PDF on CD or DVD) of all corresponding construction records.

9.0 MICROPILE ACCEPTANCE

Micropile acceptance is based on the following criteria.

1. Micropile is within 3" (75 mm) of plan location and 2% of plumb or required inclination. Top of micropile is within 1" (25 mm) below and 3" (75 mm) above the top of micropile pile elevation shown on the plans.

2. Reinforcement is properly placed and inclination and top of reinforcement is within tolerances shown above for the micropile. Center of reinforcement is within 3/4 inch (19 mm) of the center of the micropile. Tip of reinforcing casing is no higher than that noted on the plans and casing penetrates rock at least 5 ft (1.5 m) when noted on the plans.
3. Grout pressures, volumes, flow and densities are within acceptable ranges. Grout is in accordance with the contract and does not have any evidence of segregation, intrusions, contamination, structural damage or inadequate consolidation (honeycombing). For pile bents, the Engineer verifies grout flow return around the reinforcing casing.

If the Engineer determines a micropile is unacceptable or unsatisfactory, remedial measures or replacement micropiles are required at no additional cost to the Department. Obtain approval for remediation proposals before performing work. No compensation will be made for losses or damages for remedial work or investigation of unacceptable or unsatisfactory micropiles.

10.0 MEASUREMENT AND PAYMENT

____ *Dia. Micropiles* will be measured and paid for in units of each. Micropiles will be measured as the number of acceptable piles and no payment will be made for any costs associated with unacceptable micropiles. The contract unit price bid for ____ *Dia. Micropiles* will be full compensation for submittals, design, monitoring and recording, labor, tools, equipment, casings and reinforcement complete and in place and all incidentals necessary to drill through any material and construct micropiles in accordance with this provision. The contract unit price bid for ____ *Dia. Micropiles* will be full compensation for grout up to twice the theoretical drill hole volume. Grout in excess of twice the theoretical drill hole volume will be paid for as extra work in accordance with Article 104-7 of the *Standard Specifications*.

Demonstration Micropiles will be measured and paid for in units of each. *Demonstration Micropiles* will be measured as the number of acceptable demonstration piles and no payment will be made for any costs associated with unacceptable demonstration micropiles. The contract unit price bid for *Demonstration Micropiles* will be full compensation for submittals, design, monitoring and recording, labor, tools, equipment, casings and reinforcement complete and in place and all incidentals necessary to drill through any material and construct demonstration micropiles in accordance with this provision. The contract unit price bid for *Demonstration Micropiles* will be full compensation for grout up to twice the theoretical drill hole volume. Grout in excess of twice the theoretical drill hole volume will be paid for as extra work in accordance with Article 104-7 of the *Standard Specifications*.

Payment will be made under:

Pay Item	**Pay Unit**
____ Dia. Micropiles	Each
Demonstration Micropiles	Each

REMOVAL OF EXISTING STRUCTURE AT STA. 13+90.00 -L- **(SPECIAL)**

Remove the existing structure as indicated on the plans and in accordance with the Standard Specifications with the exception of the bridge railing with quatrefoil design, which shall be removed as noted below.

The contractor shall remove the rail carefully in sections to preserve the quatrefoil designs to the extent possible. Robert Griffin, Architect for Biltmore Village, will be responsible for removal of the segments from the site. The Contractor shall contact Robert Griffin at 828-274-5979 least 2 months prior to the anticipated removal date to coordinate pick-up of the salvaged rails.

CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY PEDESTRIAN BRIDGE **(SPECIAL)**

Construct, maintain and afterwards remove a temporary pedestrian bridge in accordance with the applicable parts of the Standard Specifications and this Special Provision. Provide a temporary pedestrian bridge with an approximate overall length of one hundred and five feet. The pedestrian bridge shall be located east of the existing structure and the exact location shall be determined by the engineer. Provide a minimum clear width of five feet and an underclearance elevation no less than elevation 1989 feet.

Design the temporary pedestrian bridge in accordance with the requirements of AASHTO LRFD Bridge Design Specifications for Highways and Bridges, AASHTO Guide Specification for Pedestrian Bridges, and the Standard Specifications. Prevent vehicular access by use of a fixed physical barrier at each end of the temporary pedestrian bridge.

Submit design calculations to the Engineer that, as a minimum, include stress calculations for the following structural components: railings, rail post, rail post connections, timber floor, main girders or floor beam system, bent cap, pile bearing, pile as a structural member and longitudinal and lateral stability of pile bents. Determine the pile stability assuming a scour depth equal to 250% of the pile diameter or width below the existing bed elevation. The Engineer may require, if warranted, a more detailed analysis of scour depth for pile bents containing more than a single row of piles. Submit working drawings in accordance with project special provision "Submittal of Working Drawings".

Include material specifications for all new and used materials, including commercial grades and species of timber and lumber, in the detail drawings of the structure. In addition, show the location and a detailed sketch of the used materials indicating condition of the material, the location and geometry of existing but unused holes, attachments left over from previous use and any other irregularities in the material.

Indicate the condition of the used materials in the design calculations. Provide access to any used materials for inspection prior to assembly.

All critical bolted connections in the temporary pedestrian bridge require new high strength bolts. Indicate the location of the critical connections and recommended bolt size with tightening procedures in the detail drawings of the structure. The use of used high strength bolts is limited to non-critical connections and is subject to approval. For new high strength bolts, furnish the Engineer a copy of the manufacturer's test report for each component. Have the report indicate the testing date, the location where the components were manufactured, the lot number of the material represented, the rotational capacity tests lot number and the source identification marking used by the manufacturer of each component.

Before the temporary structure is loaded, inspect the structure and submit a written statement certifying that the erected structure complies with the accepted detailed drawings prepared by a North Carolina Registered Professional Engineer. Temporary pedestrian bridges utilizing modular panels shall be inspected and certified by a manufacturer's representative. Any condition that does not comply with the accepted drawings, or any other condition deemed unsatisfactory by the Engineer, is cause for rejection until corrections are made.

Have all materials inspected by the Materials and Tests Unit or their authorized representative before shipping it to the project. The use of ungraded timber and lumber is not permitted. Use material conforming to grading rules of SPIB, NELMA or other nationally recognized specification.

The lump sum price bid for "Construction, Maintenance and Removal of Temporary Pedestrian Bridge" will be full compensation for the above work including all materials, equipment, tools, labor and incidentals necessary to complete the work.

BRIDGE DECK GRINDING **(SPECIAL)**

1.0 GENERAL

This Special Provision shall govern the longitudinal planing and all other related work associated with obtaining a smooth riding surface of uniform texture, true to the required grade and cross section.

2.0 PLANING

Planing is required as needed and as directed by the engineer.

When planing, use a Boart Longyear PC 5000, a Target 3804 or approved equal. Submit grinding equipment specifications to the Engineer for approval before any planing is performed. Use a grinding machine capable of removing a minimum 3 feet of width with each pass. Multiple passes are allowed to achieve the required depth of removal. In addition, hand grinding or other approved method will be allowed to remove vertical steps between passes.

The final concrete texture shall be uniform before proceeding with bridge deck grooving.

Construct and operate the grinding machine such that it will not cause strain or damage to the deck surface, excessive ravels, aggregate fractures, spalls, or disturbance of transverse joints. Longitudinally plane the deck parallel to the roadway centerline.

Continuously remove all slurry or other debris resulting from the grinding operations from the surfaces by vacuum pick-up or other approved methods. Prevent the slurry from flowing into floor drains, onto the ground, or into the body of water under the bridge. Dispose of all residues away from the project site.

Limit planing such that the final reinforcement cover is not less than the plan cover minus ½" (12mm). Any other corrective work may be required as directed by the Engineer.

3.0 BASIS OF PAYMENT

Payment shall be lump sum. The payment shall include but not be limited to the cost of labor, equipment, planing operation, removal and disposal of slurry, and any incidentals necessary to complete the planing operation.

Payment will be made under:

Bridge Deck Grinding.....Lump Sum

CLASSIC CONCRETE BRIDGE RAIL AND SIDEWALK (SPECIAL)

1.0 General

The "Classic Concrete Bridge Rail" and "Sidewalk" shall be in accordance with applicable parts of the Standard Specifications, the details shown on the plans and as outlined in these special provisions. Plans for the bridge rail are detailed for cast in place concrete and must be placed using conventional forms.

2.0 Concrete Mix

Concrete for the bridge rail and sidewalk shall meet the requirements in the Sand Lightweight Concrete special provision with exception noted below:

The maximum size coarse aggregate used in the concrete mix shall be #78M. The slump shall be within the range of 5" to 8" when tested in accordance with AASHTO T119. A high range water reducer shall be used. The quantity of high range water reducer per pound of cement shall be within the range recommended on the current list of approved admixtures issued by M&T Unit.

3.0 Construction

The bridge rail shall be placed to the established shape, line, grade and dimensions shown on the plans.

Joints in the rail shall be constructed as at the locations and of the type specified on the plans. Sidewalk shall be constructed as shown on the plans and in accordance with applicable parts of the Standard Specifications.

4.0 Finishing

All exposed surfaces which are not satisfactory to the Engineer as to uniformity of color and texture or because of excessive patching shall be corrected as required by the Engineer. All surfaces of the bridge rail shall be given a Class I surface finish in accordance with the Standard Specifications unless directed otherwise by the Engineer.

Sidewalk surfaces shall be finished in accordance with the applicable parts of the Standard Specifications.

5.0 Measurement

The quantity to be paid for under this item shall be the actual number of linear feet of "Classic Concrete Bridge Rail and Sidewalk", complete in place and accepted, measured continuously along the top surface of completed rail from end to end without deductions for spaces between sections.

6.0 Payment

The quantity, measured as described above, will be paid for at the contract unit price per linear foot bid for "Classic Concrete Bridge Rail and Sidewalk", which price and payment shall be full compensation for all materials, admixtures, forms, falsework, curing, surface finish, tools, labor, equipment and incidentals necessary to complete the item.

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February 20, 2009

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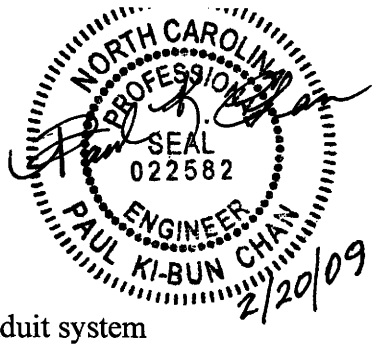


PROJECT SPECIAL PROVISIONS
Electrical Conduit System

DESCRIPTION:

The work covered by this section consists of furnishing and installing a conduit system embedded in concrete, and underneath the approach slab, for light standards to be provided and installed by others. Perform all work in accordance with these special provisions, the plans, the National Electrical Code (NEC), and Division 14 of the North Carolina Department of Transportation "Standard Specifications for Roads and Structures."

The Contractor actually performing the work described in these special provisions shall have a license of the proper classification from the North Carolina State Board of Examiners of Electrical Contractors.

The licensed Electrical Contractor must be available on the job site when the work is being performed or when requested by the Engineer. The licensed Electrical Contractor shall have a set of plans and special provisions in his possession on the job site, and must maintain accurate "as built" plans.

MATERIALS

Submit eight (8) copies of catalog cuts and/or drawings for all proposed materials for the Engineer's review and approval. Include the brand name, stock number, description, size, rating, manufacturing specification, and applicable contract item number(s) on each submittal. Allow forty (40) days for submittal review. The Engineer will advise the Contractor of reasons for rejected submittals and will return approved submittals to the Contractor. Do not deliver material to the project prior to submittal approval.

Conduit shall be non-metallic, rigid PVC (Polyvinyl chloride), Schedule 40, approved for above ground and underground use without concrete encasement per U.L. 651 "Rigid Non-Metallic Conduit". Use Terminations designed for PVC conduit, to seal and stub out each PVC conduit, and to provide watertight protection.

Type SW junction box shall be cast iron, hot-dipped galvanized with external recess flange for flush mounting sized as shown on the plans. It shall have a neoprene gasketed cover with brass or stainless steel screws and shall be suitable for a watertight installation. A mounting button with a blind tapped bolt hole shall be provided on the interior for future connection of a grounding lug. The junction box shall have a checkered cover made to withstand pedestrian and light vehicular traffic. Provide pull lines specifically designed for pulling rope through conduit. Use pull lines made of 2-ply line, with a tensile strength of 240 pounds minimum. Use rot and mildew resistant pull lines that are resistant to tangling when being dispensed.

Provide zinc rich paint conforming to Section 1080-9 of the Standard Specifications.

Coordinate with City of Asheville to install light standard anchor bolts according to pole manufacturer specifications. Light poles and luminaires are to be provided and installed by others.

CONSTRUCTION METHODS

All conduit and boxes shall be securely fastened with ties prior to placing any concrete. After the conduit is encased in concrete, the Contractor shall clean each conduit by snaking with a steel band to which shall be attached an approved tube cleaner equipped with a mandrel of a diameter not less than 85% of the nominal inside diameter of the conduit. To ensure against corrosion in the areas where hot dipped galvanizing has been damaged, cover all raw metal surfaces with a cold galvanized, zinc rich paint.

Stub the conduit out at an accessible location and seal with termination kits designed specifically for that purpose. Use termination kits of the same material as the conduit. Place backfill in accordance with Section 300-7 of the Standard Specifications. Conduit may enter junction boxes through field drilled holes protected with zinc rich paint before the conduit is inserted. Use threaded adapter and insulating bushing at all junction box to conduit connections. Install a pull line in each conduit for future use. Leave sufficient slack for attachment of a rope that will be used to install conductors. Coordinate electrical conduit system work with work by others, and allow installation of light standards, luminaires and circuitry as directed by the Engineer.

Install anchor bolts according to light standard manufacturer's specifications.

All work must be inspected and approved by the Engineer before concealment.

METHOD OF MEASUREMENT

No direct measurement will be made for the conduit system, since it will be paid for on a lump sum basis.

BASIS OF PAYMENT

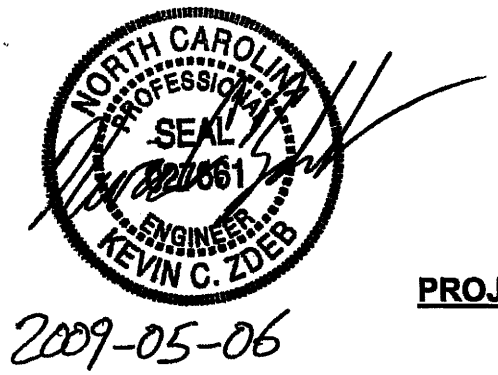
Lump Sum Basis:
Payment for the conduit system will be made at the contract lump sum price for "Electrical Conduit System at Station _____".

Compensation:

Such price and payment for the conduit system as provided above will be considered full compensation for all materials, equipment, and labor necessary to complete the work in accordance with the plans and these special provisions.

Payment will be made under:

Electrical Conduit System at Station 13+90 –L- ..... Lump Sum



2009-05-06

Project: *TIP B-2515*
County: Buncombe

PROJECT SPECIAL PROVISIONS
Structure Utilities

Telephone Conduit Structure Attachment

Scope of Work
The contractor shall furnish all equipment, labor, and materials necessary to install ten 4" PVC telephone conduits from Station 13+14 -L- to Station 14+81 -L-, as shown in the Structure Utilities plans. This work includes the bridge attachment as well as conduits beyond each end of the bridge. All work shall be done in conformance with the Structure plans, the Structure Utilities plans, and these Special Provisions.

General Requirements
All proposed utility construction shall meet the applicable requirements of the NC Department of Transportation's "Standard Specifications for Roads and Structures" dated July 2006 and the following provisions to meet the requirements of the Bell System (AT&T) Practices (Sections: 919-240-400; 622-340-201; and 919-240-520BT), dated April 20, 2006. The AT&T Practices may be obtained, by permission, from the AT&T contact person for this project.

Division 15 of the Standard Specifications is revised as follows:

Page 15-1, Paragraph 2 of Section 1500-2 – Cooperation With The Utility Owner
Provide access for Department personnel and the owner's representatives to all phases of construction. Notify Department personnel and the utility owner two weeks prior to commencement of any work and one week prior to *testing*. Keep utility owner's representatives informed of work progress and provide opportunity for inspection of construction and testing. *The fiber optic conduits on this project belong to AT&T. The contact person for AT&T is Mr. Scott Addington and he can be reached by phone at 828-258-7138.*

Page 15-2, Insert New Paragraph After Paragraph 3 of Section 1500-7 – Submittals and Records
Contractor shall provide the Engineer and AT&T with concurrent written notification that the duct bank installation has been completed. Contractor shall provide AT&T with documentation that a successfully completed mandrel test of the total assembled length of duct bank was conducted, prior to AT&T acceptance of work.

Page 15-4, Subsection C – Bedding, of Section 1505-3 – Construction Requirements
Provide excavations with *a minimum trench width of 29-1/2 inches for a 2 x 5 duct formation to allow for concrete encasement of duct formation to the trench walls. Concrete encased duct formation shall be installed upon virgin trench bottom material.*

Provide at least 6 inches of a compacted sand bedding material between rock and concrete encasement. *Compacted sand backfill shall extend a minimum of 12 inches above the top of the concrete encasement.*

Page 15-4, Subsection D – Pipe Laying, of Section 1505-3 – Construction Requirements, Replace the Text with the Following Paragraphs

Assemble pipe in accordance with the specifications and the manufacturer's recommendations. *Proper tools and equipment for the safe, convenient handling, and installation of the pipe and appurtenances shall be utilized by the Contractor. Great care shall be taken to prevent damage to any interior or exterior pipe coating of all conduits. All pipe elements shall be examined carefully for defects prior to installation. All known defective pieces shall not be installed. Any defective pieces found after installation shall be removed and replaced with a compliant piece at the expense of the Contractor.*

Horizontal or vertical bends with a radius of 40 feet or more shall be constructed using straight lengths of conduit. Conduit joints for the entire bend section should be assembled on flat ground outside of any trench. Where a direction change with a radius of less than 40 feet is needed, the bend shall be constructed with preformed 7-degree and 30-degree, 15 foot radius, bend segments. The bend segments may be used singly or in combination to achieve the required direction change.

1. *Direct Burial Conduit*
   At the trench site, examine each conduit length and remove all mud and other debris such as: lath; paper; stones; etc. from the ducts before placing them in the trench. All direct burial ducts shall be constructed with 4" inside diameter Type C (AT-8546) plastic schedule 40 PVC pipe. Type C pipe shall be joined by use of solvent cement in accordance with the manufacturer's recommendations during installation. Contractor shall keep all trenches dry while conducting work.

   A total of ten (10) ducts shall be constructed in a 2 x 5 duct bank configuration with a minimum cover depth of 30 inches from proposed final grade to the top of the conduit duct bank. Terminal points of the conduit duct bank run shall be set at a cover depth to be determined by the field AT&T representative. AT&T shall provide and install the manholes shown on the plans with their own resources. Change in vertical grade along the duct bank shall be constructed at a rate of one vertical foot for every ten horizontal feet (10%). The 2 x 5 duct bank shall be installed with pvc conduit spacers to provide a 1 inch horizontal and vertical separation between adjacent conduits.

   Conduit construction and placement for the final 2 feet of the conduit duct bank at the installation limits shall be Direct Burial Conduit and installed as per the "In-The-Trench Method" as described in Section 622-340-201 of the Bell Systems

Practices. Place and join the duct sections using the "In-The-Trench Method" as follows.

(a) Place the first tier (row) of five (5) ducts on a 1-inch bed of compacted sand backfill. Place the conduits side by side in the trench. Install the PVC conduit spacers that will hold the ducts in place and provide at least 1-1/2 inches of clearance between the trench sidewalls and the duct and 1 inch separation between each conduit

(b) Place the second tier of five (5) ducts in the PVC conduit spacers above the tier previously installed. Maintain vertical and horizontal alignment.

(c) Make sure the sand backfill fills all the voids between the duct formation and the trench sidewall and is thoroughly compacted in place. Backfill the duct formation with thoroughly compacted sand backfill to a level of 12 inches above the top of the conduits.

(d) Complete the trench backfill with select material as described in Section 1505-3, Subsection F.

Where ducts are terminated, as noted on the plans, the ends of the conduits shall be sealed with 4 inch solid rubber conduit plugs. Marker balls shall be installed by the Contractor at the ends of the conduit runs. AT&T shall supply the marker balls. Marker balls shall be installed at depths no greater than 3 foot intervals. At the close of each work day, the Contractor shall install temporary plugs, such as 4 inch universal plugs, in the ends of all exposed conduit to keep out foreign materials.

2. *Exposed / Bridge Attached Conduit*
Examine each conduit length and remove all mud and other debris such as: lath; paper; stones; etc. from the ducts before assembly. Place and join the duct sections using the "In-The-Trench Method".
All exposed conduits shall be constructed with 4" inside diameter Type D (AT-8546) plastic schedule 40 PVC pipe. Type D pipe shall be joined by use of solvent cement in accordance with the manufacturer's recommendations during installation. A total of ten (10) ducts shall be constructed in a 2 x 5 duct bank configuration. The 2 x 5 duct bank shall be installed beneath the bridge deck on a hanger system as shown on the plans and in accordance with BellSouth (AT&T) Section 919-240-520BT.

Conduit expansion couplings and restraint points shall be installed at anchor point hangers as shown on the plans. Intermediate hangers shall be placed in between

the anchor point hangers to support the conduit. Maximum allowed spacing between hangers is 8 feet.

All PVC joints in the conduit run, except the sliding portion of the expansion coupling, must be solvent welded. No joints shall fall within 12 inches of the nearest hanger. The conduit should never be supported or restrained at the hangers by bands or any type of mechanical clamp.

The steel components of the hangers shall be fabricated from low-carbon steel (A36). In high corrosive environments, weathering steel or stainless steel can be substituted for A36 steel.

Anchors used to secure the supports to the bridge deck structure shall be located as depicted on the plans. Cast-in-place anchors shall be made of malleable iron or steel, as approved by the Engineer. EXPLOSIVE DRIVEN STUDS ARE NOT ACCEPTABLE FOR THIS APPLICATION. A common size anchor bolt of ¾ inch diameter shall be utilized to secure the support hangers to the bridge deck.

3. *Mandrel Test*
   After backfilling, but PRIOR to any required repaving begins, the Contractor shall perform a mandrel test on the completed duct formation. The Contractor shall pull a D Conduit Mandrel through two (2) diametrically opposite ducts.

   If the mandrel fails to pass through the duct being tested, either the duct is: obstructed; misaligned; or constructed with a curve that has too small a radius. The conduit must be exposed and the defect corrected. Reassemble the conduit, backfill the duct formation, and repeat the mandrel test in that conduit until the segment passes. The Contractor shall conduct all corrective work and re-testing at the Contractor's own expense.

<u>Page 15-5, Subsection F – Backfilling, Insert New Paragraphs After Paragraph 1 of Section 1505-3 – Construction Requirements</u>

1. *Direct Burial Conduit*
   The trench can be backfilled any time after completion of the duct work. Thoroughly compacted sand backfill shall extend a minimum of 12 inches above the top of the duct bank. The remainder of the trench should be backfilled and compacted in place with select material free of large stones, pavement, frozen material, foreign matter, etc. that may damage the conduit.

2. *Concrete Encased Conduit*
   The trench where the conduit structure has been encased in concrete can be backfilled upon completion of the concrete work. Thoroughly compacted sand

backfill shall extend a minimum of 12 inches above the top of the concrete encasement. This backfill must be compacted in place using lightweight equipment, such as pneumatic or vibratory tampers. The remainder of the trench should be backfilled and compacted in place with select material free of large stones, pavement, frozen material, foreign matter, etc. that may damage the conduit. If backfill can not be placed over the concrete encasement upon completion of the concrete work, protect the concrete from drying too rapidly or from freezing due to weather conditions.

Page 15-5, Section 1505-5 – Concrete Encasement of Utility Lines, Replace the Text with the Following Paragraphs

The Contractor shall install concrete encasement of the duct bank: where the horizontal bend radius of the duct bank is less than 80 feet or at changes in grade of 20 percent (11.3 degrees) or more; as shown on the plans; or as directed by the Engineer or Utility Owner. Concrete encasement shall extend above the top tier of the conduit to provide a minimum of 2 inches of cover.

For proper encasement, permanent PVC conduit spacers are required to provide a minimum separation of one inch (both horizontally and vertically) between adjacent ducts and 1-1/2 inches minimum clearance between the bottom tier (row) of ducts and the trench bottom. The spacers should be located on not more than 8-foot centers and be held in place with reinforcing rods driven 6 to 12 inches into the ground.

A monolithic (single pour) concrete encasement can be made, as the duct formation is only two (2) tiers high. Concrete shall have a minimum compressive strength of 2,500 Psi and a slump of 9 inches. A slump of this magnitude will permit adequate concrete distribution and ensure proper encasement of the duct formation. A slump less than 9 inches will be too dry to flow between the duct formation and reach the trench bottom. A slump greater than 9 inches will be too wet and cause the duct formation to float.

Steel Sleeves

A steel sleeve, 34 1/2" by 13 1/2" minimum to allow 2" clearance on all sides of the conduit bundle, shall be placed in the openings of the end bents as shown in the Structure plans. The steel sleeves shall be at least 0.25" thick and shall conform to the requirements of ASTM A53 Grade B or API 5L Grade B. The sleeves are to be installed in the end bents as shown on the plans. The sleeves are to be of one piece construction and cut to fit the skew of the end bents. Both ends of the sleeve shall be flush with both faces of the end bents, and the vertical grade on which the telephone conduit will be installed. If not fabricated to fit, a torch shall be used to cut the ends of the sleeves: protective shields shall be placed on both faces of the concrete. All edges on the end of the ends and inside of the sleeve shall be smooth. Any rough

edges shall be removed by filing or reaming. A waterstop ring shall be continuously welded around the exterior of the face of the sleeve, projecting a minimum of ¼" from the exterior of the sleeve, positioned approximately halfway between each end of the sleeve.

Waterproofing

In the end bents, the space between each adjacent telephone conduit and the space between the telephone conduits and the sleeve shall be filled with an approved type of jute with a 2" recess at each end of the sleeve. The recesses shall be filled with an approved mastic or plastic caulking compound that conforms to all surfaces, and shall be finished flush and smooth with the faces of the end wall.

Measurement and Payment

Telephone Conduit Structure Attachment will be paid for as a lump sum item. Payment shall be compensation for all labor, equipment, and materials incidental to the construction of this item.

Payment will be made under:

Pay Item	**Pay Unit**
Telephone Conduit Structure Attachment	Lump Sum