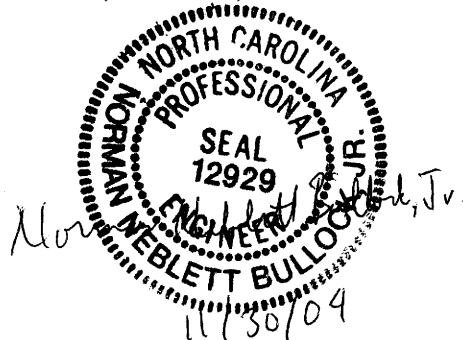


**Project Special Provisions
Structures**

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PROJECT SPECIAL PROVISIONS
STRUCTURE

PROJECT F-4700

Currituck County

SECURING OF VESSELS

(10-12-01)

Secure vessels in accordance with Section 107 of the Standard Specifications and the following provision.

When utilizing barges, tugboats or other vessels, take all necessary precautions to ensure that such vessels are securely anchored or moored when not in active operation. Take all necessary measures to ensure that the vessels are operated in a manner that avoids damage to or unnecessary contact with bridges and other highway structures and attachments. If severe weather conditions are anticipated, or should be anticipated through reasonable monitoring of weather forecasts, take additional measures to protect bridges and other highway structures and attachments from extreme conditions. The Contractor is strictly liable for damages to any bridge or other highway structure or attachment caused by a vessel owned or controlled by the Contractor. The Contractor is also liable to third parties for property damages and loss of revenue caused by vessels under the Contractor's control.

CALCIUM NITRITE CORROSION INHIBITOR

(2-14-04)

Add an approved calcium nitrite corrosion inhibitor (30% solids) to the concrete mix at the batch plant for the members identified by the plan notes. Clearly mark the prestressed concrete members that contain calcium nitrite.

Use the inhibitor at a minimum rate of 3.0 gal/yd³ (14.9 liters/m³). Ensure that the hardened concrete contains at least 5.1 lbs/yd³ (3.0 kg/m³) Nitrite (NO₂) when tested in accordance with N.C. Department of Transportation, Materials and Tests Method Chem. C-20.0 with the exception of concrete used in prestressed members. Test prestressed members as follows:

The Inspector will perform the complete C-21.0 "Field Test Procedure for the Nitrite Ion in Plastic Concrete" on plastic concrete samples obtained randomly from a truck used to pour concrete near each end (live end and dead end) of a prestressed concrete casting. Powder samples will be taken from hardened cylinders made at the time C-21.0 is run for any concrete that fails the C-21.0 (plastic test) method. The Chemical Testing Laboratory will test the powder using method C-20.0 "Determination of Nitrite in Hardened Concrete." Acceptance of the concrete is dependent in the results of method C-20.0 (hardened test) when any sample fails the C-21.0 (plastic test method).

The Inspector will perform a qualitative nitrite ion check by method C-22.0 (Field Spot Test) on each load of concrete batched for a prestressed concrete casting bed. Acceptance of the concrete is dependent on the results of method C-20.0 (hardened test) when any sample fails the C-22.0 (Field Spot Test). The producer may elect to not incorporate concrete that fails Method C-22.0 (Field Spot Test) in lieu of waiting for C-20.0 (hardened test) test results to determine the acceptability of the member. Once per each week's production of prestressed concrete with corrosion inhibitor, random samples of hardened concrete powder will be taken from cylinders used for method C-21.0 (plastic test). These samples will be submitted to the Chemical Testing Laboratory for analysis using method C-20.0 (hardened test).

Units with calcium nitrite in a quantity less than specified are subject to rejection.

Furnish concrete cylinders to the Engineer, in a quantity to be specified, to verify the concentrations of calcium nitrite in hardened concrete. Concrete failing to contain calcium nitrite at the required concentrations as tested is subject to rejection.

Use only air-entraining, water-reducing, and/or set-controlling admixtures in the production of concrete mixtures that are compatible with calcium nitrite solutions.

Strictly adhere to the manufacturer's written recommendations regarding the use of admixtures including storage, transportation and method of mixing. If preferred, use calcium nitrite, which acts as an accelerator, in conjunction with a retarder to control the set of concrete, as per the manufacturer's recommendation.

No separate payment will be made for furnishing and incorporating the calcium nitrite solution into the concrete mixture. The cost of furnishing and incorporating the admixture is considered a part of the work of fabricating and furnishing the prestressed concrete units or supplying Class AA concrete.

THERMAL SPRAYED COATINGS (METALLIZATION)

(SPECIAL)

1.0 DESCRIPTION

Apply a thermal sprayed coating (TSC) and sealer to metal surfaces as specified herein when called for on the plans or by other Special Provisions, or when otherwise approved by the Engineer in accordance with the SSPC-CS 23.00/AWS C2.23/NACE No. 12 Specification. Only Arc Sprayed application methods are used to apply TSC coatings, the Engineer must approve other methods of application.

2.0 QUALIFICATIONS

Only use NCDOT approved TSC Contractors meeting the following requirements:

1. Who have the capability of blast cleaning steel surfaces to SSPC SP-5 and SP-10 Finishes.

2. Who employ a Spray Operator(s) qualified in accordance with AWS C.16/C2.16M2002 and a Quality Control Inspector(s) who have documented training in the applicable test procedures of ASTM D-3276 and SSPC-CS 23.00.

A summary of the contractor's related work experience and the documents verifying each Spray Operator's and Quality Control Inspector's qualifications are submitted to the Engineer before any work is performed.

3.0 MATERIALS

Provide wire in accordance with the metallizing equipment manufacturer's recommendations. Use the wire alloy specified on the plans which meets the requirements in Annex C of the SSPC-CS 23.00 Specification. Have the contractor provide a certified analysis (NCDOT Type 2 Certification) for each lot of wire material.

4.0 SURFACE PREPARATION AND TSC APPLICATION

Grind flame cut edges to remove the carbonized surface prior to blasting. Bevel all flame cut edges in accordance with Article 442-10(D) regardless of included angle. Blast clean surfaces to be metallized with grit or mineral abrasive in accordance with Steel Structures Painting Council SSPC SP-5/10(as specified) to impart an angular surface profile of 2.5 - 4.0 mils (0.063 - 0.100 mm). Surface preparation hold times are in accordance with Section 7.32 of SSPC-CS 23. If flash rusting occurs prior to metallizing, blast clean the metal surface again. Apply the thermal sprayed coating only when the surface temperature of the steel is at least 5°F (3°C) above the dew point.

At the beginning of each work period or shift, conduct bend tests in accordance with Section 6.5 of SSPC-CS 23.00. Any disbonding or delamination of the coating that exposes the substrate requires corrective action, additional testing, and the Engineer's approval before resuming the metallizing process.

Apply TSCs to thickness specified on the plans. All spot results (the average of 3 to 5 readings) must meet the minimum requirement. No additional tolerance (as allowed by SSPC PA-2) is permitted. The specified thickness requirement has been adjusted for surface roughness so that no correction for base metal is needed. (For Steel Beams: For pieces with less than 200 ft² (18.6m²) measure 2 spots/surface per piece and for pieces greater than 200 ft² (18.6m²) add 1 additional spots/surface for each 500 ft² (46.5m²))

When noted on the plans, apply the sealer to all metallized surfaces in accordance with the manufacturer's recommendations. Only apply the seal coat when the air temperature is above 40°F (4°C) and the surface temperature of the steel is at least 5°F (3°C) above the dew point. If the sealer is not applied within eight hours after the final application of TSC, the applicator verifies acceptable TSC surfaces and obtains approval from the Engineer before applying the sealer.

5.0 INSPECTION FREQUENCY

The TSC Contractor must conduct the following tests at the specified frequency and the results documented in a format approved by the Engineer.

TEST/STANDARD	LOCATION	FREQUENCY	SPECIFICATION
Ambient Conditions	Site	Each Process	5°F (3°C) above the dew point
Abrasive Properties	Site	Each Day	Size, angularity, cleanliness
Surface Cleanliness SSPC Vis 1	All Surfaces	Visual All Surfaces	SSPC-SP-10 Atmospheric Service SSPC-SP - 5 Immersion Service
Surface Profile ASTM D-4417 Method C	Random Surfaces	3 per 500 ft ²	2.5 - 4.0 mils
Bend Test SSPC-CS 23.00	Site	5 per shift	Pass Visual
Thickness SSPC PA-2R SSPC-CS 23.00	Each Surface	Use the method in PA-2 Appendix 3 for Girders and Appendix 4 for frames and miscellaneous steel. See Note 1.	Zn - 8.0 mils minimum Al - 12 mils minimum Areas with more than twice the minimum thickness are inspected for compliance to the adhesion and cut testing requirements of this specification.
Adhesion ASTM 4541	Random Surfaces Splice Areas	1 set of 3 per 500 ft ²	ZN > 500 psi Al > 1000 psi
Cut Test - SSPC-CS 23.00	Random Surfaces	3 sets of 3 per 500 ft ²	No peeling or delamination
Job Reference Std. SSPC-CS 23.00	Site	1 per job	Meets all the above requirements

6.0 REPAIRS

All Repairs are to be performed in accordance with the procedures below, depending on whether the repair surface is hidden or exposed. As an exception to the following, field welded splices on joint angles may be repaired in accordance with the procedures for hidden surfaces.

For hidden surfaces (including but not limited to interior girders, interior faces of exterior girders, and below-grade sections of piles):

1. Welding of metallized surfaces may be performed only if specifically permitted by the Engineer. Remove metallizing at the location of field welds by blast cleaning (SSPC SP-6 finish), or hand (SSPC SP-2 finish) or power tool cleaning (SSPC SP-3 finish) just prior to welding. Clean sufficiently to prevent contamination of the weld. All repairs to welded connections are metallized in accordance with SSPC CS 23.00.
2. Minor areas less than or equal to 0.1 ft^2 (9300mm^2) exposing the substrate are metallized in accordance with SSPC CS 23.00 or painted in accordance with ASTM A780, "Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings."
3. Large areas greater than 0.1 ft^2 (9300mm^2) exposing the substrate are metallized in accordance with SSPC CS 23.00.
4. Damaged (burnished) areas not exposing the substrate with less than the specified coating thickness are metallized in accordance with SSPC CS 23.00 or painted in accordance with ASTM A780, "Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings."
5. Damaged (burnished) areas not exposing the substrate with more than the specified coating thickness are not repaired.
6. Defective coating is repaired by either method 2 or 3 depending on the area of the defect.

For Exposed Surfaces (including but not limited to exterior faces of exterior girders and above-grade sections of piles):

1. Welding of metallized surfaces may be performed only if specifically permitted by the Engineer. Remove metallization at the location of field welds by blast cleaning (SSPC SP-6 finish), or hand (SSPC SP-2 finish) or power tool cleaning (SSPC SP-3 finish) just prior to welding. Clean sufficiently to prevent contamination of the weld. All repairs to welded connections are metallized in accordance with SSPC CS 23.00.
2. All areas exposing the substrate are metallized in accordance with SSPC CS 23.00
3. Defective coating is repaired by either method 2 or 3 depending on the area of the defect.

7.0 TWELVE MONTH OBSERVATION PERIOD

The contractor maintains responsibility for the coating system for a twelve (12) month observation period beginning upon the satisfactory completion of all the work required in the plans or as directed by the engineer. The contractor must guarantee the coating system under the payment and performance bond (refer to article 109-10). To successfully complete the observation period, the coating system must meet the following requirements after twelve(12) months service:

- No visible rust, contamination or application defect is observed in any coated area.
- Painted surfaces have a uniform color and gloss.
- Surfaces have an adhesion of no less than 500 psi (3.45 MPa) when tested in accordance with ASTM D-4541.

8.0 BASIS OF PAYMENT

The contract price bid for the bridge component to which the coating is applied will be full compensation for the thermal sprayed coating.

ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS

(10-12-01)

1.0 DESCRIPTION

The work covered by this Special Provision consists of furnishing all necessary labor, equipment, and materials and performing all operations necessary for installing anchor bolts/dowels in concrete using an adhesive bonding system in accordance with the details shown on the plans and with the requirements of this specification unless otherwise directed.

Submit a description of the proposed adhesive bonding system to the Engineer for review, comments and acceptance. Include in the description the bolt type and its deformations, equipment, manufacturer's recommended hole diameter, embedment depth, material specifications, and any other material, equipment or procedure not covered by the plans or these specifications. List the properties of the adhesive, including density, minimum and maximum temperature application, setting time, shelf life, pot life, shear strength and compressive strength. If bars/dowels containing a corrosion protective coating are required, provide an adhesive that does not contain any chemical elements that are detrimental to the coating and include a statement to this effect in the submittal.

2.0 MATERIALS

Use an adhesive bonding system that has been tested for a tensile strength of 125% of the specified anchor bolt/dowel yield load. Provide certification that, for the particular bolt grade, diameter and embedment depth required, the anchor system will not fail by adhesive failure and that the anchor bolt/dowel will not move. The minimum concrete compressive strength is 3000 psi (20.7 MPa) for certification and anchorage selection.

Package components of the adhesive so that one whole container of each component mixes to form one batch of adhesive. Use containers designed so that all of the contents may be removed easily and sealed tightly to prevent leakage. Furnish adhesive material requiring hand mixing in two separate containers designated as Component A and Component B. Provide a self contained cartridge or capsule consisting of two components which are automatically mixed as they are dispensed, as in the case of a cartridge, or drilled into, as in the case of a capsule.

Clearly label each container with the manufacturer's name, date of manufacture, batch number, batch expiration date, direction for use, and warnings and precautions concerning the contents as required by State or Federal Laws and Regulations.

3.0 PROCEDURE

A. Drilling of Holes into Concrete

When directed, use a jig or fixture to ensure the holes are positioned and aligned correctly during the drilling process. Upon approval, adjusting hole locations to avoid reinforcing steel is permitted.

Drill the holes with a pneumatic drill unless another drilling method is approved. Follow the manufacturer's recommendations regarding the diameter of the drilled hole.

Immediately after completion of drilling, blow all dust and debris out of the holes with oil-free compressed air using a wand extending to the bottom of the hole. Remove all dust from the sides of the holes by brushing the holes with a stiff-bristled brush of a sufficient size and then blow the hole free of dust. Repeat this procedure until the hole is completely clean. Check each hole with a depth gauge to ensure proper embedment depth.

Repair spalled or otherwise damaged concrete using approved methods.

B. Inspection of Holes

Inspect each hole immediately prior to placing the adhesive and the anchor bolts/dowels. Ensure all holes are dry and free of dust, dirt, oil, and grease. Rework any hole that does not meet the requirements of this Special Provision.

C. Mixing of Adhesive

Mix the adhesive in strict conformance with the manufacturer's instructions.

D. Embedment of Anchor Bolt/Dowel

Clean each anchor bolt/dowel so that it is free of all rust, grease, oil, and other contaminants.

Unless otherwise shown on the plans, the minimum anchor bolt/dowel embedment depth is such that the adhesive develops at least 125% of the anchor bolt/dowel yield load as determined by the manufacturer.

Insert the anchor bolt/dowel the specified depth into the hole and slightly agitate it to ensure wetting and complete encapsulation. After insertion of the anchor bolt/dowel, strike off any excessive adhesive flush with the concrete face. Should the adhesive fail to fill the hole, add additional adhesive to the hole to allow a flush strike-off.

Do not disturb the anchor bolts/dowels while adhesive is hardening.

4.0 FIELD TESTING

When specified on the plans, test the installed anchor bolts/dowels for adequate adhesive as specified below. Inform the Engineer when the tests will be performed at least 2 days prior to testing. Conduct the tests in the presence of the Engineer.

Use a calibrated hydraulic centerhole jack system for testing. Place the jack on a plate washer that has a hole at least 1/8 inch (3 mm) larger than the hole drilled into the concrete. Position the plate washer on center to allow an unobstructed pull. Position the anchor bolts/dowels and the jack on the same axis. Have an approved testing agency calibrate the jack within 6 months prior to testing. Supply the Engineer with a certificate of calibration.

In the presence of the Engineer, field test 10% of the first 50 anchor bolts/dowels prior to installing any additional anchors. For testing, apply and hold briefly 90% of the anchor bolt/dowel yield load shown on the plans. No visible signs of movement of the anchor bolts/dowels is permitted under this load. Upon receiving satisfactory results from these tests, install the remaining anchors. Test a minimum of 2% of the remaining anchors as previously described.

Record data for each anchor bolt/dowel tested on the report form entitled "Installation Test Report of Adhesively Anchored Anchor Bolts or Dowels". Obtain this form from the North Carolina Department of Transportation Materials and Tests Engineer. Submit a copy of the completed report forms to the Engineer.

Final acceptance of the adhesively anchored system is based on the conformance of the pull test to the requirements of this specification. Failure to meet the criteria of this specification is grounds for rejection.

5.0 BASIS OF PAYMENT

No separate measurement or payment will be made for furnishing, installing, and testing anchor bolts/dowels.

Payment at the contract unit prices for the various pay items will be full compensation for all materials, equipment, tools, labor, and incidentals necessary to complete the above work.

EPOXY PROTECTIVE COATING

(10-12-01)

1.0 DESCRIPTION

This work consists of preparing the concrete surface and furnishing and applying an epoxy protective coating to the surfaces described in this Special Provision. When epoxy protective coating is required, cure the top surfaces of the bent or end bent caps in accordance with the Standard Specifications, but do not use the Membrane Curing Compound method.

2.0 MATERIALS

Use an epoxy coating that meets the most recently published NCDOT Specification on the date of advertisement. Use the epoxy coating that meets NCDOT-Type 4A Flexible, epoxy coating, moisture insensitive.

Provide a certification for the proposed epoxy showing that it meets NCDOT-Type 4A.

The following companies have epoxies that meet Type 4A Specifications:

- E-Bond Epoxy, Inc.
Fort Lauderdale, Florida 33307
- Permagile Industries
Plainview, NY 11803
- Poly-Carb
Cleveland, OH 44139
- Tamms, Inc.
Mentor, OH 44060
- Adhesive Engineering
Cleveland, OH 44122-5554
- Kaufman Products
Baltimore, MD 21226-1131
- Prime Resins
Lithonia, GA 30058

- Sika Corporation
Lyndhurst, N. J. 07071

A copy of the specifications for Epoxy Resin Systems is available from the Materials and Tests Unit.

3.0 SURFACES

With the exception of cored slab bridges, apply the epoxy protective coating to the top surface area, including chamfer area, of bent caps under expansion joints and of end bent caps, excluding areas under elastomeric bearings. For cored slab bridges, do not apply the epoxy protective coating to the bent or end bent caps. Also, apply epoxy protective coating to the ends of prestressed concrete members as noted on the plans.

Use extreme care to keep the area under the elastomeric bearings free of the epoxy protective coating. Do not apply the epoxy protective coating in the notch at the ends of the prestressed concrete girders.

Thoroughly clean all dust, dirt, grease, oil, laitance, and other objectionable material from the concrete surfaces to be coated. Air-blast all surfaces immediately prior to applying the protective coating.

Only use cleaning agents pre-approved by the Engineer.

4.0 APPLICATION

Apply epoxy protective coating only when the air temperature is at least 40°F (4°C) and rising, but less than 95°F (35°C) and the surface temperature of the area to be coated is at least 40°F (4°C). Remove any excess or free standing water from the surfaces before applying the coating. Apply one coat of epoxy protective coating at a rate such that it covers between 100 and 200 ft²/gal (2.5 and 5 m²/liter).

Note: Under certain combinations of circumstances, the cured epoxy protective coating may develop “oily” condition on the surface due to amine blush. This condition is not detrimental to the applied system.

Apply the coating so that the entire designated surface of the concrete is covered and all pores filled. To provide a uniform appearance, use the exact same material on all visible surfaces.

5.0 BASIS OF PAYMENT

No separate measurement or payment will be made for preparing, furnishing and applying the epoxy protective coating to the concrete surfaces.

Payment at the contract unit prices for the various pay items will be full compensation for the above work including all materials, equipment, tools, labor, and incidentals necessary to complete the work.

FALSEWORK AND FORMWORK

(10-12-01)

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 420-17 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. 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**(8-13-04)****1.0 GENERAL**

Submit working drawings in accordance with Article 105-2 of the Standard Specifications and the requirements of this Special Provision. The list of submittals contained herein does not represent a list of required submittals for this project. Submittals are only necessary for those items as required by the Standard Specifications, other Special Provisions, or contract plans. Make submittals that are not specifically noted in this Special Provision directly to the Resident Engineer.

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

2.0 WORKING DRAWINGS SUBMITTAL CONTACTS

All submittals noted herein are reviewed by the Structure Design Unit and/or the Geotechnical Engineering Unit.

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@dot.state.nc.us

Secondary Structures Contacts: James Gaither (919) 250 – 4042
Man-Pan Hui (919) 250 – 4044

Eastern Regional Geotechnical Contact (Divisions 1-7):
K. J. Kim
(919) 662 – 4710
(919) 662 – 3095 facsimile
kkim@dot.state.nc.us

Western Regional Geotechnical Contact (Divisions 8-14):
John Pilipchuk
(704) 455 – 8902
(704) 455 – 8912 facsimile
jpilipchuk@dot.state.nc.us

3.0 SUBMITTAL COPIES

The quantities provided in this Special Provision act as a guide in the submittal process.

Unless otherwise required by the contract, submit two sets of supporting calculations to the Structure Design Unit.

Furnish one complete copy of the submittal, including all attachments, to the Resident Engineer. If requested, provide additional copies of any submittal. At the same time, submit the following number of copies directly to the Structure Design Unit and/or the Geotechnical Engineering Unit:

Working Drawing 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
Box Culvert Falsework ²	5	0	Plan Note & SN Sheet
Cofferdams ⁴	6	1	Articles 410-5 and 420-8
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 (superstructure)	8	0	Article 420-3
Falsework & Forms ² (substructure)	8	0	Article 420-3
Mechanically Stabilized Earth Retaining Walls ⁴	7	1	“MSE Retaining Walls”
Metal Bridge Railing	8	0	Plan Note
Metal Stay-in-Place Forms	8	0	Article 420-3
Metalwork for Elastomeric Bearings ^{5,6}	7	0	Article 1072-10
Miscellaneous Metalwork ^{5,6}	7	0	Article 1072-10
Overhead Sign Assemblies	13	0	Article 903-3(C)
Pile Points	7	1	Article 450-8(D) & “Steel Pile Points”
Placement of Equipment on Structures (cranes, etc.)	7	0	Article 420-20

Precast Concrete Box Culverts	2, then 1 reproducible	0	“(Optional) Precast Reinforced Concrete Box Culvert at Station ____”
Precast Retaining Wall Panels	10	0	Article 1077-2
Pot bearings ⁵	8	0	“Pot Bearings”
Prestressed Concrete Deck Panels	6 and 1 reproducible	0	Article 420-3
Proprietary retaining walls ⁴	9	1	Applicable Project Special Provision
Prestressed Concrete Girder (strand elongation and detensioning sequences)	6	0	Articles 1078-8 and 1078-11
Prestressed Concrete Cored Slab (detensioning sequences) ³	6	0	Article 1078-11
Revised Bridge Deck Plans (adaptation to metal stay-in-place forms)	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”
Soil Nail Retaining Walls ⁴	4	1	Applicable Project Special Provision
Sound Barrier Wall Steel Fabrication Plans ⁶	7	0	Article 1072-10 & “Sound Barrier Wall”
Sound Barrier Wall Casting Plans	10	0	Article 1077-2 & “Sound Barrier Wall”
Structural Steel ⁵	2, then 7	0	Article 1072-10
TFE Expansion Bearings ⁵	8	0	Article 1072-10
Temporary Detour Structures ⁴	10	1	Article 400-3 & “Construction, Maintenance and Removal of Temporary Structure at Station ____”
Temporary Shoring ⁴	6	1	Article 410-4 & “Temporary Shoring for Maintenance of Traffic”

Temporary Fabric or Wire Walls ⁸	0	2	Applicable Project Special Provision
Permanent Anchored Tieback Retaining Walls ⁴	4	1	Applicable Project Special Provision
Evazote Joint Seals ⁷	9	0	Applicable Project Special Provision
Optional Disc Bearings ⁵	8	0	“Optional Disc Bearings”
Removal of Existing Structure over Railroad	5	0	Railroad Special Provisions
Drilled Pier Construction Sequence Plans ⁸	0	2	“Drilled Piers”
Pile Hammers ⁸	0	2	Article 450-6

FOOTNOTES

1. References are provided to help locate the part of the contract where the working drawing submittals are required. References in quotes refer to the Project Special Provision by that name. Articles refer to the Standard Specifications.
2. Submittals for these items are necessary only when plan notes require them.
3. Submittals for these items may not be required. A list of pre-approved sequences is available from the producer or the Materials and Tests Unit.
4. These submittals are reviewed by the Structure Design Unit and the Geotechnical Engineering Unit. If NCDOT Shoring Standards are used, working drawings need not be submitted, but the Shoring Selection Form should be forwarded to the Geotechnical Engineering Unit.
5. The fabricator may submit these items directly to the Structure Design Unit.
6. The two sets of preliminary submittals required by Article 1072-10 of the Standard Specifications are not required for these items.
7. Submittals for Fabrication Drawings are not required. Submission of Catalogue Cuts of Proposed Material is required. See Section 5.A of the Project Special Provision.
8. Submittals for these items are reviewed by the Geotechnical Engineering Unit only and correspondence regarding these items should be directed to and will come from the Geotechnical Engineering Unit.

ELASTOMERIC BEARINGS

(10-03-02)

Use elastomeric bearings in accordance with Article 1079-2 of the Standard Specifications except as follows:

**TABLE 1079-2
NATURAL RUBBER ELASTOMER REQUIREMENTS**

Grade (durometer)	50	60
PHYSICAL PROPERTIES		
Hardness ASTM D2240	50 +5 -5	60 +5 -5

UNCLASSIFIED STRUCTURE EXCAVATION AT STATION 10+00.00 -RP1- & 10+00.00 -RP2-

(12-12-02)

The 2002 Standard Specifications shall be revised as follows:

Unclassified structure excavation shall be in accordance with Section 412 of the Standard Specifications with the following exception:

Payment will be made under:

Unclassified Structure Excavation at Station _____Lump Sum

PRESTRESSED CONCRETE MEMBERS

(2-14-04)

In Section 1078-12 of the Standard Specifications after the first sentence of “5,” place the following:

“Conduit may be rigid one-piece or rigid two-piece (split sheathed). Do not use flexible conduit.”

In Section 1078-13 of the Standard Specifications, after the fourth paragraph add the following paragraph:

“When handling the prestressed concrete members, a temporary stress of $5\sqrt{f_{ci}}$ is permitted, where f_{ci} is the strength of concrete at release, in psi.”

In Section 1078-5 of the Standard Specifications, place the following two sentences after the first paragraph:

“When casting holes through the top flange of Bulb Tee Girders for overhang or interior bay falsework hanger rods use rigid PVC conduits with a wall thickness of approximately 1/8 inch. Do not use thin wall material. Secure conduits in the forms so that they do not migrate out of the proper location. Other methods of forming holes may be proposed but are subject to the Engineer’s approval.”

“When casting dowel rod holes in cored slab members use material that creates round, vertical holes of the specified diameter and in the correct location. Do not use material that deforms, collapses or shifts position during casting of the member.”

PRESTRESSED CONCRETE PILES

(8-13-04)

In Section 450–11, “Basis of Payment” of the Standard Specifications. When the plans indicate the Engineer is determining the length of piles revise “(B) Cutting off Piles” as follows:

Change the sentence in the second paragraph to read:

“...payment for cutting off each pile will be made at an amount equal to the contract unit price per linear foot (per 0.3 meter) for furnishing and driving the pile which has been cut off.”

CRANE SAFETY

(11-09-04)

Submit all items listed below to the Engineer prior to beginning crane operations. . 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.

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).

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, experience and training of the persons responsible for rigging operations. Training should include, but not be limited to, weight calculations, center of gravity determinations, sling selection and capacities, sling and rigging equipment inspection, safe rigging practices, and determining load weights.

- C. **Crane Inspections:** Inspection records for all cranes shall be current and readily accessible for review upon request.
- D. **Crane Operators:** By January 1, 2006, all crane operators 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. Submit current certification for the type of crane operated (small hydraulic, large hydraulic, small lattice, large lattice) and medical evaluations, for each operator.

Medical evaluations shall meet or exceed the CCO medical evaluation requirements and must remain current within a 3-year expiration date. Utilize either the CCO Physical Examination Form or a current DOT Medical Examiner's Certificate.

CLEANING AND PAINTING OF EXISTING LIFT BENT

(SPECIAL)

This work shall consist of cleaning all spot rust or damaged areas of the existing coal tar paint system and applying 2 coats of paint to these areas, and prepare surface for an appearance coat of paint to each existing lift bent.

SURFACE PREPARATION

All surface contaminants such as organic material oil, grease or soluble salts shall be removed by the appropriate SSPC power washing or solvent cleaning methods before any spot repairs or painting is conducted. Rust spots and other damaged areas shall be prepared to a SSPC SP-3 finish. No abrasive blasting will be permitted.

The surface contaminants shall be cleaned from the existing paint system as indicated above and the surface roughened with a #80 grit sand paper before the appearance coat is applied.

PAINTING

Section 442 of the Standard Specifications shall govern the field painting activities unless otherwise indicated in this Special Provision. The coal tar epoxy paints shall meet the requirements Section 1080-8 of the Standard Specifications. All paint shall be applied by spraying.

The first coat shall be minimum of 8 mils DFT Black Coal Tar.

The second spot coat shall be a minimum of 8 mils DFT Red Coal Tar.

The appearance coat shall be a minimum 4 mils DFT Black Coal Tar.

Thinning with special solvents may be required to achieve a satisfactory bond with the existing coal tar system.

The minimum ASTM D3359 is adhesion shall be 3A.

COMPENSATION

The work covered by this provision will be paid for at the contract lump sum price for “Cleaning and Painting Existing Lift Bents”. The payment will be full compensation including but not limited to furnish all materials, labor, tools, equipment and all incidentals necessary to complete with work.

Payment will be made under:

Cleaning and Painting Existing Lift Bents at Station _____ Lump Sum

EPOXY SKID – RESISTANT OVERLAY

(SPECIAL)

Description:

The work covered by this special provision consists of preparing the top of the checkered floor plate to receive epoxy overlay, and to place epoxy and sand on the checkered floor plate. The work shall be done in the shop and any damage to the overlay during shipping and installation shall be repaired in the field.

Materials:

The epoxy shall be Type 2 in accordance with Section 1081-1 of the Standard Specifications. Sand shall be dry, clean, white silica sand and meet the following gradation requirements:

Standard Size No.	4	8	16	20	40	100	200
Percentage of Total By Weight Passing	100	100	80-100	45-90	0-10%	0-2	0

Surface Preparation:

The metallized surface of the checkered plate shall be brushed blasted to remove any loose materials and to give a roughened surface in accordance with Section 442-8(A) of the Standard Specifications.

Application:

Type 2 epoxy shall be applied in two coats by either long nap roller or squeegee with the surface of plate in a horizontal position. The first coat of epoxy shall be applied within two hours after blast cleaning and the surface shall be clean, dry, free of oil and any deleterious materials. Immediately after application of the epoxy, sand shall be applied to the surface from a vertical direction. The application of sand shall be continued until there are no visible moist spots.

The first coat shall be allowed to cure as recommended by the epoxy manufacturer, excess sand swept off, and the second coat of epoxy and sand shall be applied in the same manner as the first coating. Excess sand is to be swept off after the second coat has cured.

Field Repair of Coating:

Areas which are damaged during shipping, handling, erection or any other cause shall be repaired with the same type of materials and manner as shop application at no additional cost to the Department.

Compensation:

There will be no direct payment for the work covered in this special provision. Payment at the contract lump sum price for "Approximately _____ Pounds Structural Steel" will be full compensation for work covered by this special provision.

EPOXY FINISH PAINT:

(SPECIAL)

Scope

This special provision covers the fast-dry epoxy paint system to be used over compatible metallized metal surfaces. A compatible sealer may be required to prevent application bubbling.

The Contractor shall submit to the Engineer a field repair procedure for any damaged areas of the paint system.

Painting shall be in accordance with Section 442 of the Standard Specifications, and with the manufacturer's instructions, except as modified herein. This work shall consist of surface preparation and painting of the metallized surfaces. Painting is to be conducted after assembly of the metallized steel ramps. All paint in this system shall be applied by spraying, except that minor repairs may be made by brush where permitted by the Engineer. The thickness of the dry coat of paint shall be a minimum of 4 mils and a maximum of 6 mils.

Description

An acceptable paint for this system is Amercoat 370 manufactured by Ameron International (1-800-245-5686). An approved equal fast-dry epoxy paint system may be used.

Basis of Payment

The entire cost of the fast-dry epoxy paint system shall be included in the price bid for the bridge component to which the coating is applied.

PAVING OPERATION

(SPECIAL)

The paving operation shall consist of placement of bituminous concrete surface course Type SF9.5A on the cored slab bridges and the repair and grading of the bridge approaches with bituminous concrete. The work shall be in accordance with the plans and the Standard Specifications.

The asphalt plant mix shall meet the requirements of Division 6 of the Standard Specification except the seasonal and temperature limitations in Article 610-4 shall not apply. Asphalt material shall not be placed when the air temperature measured in the shade away from artificial heat at the location of the paving operation is less than 35°F unless approved by the Engineer.

The repair and grading of the bridge approaches shall include placement of ABC and feathering out bituminous concrete to match existing approach pavement as shown on the plans.

Payment shall be made at the lump sum bid price for "Paving Operation" which price and payment shall include but not be limited to all labor, materials, equipment, tools, and incidentals necessary to complete the work to the satisfaction of the Engineer.

Payment shall be made under:

Paving Operation at Station _____Lump Sum

TREATED STRUCTURAL TIMBER

(SPECIAL)

General

The treated structural timber used on the pivot bents shall be constructed according to the plans, Standard Specifications, and these special provisions. The treated timber shall be Southern Yellow Pine No. 2. Grade or better and treated to a minimum retention of 0.40 lbs. of alkaline copper quat per cubic foot of wood. All hardware shall be galvanized according to the Standard Specifications. Adhesively Anchored Anchor Bolts shall be allowed for the ¾ in. anchor bolts embedded into the slab to connect the 4" x 6" posts to the slab.

Payment

There will be no separate payment for this work. All materials, labor, hardware and incidentals necessary to install the wooden rails shall be included in the contract price bid for Steel Beam Guardrail per Linear Foot.

REPLACEMENT OF EXISTING ANCHOR RODS**(SPECIAL)****Description**

The work covered by this special provision shall consist of furnishing all necessary equipment materials, and operations necessary for the removal and replacement of the anchor rods in the bulkhead as shown in the plans and with the requirements of this specification unless otherwise directed by the Engineer.

The Contractor shall uncover the existing anchor rods and king pile. The Contractor shall then temporary support the existing wall and king pile with a post tensioning system relieving the stress in the anchor rods. The anchor rods shall then be removed and replaced with a new anchor rod and bolts. The post tensioning system shall then be detensioned and moved to the next anchor location. The profile of the bulkhead should not change as a results of this operation. The backfill material shall be placed to the original ground lines.

Materials

The anchor rods shall be Type 304 (18-8) stainless steel with compatible nuts and washers. Couplers and nuts for the anchor rods shall be capable of developing 100% of the guaranteed minimum ultimate tensile strength of the rod.

Basis of Payment

The entire cost of the above work including all materials equipment, tools, post tensioning system, labor, and incidentals necessary to complete the work shall be paid for at the contract unit bid price for 5/8" dia. Anchor Rod Replacement.

ELECTRICAL SYSTEM**(SPECIAL)****ELECTRICAL SYSTEM INSTALLATION**

The electrical installation for this project shall include the following:

Currituck Facility

1. The installation of a 2 ½" PVC conduit run from the existing junction box located at the shore end of bridge to the hydraulic unit platform. The conduit is to be installed underground across the roadway, through a sleeve in the end bent wing wall, attached to the cored slab sections as per drawing detail to the platform to feed a 200amp three phase shore power receptacle. Reuse the existing 200amp 3 phase receptacle removed from the existing bridge. The existing feeder from the 200amp fusible disconnect at the service equipment on the office building labeled "Three Phase Shore Power" to the junction box is to be used. New feeder cables are to be installed from the junction box to the receptacle in the new 2 ½" PVC conduit.

2. The installation of a 2 ½” PVC conduit run from the existing junction box located at the shore end of bridge to the hydraulic unit platform. The conduit is to be installed underground across the roadway, through a sleeve in the end bent wing wall, attached to the cored slab sections as per drawing detail to the platform to feed a 200amp three phase shore power receptacle. A new 200amp 3 phase receptacle is to be installed adjacent to the above existing receptacle. The existing empty 4” PVC conduit from the 200 amp fusible disconnect at the service equipment on the office building labeled “Single Phase Shore Power” to the junction box is to be used for the installation of a new 200amp feeder. New feeder cables are to be installed from the junction box to the receptacle in the new 2 ½” PVC conduit. Convert the existing 200 amp fusible disconnect at the service equipment to three phase configuration by adding a third 200 amp fuse and label “Three Phase Shore Power”
3. The installation of a 1 ½” PVC conduit run from the existing Midwest 200amp three phase 120/208Y panelboard labeled “Ramp Panel” located on shore adjacent to the junction box at the bridge end to the hydraulic unit platform. The conduit is to be installed underground across the roadway, through a 2” sleeve in the end bent wing wall, attached to the cored slab sections as per drawing detail to the platform to feed ramp utility circuits and the hydraulic power unit magnetic starter. It is to terminate in a 12 X 12 NEMA 4X junction box mounted as per drawing detail on platform.
4. A new messenger system is to be installed to convey power and hydraulic lines from the platform to the lift bent. A new conduit system is to be installed on the ramp and support structure to provide electrical feeds for the electrical chain hoists, ramp light, and hydraulic unit control station. The chain hoist receptacles are to be furnished by the Ferry Division.

Knotts Island Facility

1. Existing service panel mounted on a pole adjacent to the rest room building is to be replaced with a new 200 amp single phase 120/240 NEMA 3R main breaker panelboard. The service rise is to be 2” PVC conduit to a PVC weather head with 3 #3/0 THWN copper conductors installed to the 200 amp main breaker.
2. Install new underground feeder from the new service panel to a new “Well Panel” to be installed on a treated wood structure adjacent to the well. The underground feeder is to be installed in 1½” PVC conduit composed of 2 #2 THWN, 1 #4 THWN, and 1 #6 THWN. It is to terminate in a 125amp 120/240 single phase main lugs only NEMA 3R panelboard that will provide branch circuits for the existing pump control, GFCI receptacle, and pump house heater. Distance to “Well Panel” approximately 300 ft.
3. Install new underground feeder from the new service panel to the existing panel in the Rest Room building. Feeder to consist of 1¼” PVC conduit and 4 #8 THWN copper conductors.
4. Install new underground feeder from the new service panel to the pull box adjacent to the end bent at the new bridge structure. Feeder is to consist of 2” PVC conduit with 2 #2 THWN, 1 #4 THWN, and 1 #6 THWN for the “Ramp Panel” feeder, and 3 #10 THWN for pole mounted security lights and cameras.

5. The installation of a 1½” PVC conduit run form the new in-the-ground pull box to the hydraulic unit platform. The conduit is to be installed underground, through a 2” sleeve in the end bent wing wall, attached to the cored slab sections as per drawing detail to the platform to feed ramp utility circuits and the hydraulic power unit magnetic starter. It is to terminate in a 125amp main lugs only NEMA 3R single phase 120/240 panelboard mounted on the hydraulic platform adjacent to the magnetic starter. This panelboard is to be labeled “Ramp Panel”.
6. A new messenger system is to be installed to convey power and hydraulic lines form the platform to the lift bent. A new conduit system is to be installed on the ramp and support structure to provide electrical feeds for the electrical chain hoists, ramp light, and hydraulic unit control station. The chain hoist receptacles are to be furnished by the Ferry Division.

ELECTRICAL COORDINATION FOR FERRY OPERATIONS

All electrical outages during construction and service change over must be coordinated with Currituck Ferry Operations through the Resident Engineer with a minimum of 10 working days notice.

All power for office and ramp hoist circuits that must remain in use for ferry operations, shall be kept in service. Any temporary wiring used shall meet Article 305 of the National Electrical Code.

ELECTRICAL INSTALLATION – GENERAL

The electrical installation shall be installed by an Electrical Contractor duly licensed in the State of North Carolina for a project of this size.

The installation shall meet the latest addition of NFPA 70 (National Electrical Code) and any additions or addendum as approved by the North Carolina Building Code Council.

Eight copies of all catalog cuts for all material and equipment to be used in the electrical installation shall be submitted to the Resident Engineer for approval. Thirty days shall be allowed for the approval process and no material is to be ordered or installed until approval is granted.

All material is to be furnished new and stored in protective conditions. Any deterioration due to improper storage will be grounds for requiring replacement.

ELECTRICAL PANELS

The electrical panels furnished for the Knotts Island facility are to be single phase 120/240VAC, rated NEMA 3R with main service panel rated 200 amperes and furnished with a 200 amp 2 pole main circuit breaker with the branch breakers shown in the panel schedule. Panel is to be a minimum of 30 circuit and utilize bolt-on circuit breakers. The "Well Panel" and the "Ramp Panel" are to rated 125 amps main lugs only and furnished with the branch breakers shown in the panel schedule. All breakers are to be bolt-on. All panels to be Square "D" NQOD or equal.

GROUNDING

Grounding of all electrical equipment and service equipment shall meet the requirements of Article 250 of the NEC. An initial ground grid is to be composed of two ¾" by 20ft copperweld electrodes driven with 20 foot spacing. A ground resistance test instrument will be used to measure the resistance of the grounding electrodes to Earth. A test result of 15 OHMS or less will be achieved by driving additional electrodes of 20 foot length on 20 foot spacing until this value is achieved. Bare #1/0 copper is to be exothermically welded to each rod creating a continuous grid and return to the service equipment at equipment grounding points. The grid is to be a minimum of 12" below grade, but shall be left exposed for inspection by the engineer.

A grid is to be driven at the Midwest panel labeled "Ramp Panel" at the Currituck facility and tied to the system ground.

A grid is to be driven at the Service Panel at the Knotts Island facility and also adjacent to the pullbox at the end bent and tied to the system ground.

Equipment grounding conductors are to be pulled in all conduit runs both metallic and non-metallic. These conductors are to be sized in accordance with Article 250 of the NEC or as shown on the plans and are to be THWN and color coded green. All equipment and devices are to be bonded to the equipment grounds including all panelboards, all shore power receptacles, all messenger cable and support structure, motor starters, metallic junction and pull boxes, and troughs. All conduit and feeder schedules listing conduit size and circuit conductors may not include the equipment grounding conductors, but these are to be furnished in these runs as detailed above.

CONDUIT AND FITTINGS

All conduit used in this project shall be schedule 40 PVC except as noted on the plans. The PVC conduit shall be furnished in the sizes indicated. The PVC shall meet commercial standard CS-207-60 with a tensile strength of 5,500 psi at 78 degrees F, flexural strength of 11,000 psi, and compressive strength of 8,600 psi. All PVC conduit and fittings are to be UL listed and labeled. Catalog cuts are required on all PVC conduit and fittings.

All PVC fittings used are to be of the same manufacturer as the conduit. Cement is to be as recommended by the manufacturer and applied per manufacturers instructions with particular attention to minimum temperatures.

Field bending shall be accomplished by use of a heat bender designed for that purpose. No heating of conduit with open flames will be permitted.

All cutting of PVC conduit shall be accomplished with the use of a miter box to ensure square ends. These ends shall be reamed to ensure no restriction of the inside diameter.

FLEXIBLE NON-METALLIC CONDUIT AND FITTINGS

All flexible non-metallic conduit for this project shall be Type A jacketed and nylon reinforced core of PVC as manufactured by Electric-flex Type LNM-P in the appropriate sizes as shown on the plans. The conduit is to be Orange in color, and "UL" listed and labeled.

Fittings for the above are to be T & B Type A 6300 series in the appropriate sizes made of fiberglass reinforced thermoplastic. All conduit and its installation shall meet the requirements of the NEC.

JUNCTION AND PULL BOXES

The direct burial pull box shall be Quazite series "PG". This box is to be constructed of polymer concrete and reinforced by heavy weave fiberglass. The box is to be furnished in two sections. The top section shall be 24" x 36" x 18" without a bottom. The top section is to be stacked on a 24" x 36" x 8" box extension. All conduit entrances are to be cut with a conduit trade size carbide tipped holesaw for each conduit size. No other method of cutting will be permitted. A steel cover is to be provided, and the cover and box are to be installed in accordance with the manufacturers instructions to achieve a H-20 load rating. Two 3/4" holes are to be drilled in the bottom of the box extension to allow water to drain into the sand below.

No splices of conductors in the pull box will be permitted with the exception of the equipment grounding conductors that are to be bonded together at the box.

Metallic junction boxes sized 12x12x6 are to be installed as shown on the plans to transition to the 1 1/4" flexible conduit at each end of the messenger. These are to be mounted as shown on the plans. These boxes are to be rated NEMA 4X, single hinge cover stainless steel. Box is to be constructed of 16 gauge body and 14 gauge door 304 stainless steel. Door hinge is to be continuous 304 stainless steel. Junction box to meet the following standards, UL 508 and NEMA 4X. Boxes are to be Hoffman A series or approved equal.

WIRE AND CABLE

All wire for this project shall be copper with type THWN insulation rated 600 volts. All wire shall be "UL" listed and labeled and catalog cuts are to be submitted for approval for all sizes and types. All wire is to be furnished new. No use of existing conductors unless shown on the plans will be permitted.

All wire used in the ramp electrical circuits to include receptacle and lighting, and hoist electrical system shall be 19 strand copper with THWN insulation. Control wiring shall be #12 AWG and the motor conductors shall be #10 AWG for three phase motors, and #8 AWG for single phase motors. All terminations shall use a NEC approved method for terminating stranded conductors.

All service and feeder conductors are to be tested with a 500 VDC megger after installation and before being energized. A list of each conductor with resistance reading to ground is to be furnished to the engineer. Any reading below 100 megohms to ground will require replacement of the conductor.

SHORE POWER RECEPTACLES

Shore power receptacles will only be installed at the Currituck facility of this project and will consist of the reuse of one existing 120/208Y 200amp receptacle and the installation of one new receptacle.

Furnish one new 200 amp three phase shore power receptacle for installation on the hydraulic platform at Currituck as show on the plans. The shore power receptacles are to be rated for three phase four wire 120/208 "Y". The standard shore power receptacle for the Ferry Division is available through Russell and Stoll Electrical Equipment. The 200 amp receptacle is Russell and Stoll #DBRS2516200. A long delivery time should be anticipated. Confirm the conduit outlet locations and size. The circuit breakers mounted in the receptacle are not used for overcurrent protection, but as a disconnecting means and they should be furnished without trip mechanisms and rated for switch duty. Ratings shall be 200 amperes three phase.

The feeder for the receptacle is to be composed of 4 #3/0 THWN current carrying conductors and 1 #4 THWN equipment grounding conductor.

MESSENGER SYSTEM

A messenger system is to be installed from the pivot bent platform to the ferry ramp lift structure as shown on the plans at the two ramp locations. The messenger is to be terminated at a 3/4" hot dipped galvanized eye bolt at each end. The eye bolt at the platform end is to be set horizontal in a stainless steel anchor. The eye bolt at the "H" pile is to be through bolted. The messenger cable is to be terminated at each eye bolt with a 3/8" strand vise Reliable #5102.

The messenger cable is to be copperweld 3/8 inch. Due to the large minimum quantity required to purchase this cable, the necessary lengths will be furnished to the contractor by NCDOT for installation. 30 working days notice should be given to the Resident Engineer prior to needing the cable on the job site.

The 1 1/4" flexible non-metallic conduit and three hydraulic lines will be supported from the messenger with 6"x3/8" copperweld cable rings on 2 foot centers. These rings will also be furnished to the contractor by NCDOT for installation.

MAGNETIC COMBINATION STARTERS

A combination magnetic starter is to be furnished for each hydraulic pump for each ramp lift system. The starter enclosure is to be constructed of stainless steel with an electropolished finish with a NEMA rating of 4. The starter for the Currituck ramp is to be rated for 5HP 208 VAC three phase and the starter for the Knotts Island pump is to be rated 5HP 230VAC single phase. The starter is to contain a fusible disconnecting device rated 60 amperes for the single phase motor and 30 amperes for the three phase motor. The coil voltage for the magnetic starter is to be rated 120 VAC. Thermal overloads sized for the full load amperage taken from the nameplate of the pump motor are to be installed. Installation of a 300 VA control transformer and two primary and one secondary fuse block is to be accomplished as a factory installed option (will require a larger enclosure and longer lead time). All conduit entrances are to be made in the bottom of the enclosure using approved corrosion resistance watertight hubs.

The single phase starter is to be Square "D" #8538 SDW-62 series with #9999 Form FF4T13 transformer and fuse modification in an oversize enclosure.

The three phase starter is to be Square "D" #8538 SDW-12 series with #9999 Form FF4T13 transformer and fuse modification in an oversize enclosure.

PUSHBUTTON STATION

A four station pushbutton is to be furnished in a non-metallic enclosure rated NEMA 4X. It is to be furnished with a stainless steel hanger bracket with ¾" threaded conduit hub in top.

Furnish pushbutton units rated NEMA 4X with the contact schedule shown in the wiring diagram. The top two pushbuttons shall consist of one normally open-momentary contact and one normally closed-momentary contact complete with a legend plate labeled "START" and "STOP". The bottom two push buttons shall consist of two interlocked normally open momentary contact units complete with a legend plate labeled "HOIST", "UP" and "DOWN". To enhance the NEMA 4X rating of the push buttons, weather proof boots are to be installed over the push button operators. They are to be of the following colors and are to be installed with the factory furnished tool:

Start	Black Boot	# 9001KU1
Stop	Red Boot	# 9001KU2
Up	Blue Boot	# 9001KU3
Down	Brown Boot	# 9001KU4

The upper mounting blank is to contain a 120 VAC red NEMA 4X pilot light. Pushbutton enclosure to be Square "D" # 9001 SKYP-40 with SKRU-1 and SKRU-10 push buttons with SKN-208 and SKN-201 legend plates and with SKP38R31 pilot light.

Install the conduit for the pushbutton station from the enclosure of the combination magnetic starter for the hydraulic power unit located on the platform to the bottom flange of the ramp beam out to the location of the pushbutton station. The conduit attached to the beam flange is to

be 1" rigid galvanized conduit attached with galvanized beam clamps. The transition to the pushbutton station is to be made with 1" flexible non-metallic conduit and appropriate fittings. The transition at the platform end is to be made using 1" flexible non-metallic conduit and appropriate fittings with adequate loop provided to compensate for ramp up and down movement.

The conduit to the pushbutton station will contain 6 #12 THWN copper and 1 #12 ground.

CONDUIT SUPPORT STRUCTURES

The installation of all non-metallic conduit above ground to include ramp power, hydraulic power unit panels, electrical service and feeders, and shore power receptacles are to be supported as shown on the plans and as required by the NEC shall be mounted on 1 5/8" x 1 5/8" 12 gauge stainless steel #304 channel with appropriate sized interlocking #304 stainless steel conduit straps. The channel is to be mounted using stainless steel expansion anchors, stainless steel bolts, or stainless steel lag bolts as needed. Channel and conduit straps are to be All-Strut series AS-132 with 304 SS Conduit clamps and specified hardware.

HARDWARE

All hardware used in the electrical system for support, attachment, assembly, or mounting shall be corrosion resistant and consistent with the corrosion protection of the devices mounted. All hardware shall be either not dipped galvanized or stainless steel. If hardware is not available with this protection, then standard hardware will be sent to a galvanizer for hot dipping.

BASIS OF PAYMENT

Payment for the electrical system shall be at the lump sum contract price for "Electrical System at Station _____". This price and payment shall be full compensation for furnishing all materials, equipment, labor, tools, and incidentals required to install the electrical system complete and operational as detailed on the plans in a workmanlike manner and satisfactory to the Engineer.

RAMP LIFT AND LUBRICATION SYSTEM

(SPECIAL)

DESCRIPTION

The work covered in this special provision consists of furnishing all materials, labor, equipment, and incidentals necessary for installing complete and operable ramp lift system in accordance with the applicable parts of the Standard Specifications, details on the plans, and these special provisions.

Each ramp lift system consist of (2) two hydraulic cylinders, hydraulic pump with reservoir and controls (electrical and hydraulic), enclosure and support, chain, chain shackles, 2 concrete counterweights with hardware, wire rope, wire rope clamps, thimbles, wire rope blocks, central lubricating system for wire rope blocks, and 2 electrically operated chain hoists. The 2

electrically operated chain hoists for each ramp will be furnished by the Ferry Division. See plans and special provisions for details. For remote electrical controls, see special provisions and plans for "Electrical System".

Each ramp hydraulic power unit will be mounted on the pivot bent platform adjacent to the approach bridge as shown on the plans. Three hydraulic lines will be conveyed to the ramp support structure in the messenger cable. Installation of the flow integrator will be at the power unit requiring two return lines to the power unit from the cylinders. The flow integrator and the flow control valve will be piped with ½" stainless steel tubing at the power unit. ¾" stainless steel tubing will be used between the power unit and the ¾" hose that will be installed in the messenger system. The hose will transition to ¾" stainless steel tubing at the attachment point on the ramp support structure. All tubing installed on the ramp support structure will be ¾" stainless steel.

GENERAL

All ramp support and lift systems for the two ramps are to be furnished new and complete as covered on the plans and in these Special Provisions.

Place the ramp in a horizontal position with chains attached to hydraulic cylinders, extend hydraulic cylinders as recommended by the Ferry Division, and attach chain to ramp lift beam with shackle. Each chain should have a minimum of 4 feet excess length from point of attachment to ramp lift beam.

Concrete counterweights shall be installed in accordance with the special provisions for concrete counterweights.

The electrically operated chain hoists are to be installed at elevations so they are operable from the ramp and provide a movement of ramp of a least 5 feet above and below horizontal ramp position.

RAMP HOISTING SYSTEM

All material specified under this section of the contract shall require the contractor to submit to the Resident Engineer for approval, catalog cuts, descriptive bulletins, literature and/or drawings with specific dimensions, data, flow rates, and manufacturers part numbers to allow determination of plan and special provision compliance. Thirty days shall be allowed for the engineer's review of each submittal. Materials which have not been approved shall not be delivered to the project. The Department of Transportation will not be responsible for any costs (fabrication, etc.) prior to approval of submittals. Eight copies of each catalog cut, bulletin, literature, and drawings shall be submitted and each shall show the material description, brand name, stock number, size, rating, manufacturing specifications, and the use for which it is intended.

HYDRAULIC HOIST AND CENTRAL LUBRICATION SYSTEM

The hoist system for each ramp shall be furnished complete and operational. The system for each RAMP shall consist of a hydraulic power unit composed of the components listed below, hardware, and all interconnecting tubing and hose.

The system shall provide for full extension and retraction of the cylinders in 45 seconds under rated load. The system is to be as previously furnished to the Ferry Division by Livingston and Haven or an approved equal.

The central lubrication system shall be furnished with two-four station lubrication units mounted on each ramp as shown on the plans to provide lubrication of each wire rope block supporting the counterweight system. The system shall consist of the central stations and all interconnecting tubing, hardware, and mounting hardware covered in these special provisions and plans.

HYDRAULIC SYSTEM

GENERAL

Hydraulic power unit and components necessary to raise and lower ferry ramp shall be as follows:

HYDRAULIC FLUID

Hydraulic fluid shall be Texaco #RANDO HD32

RESERVOIR

Capacity - 25 gallons
 Material - Steel
 Paint - Marine Enamel

Note: The following is a list of components that are to be contained in the reservoir and comprise the power unit which is to be painted with marine enamel.

PUMP MOUNTING BRACKET

Material - Aluminum
 Size - must accommodate 5HP TEFC "C" face motor and SAE "A" pump mounting pad

COUPLING

Material - Steel
 Size - Bore/motor - 1 1/8" W 1/4 keyway
 Bore/Pump - 5/8 w 5/32 keyway

PUMP

Positive Displacement 1.0in³/rev. gear type
Working Pressure - 3,000psi
Mat. Surge Pressure - 3,500psi
Mounting - SAE - 2 bolt
Port size - SAE 12
Port Location - Rear inlet and outlet
Shaft - 5/8" Dia. Woodruff key hardened steel
Gears - Sintered Metal
Seals - Buna N
Bearings - Pressure lubricated, teflon impregnated sleeve
Body and End Covers - Die Cast Aluminum

ELECTRIC MOTOR CURRITUCK

Totally Enclosed Fan Cooled
5 HP, 1750 RPM, Three Phase
Service Factor 1.1
Rated for operation on 208v system

ELECTRIC MOTOR KNOTTS ISLAND

Totally Enclosed Fan Cooled
5 HP, 1750 RPM, Single Phase
Service Factor 1.1
Rated for operation on 230v system

DIRECTIONAL CONTROL VALVE

4 way 3 position direct operated solenoid valve with manual overrides
Mounting - subplate
Size - 1/4" ANSI DO3 standard
Electrical connection - Central terminal box
Solenoid - Wet pin type 120 volt coil, 60 hz
Spool - all ports connected to tank in center and cross over positions
Max Pressure @ P, A, and B ports - 4600psi
Max Tank Pressure - 1450psi

FLOW INTEGRATOR

Type - Proportional nonadjustable with free reverse flow
Pressure - 3000psi
Rated Flow - 8 to 16 GPM
Port Size - ½"
Ratio - 50:50
Manufacturer - Brand #B-300

FILTER

Type - full flow in line return with by pass and spin-on throw away element
Rated Flow - 20 GPM
Rated Pressure - 2 psi
Filtration - 10 micron
By Pass Pressure - 15 psi
Port Size - ¾" NPTF

BREATHER CAP

Air Displacement - 500 GPM
Strainer - Nylon
Cap - Nickel Chrome plated
Air Filtration - 15 microns

RELIEF VALVE

Type - Direct Operated Cartridge
Pressure - 3000psi
Operator - Hand knob
Response - 20 milliseconds
Seals - Buna N

MANIFOLD

Type - Inline Bar
Pattern - N.F.P.A. DO3
Material - 6061-T6 Aluminum
Thread Size - Pressure and tank ports SAE 7/8-14, A & B ports SAE ¾-16, gauge port ¼ NPT

CHECK VALVE

Type - Pilot operated sandwich plate design
Pattern – A.N.S.I. DO3
No. of Service Ports - 2
Cartridge Type - Poppet/seat
Cracking Pressure – 22 psi
Seals - Buna N
Max Pressure - 4600 psi
Flow Rating - 16 GPM

FLUID LEVEL INDICATOR

Size - 127 MM Center Line Distance between screws
Pressure – capable of 29 psi
Seals - Perbunan
Thermometer Registration - Fahrenheit
Body Material – Galvanized steel

FLOW CONTROL VALVE

Type – Full flow one direction, metered flow opposite direction with knurled knob option
Max Pressure - 5000 psi
Size - ½” NPT
Material - 416 Stainless
Maximum flow – 12 GPM

PRESSURE GAGE

Design - Liquid filled with over pressure valve
Case Material – Stainless Steel
Case Diameter – 2 ½”
Max Temperature - 50C
Connection - ¼” NPT
Accuracy - 1.6%

F-4700

THE FOLLOWING IS A LIST OF COMPONENTS TO BE SHIPPED SEPARATE FORM THE POWER UNIT

HYDRAULIC CYLINDERS

Bore - 3 ¼"
Stroke - 72"
Mounting Style - MP1
Rod Size - 1 3/8" diameter
Stop Type - 1"
Piston Seals - Lip Type
Rod Material - 316 Stainless steel
Rod End Style - #1
Pressure - 3000psi
Paint - Marine enamel

ROD CLEVIS

Thread Size - 1"-14
Pin Size - 1"
Load Rating - 12,000 lbs
Material - 316 Stainless steel

ROD CLEVIS PIN AND FIXED CLEVIS PIN

Diameter - 1"
Load Rating - 12,000 lbs
Material - 316 Stainless steel

TUBING

Nominal Size - ½" OD
Wall thickness - 0.49"
Nominal Size - ¾" OD
Wall thickness - 0.72"
Material - Stainless Steel seamless tubing
Specifications - ASTM A-269, Mil Spec 8808
Rockwell Hardness - 80 or less for use with 37 degree JIC adaptors
Rating - 3000psi

ADAPTORS

Nominal size - 1/2" and 3/4"

Type Connection - 37 degree JIC

Material - Stainless steel

Rating - 3000 psi

Note: Terminations are to be made with manufacturers procedures & equipment

FLEXIBLE HOSE

Flexible high pressure hose shall be used to connect hard mounted stainless steel tubing to the hydraulic power unit and hoist cylinders and in the messenger cable hangers between the platform and the support structure.

Nominal size - 1/2" and 3/4"

Material - Stainless steel braid with outer non-metallic sunlight resistant jacket

Fittings - Stainless steel

Rating - 3000 psi

STRAPS AND HARDWARE

Stainless steel tubing is to be strapped to the steel support structure at intervals not to exceed 4 feet. Straps are to be stainless steel. All mounting hardware including plates, angle, and fasteners is to be stainless steel.

WIRE ROPE BLOCK LUBRICATING SYSTEM

CENTRAL LUBRICATING SYSTEM

Design - Stackable subplate consisting on inlet section and end section

Operation - Positive displacement series flow, manually operated

No. of Outlets - 4

Max Pressure - 3500 psi

Lubricant - Oil and grease

Flow Rate - 38 in³/min

Displacement - 0.020 in³

Finish - corrosion Resistant nickel plated

Indicator - Lube Count Pin

System to be Lubriquip EZ Luber or approved equal

LUBRICATION TUBING

Construction - Copper tubing meeting ACR specifications

Size - 1/4" OD wall thickness 0.030"

Rating - 1250 psi working pressure, 5000 psi ultimate burst

FLEXIBLE HOSE

From the wire rope block center pin to tubing hard mounted on structure a flexible hose shall be installed.

Construction - Double stainless steel braid with outer sunlight resistant non-metallic jacket

Rating - 3000 psi

RAMP SUPPORT AND COUNTERWEIGHT SYSTEM COMPONENTS

WIRE ROPE

The wire rope used in the support and movement of the ramp and counterweights is to meet the following requirements:

Size	3/4"
Stranding	6 X 25
Core	IWRC
Lay	Right Land Lay
Material	Improved Plow Steel
Breaking Strength	25.6 tons

THIMBLES

For all terminations requiring the use of thimbles, they are to meet the following requirements:

Construction	Galvanized steel
Type	USS Heavy Wire Rope
Size	3/4"
Width of Opening (Min)	2"
Length of Opening (Min)	3 3/4"
Depth	1 1/16"
Overall Length	6 1/2"
Overall Width	3 3/4"

WIRE ROPE CLIP

Wire Rope clips are to be 3/4" for use with 3/4" wire rope. Clip is to have a 5/8" diameter U-bolt minimum. The base is to be of steel and be drop forged. The clip is to be hot dipped galvanized.

A minimum of four clips is to be used for each termination. The first clip is to be installed tight against the thimble with each additional clip located a minimum of four inches apart. The clips are to be installed with the base against the live end and the U-bolt against the dead end. After the wire rope has been placed in tension, the nuts shall be tightened again to compensate for any decrease in rope diameter.

CHAIN

Chain used with the hydraulic hosts shall be 5/8" trade size grade 28 hot dipped galvanized with a minimum working load of 6,900 pounds. Chain dimensions shall conform to NACM specifications for 5/8" chain. Dimensions of the chain link shall allow the passing of a 3/4" pin through any link in the chain. The eye of a 5/8" screw pin shackle shall be able to pass through an end link.

SCREW PIN SHACKLE

Wire rope blocks are to be furnished in the location and quantities shown on the plans and listed in the special provisions.

The wire rope block is to be 14" for use with 3/4" wire rope with a working load minimum of 8 tons. The block shall be furnished with a shackle with the shackle opening axis mounted parallel to the sheave bearing pin. The sheave is to be mounted on a bronze bearing with provisions for pressure lubrication of the bearing through the center pin.

The wire rope block is to be hot dipped galvanized.

The block is to be Brewer-Titchener #40990K with F1G8 bearing or equal.

The contractor must ensure that block and shackle dimensions are compatible with support structure shown on the plans.

HYDRAULIC POWER UNIT ENCLOSURE

The enclosure and drip pan details are shown on the plans.

It is the responsibility of the contractor to ensure compatibility of the dimensions of the enclosure with the power unit approved to be furnished. All hardware on the enclosure is to be stainless steel. The enclosure is to be constructed from a minimum of 16 gauge 304 stainless steel. The angle base and mounting plates are to be of 304 alloy. The contractor shall furnish the enclosure fabricator a foot print of the power unit to location and drilling of the mounting plates.

SPARES TO BE FURNISHED

The following items are to be furnished to Currituck Ferry Operations as spares for this project”

Quantity	Description
2	Spare hydraulic cylinders filled with hydraulic fluid and plugged
8	Wire rope blocks complete
1	Three phase 5HP spare hydraulic pump motor
1	Single phase 5HP spare hydraulic pump motor

BASIS OF PAYMENT

Payment for the ramp lift system shall be at the lump sum contract price for “Ramp Lift and Lubrication System at _____”. This price and payment shall be full compensation for furnishing all materials, equipment, labor, tools, and incidentals required to install the ramp lift and lubrication system complete and operational as detailed on the plans in a workmanlike manner and satisfactory to the Engineer.

CONCRETE COUNTERWEIGHTS

(SPECIAL)

Description:

The work covered in this special provision covers furnishing and installing two new concrete counterweights for each lift bent to assist the mechanical hoists in raising and lowering the ramp.

Materials:

Concrete counterweights shall consist of Class "A" concrete, reinforcing steel, eye bolts, steel plates and bolts in accordance with the Standard Specifications and plans.

Furnishing:

Each concrete counterweight shall be of the same weight with dimensions of the counterweights as indicated on plans. The depth of the counterweight shown as 7'-0" on the plans may vary depending on the unit weight of cured concrete mix used. The weight of each counterweight shall be between 1400 Lbs. and 700 Lbs. less than 1/2 the ramp reaction at the lift bent. Reactions of the ramp at the lift bents and dimensions and weight of counterweights as indicated on the plans are approximate. The Contractor shall furnish the Engineer checked calculations and sketches of ramp reaction at, lift bent and weight and volume of concrete to be used and steel in each counterweight.

Calculations shall be based on scale weights of ramp materials, and weight per cubic foot of cured concrete mix to be used in the counterweight. Dimensions of counterweight should be such that operation of ramp will not be interfered with by the movement of the counterweight. The Contractor shall use a dynamometer to determine reactions in calculating counterweight weights.

The concrete portion of the counterweight shall represent (±) 95% of the total required weight as calculated above. The remainder of the weight necessary to ensure the desired balance with the hydraulic system and proper operation of the ramp shall be determined in the field.

Temporary removable weights may be used to determine the number of steel plates needed for proper operation of the ramp. The final quantity of steel plates to be added to the concrete shall be as directed by the Engineer.

Installation:

Counterweights shall be assembled as shown on the plans and with ramp in a horizontal position, counterweight wire rope shall be attached to provide free movement of at least 5'-0" above and below the horizontal position, thimbles shall be used where wire-rope is connected to eyebolts or u-bolts. Ends of wire rope shall be secured with a minimum of 4 wire rope clips.

Compensation:

There will be no direct payment for the work covered in this special provision. Payment shall be included in the contract lump sum price bid for the Ramp Lift and Lubrication System at each ramp.

STEEL BEAM GUARDRAIL:

(SPECIAL)

The steel beam guardrail & posts shall be in accordance with Section 862 of the Standard Specifications except that the payment shall be made under

Steel Beam GuardrailLinear Feet