



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J. ERIC BOYETTE
SECRETARY

September 14, 2022

Addendum No. 1

RE: Contract # C204775

WBS # 50346.3.1

FEDERAL AID # 0064216

Dare County (HB-0017)

BRIDGE #9 ON US-64 IN MANNS HARBOR.

September 20, 2022 Letting

To Whom It May Concern:

Reference is made to the plans and proposal form furnished to you on this project.

The following revisions have been made to the Structures plans.

Sheet No.	Revision
S-1	Scope of Work notes: Notes 9 & 10 have been revised to remove Bent 165.
S-15	Bill of Materials: The Concrete Deck Repair for MMA Overlay quantity has been revised to 24.6 CF.
S-51	Summary of Quantities: The Concrete Deck Repair for MMA Overlay quantity has been revised to 1.7 CF for Span 126.
S-97	Summary of Quantities: The Concrete Deck Repair for MMA Overlay quantity has been revised to 0.1 CF for Span 275.

Please void the above listed Sheets in your plans and staple the revised Sheets thereto.

The following revisions have been made to the proposal.

Page No.	Revision
Proposal Cover	Note added that reads "Includes Addendum No. 1 Dated 09-14-2022".

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
CONTRACT STANDARDS AND DEVELOPMENT
1591 MAIL SERVICE CENTER
RALEIGH, NC 27699-1591

Telephone: (919) 707-6900
Fax: (919) 250-4127
Customer Service: 1-877-368-4968

Location:
1020 BIRCH RIDGE DR.
RALEIGH, NC 27610

Website: www.ncdot.gov

Page No.	Revision
BP-7 to BP-12	Unit Project Special Provision entitled STRUCTURES revised. "CONCRETE DECK REPAIR FOR METHYL METHACRYLATE OVERLAY" provision was revised. The language to begin work within 60 days of notification has been deleted from "General" section.
BP-13 to BP-14	Unit Project Special Provision entitled STRUCTURES revised. "CONCRETE DECK REPAIR FOR METHYL METHACRYLATE OVERLAY" provision was revised. Language for Class II Surface Preparation, Class III Surface Preparation, and Concrete Deck Repair for Methyl Methacrylate Overlay in the "Measurement and Payment" section has been revised.
BP-15 to BP-17	Unit Project Special Provision entitled STRUCTURES revised. "CONCRETE BRIDGE DECK CRACK SEALING" provision was revised. "Surface Preparation" section revised, bullets added and revised. Shotblasting for the HMWM deck sealer has been incorporated in the provision.
BP-18 to BP-38	Unit Project Special Provision entitled STRUCTURES revised. "CONCRETE BRIDGE DECK CRACK SEALING" provision was revised. "Limitations of Operations" section revised. Language for Concrete Bridge Deck Crack Sealing in the "Measurement and Payment" section was revised.

Please void the above listed existing Pages in your proposal and staple the revised Pages thereto.

On the item sheets the following pay item revision has been made:

<u>Item</u>	<u>Description</u>	<u>Old Quantity</u>	<u>New Quantity</u>
0033-8820000000-E-SP	CONCRETE DECK REPAIR FOR MMA OVERLAY	23.1 CF	24.6 CF

The Contractor's bid must include this pay item revision.

The electronic bidding file has been updated to reflect this revision. Please download the Addendum File and follow the instructions for applying the addendum. Bid Express will not accept your bid unless the addendum has been applied.

The contract will be prepared accordingly.

Sincerely,

DocuSigned by:
Ronald Elton Davenport, Jr.
F81B6038A47A442...

Ronald E. Davenport, Jr., PE
State Contract Officer

RED/cms
Attachments

cc: Mr. Boyd Tharrington, PE
Mr. C. W. "Win" Bridgers, PE
Mr. Jon Weathersbee, PE
Mr. Ken Kennedy, PE
Project File (2)

Mr. Forrest Dungan, PE
Ms. Jaci Kincaid
Mr. Kyle Kempf
Ms. Lori Strickland
Mr. Mike Gwyn
Ms. Penny Higgins

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH, N.C.

PROPOSAL

INCLUDES ADDENDUM No.1 DATED 09-14-2022

DATE AND TIME OF BID OPENING: **Sep 20, 2022 AT 02:00 PM**

CONTRACT ID C204775
WBS 50346.3.1

FEDERAL-AID NO. 0064216
COUNTY DARE
T.I.P NO. HB-0017
MILES 2.700
ROUTE NO. US-64
LOCATION BRIDGE #9 ON US-64 IN MANNS HARBOR.

TYPE OF WORK BRIDGE PRESERVATION.

NOTICE:

ALL BIDDERS SHALL COMPLY WITH ALL APPLICABLE LAWS REGULATING THE PRACTICE OF GENERAL CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA WHICH REQUIRES THE BIDDER TO BE LICENSED BY THE N.C. LICENSING BOARD FOR CONTRACTORS WHEN BIDDING ON ANY NON-FEDERAL AID PROJECT WHERE THE BID IS \$30,000 OR MORE, EXCEPT FOR CERTAIN SPECIALTY WORK AS DETERMINED BY THE LICENSING BOARD. BIDDERS SHALL ALSO COMPLY WITH ALL OTHER APPLICABLE LAWS REGULATING THE PRACTICES OF ELECTRICAL, PLUMBING, HEATING AND AIR CONDITIONING AND REFRIGERATION CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA. NOTWITHSTANDING THESE LIMITATIONS ON BIDDING, THE BIDDER WHO IS AWARDED ANY FEDERAL - AID FUNDED PROJECT SHALL COMPLY WITH CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA FOR LICENSING REQUIREMENTS WITHIN 60 CALENDAR DAYS OF BID OPENING.

BIDS WILL BE RECEIVED AS SHOWN BELOW:

THIS IS A ROADWAY & STRUCTURE PROPOSAL

5% BID BOND OR BID DEPOSIT REQUIRED

cured properly, remove the block out and install elastomeric concrete as described in the Elastomeric Concrete special provision.

For joint repairs utilizing strip seals, secure the strip seal retainer rails in final position to match existing grade and cross slope. Furnish falsework to support retainer rails during installation as described in the Strip Seal special provision.

For joint repairs with sidewalk or curb sections including cover plates, remove the existing cover plates and replace with new cover plates or modify the existing cover plates and re-install as shown in the plans.

Secure screed rail guides in position to ensure finishing the surface to the required profile and cross slope. Do not treat screed rails with parting compound to facilitate their removal.

Completely clean all surfaces of grease, oil, curing compounds, acids, dirt, or loose debris within 24 hours of placing concrete. Thoroughly soak and cover existing concrete surfaces for a minimum of two (2) hours prior to placing concrete. Remove any standing water from the repair area surface prior to placing concrete.

PLACING AND FINISHING

Construction joints other than those shown on the plans will not be permitted unless approved by the Engineer.

Prior to placement, the air temperature, wind speed, and evaporation rate shall be determined by the Contractor and verified by the Engineer. Do not place concrete if the ambient air temperature is below 45°F or above 85°F, or if the wind velocity is in excess of 10 mph.

If the rate of evaporation of surface moisture exceeds 0.10 pounds per square foot per hour during placement, measures shall be taken to reduce the rate of evaporation. The evaporation rate is calculated using the following formula:

$$E = (T_c^{2.5} - r \cdot T_a^{2.5}) \cdot (1 + 0.4V) \cdot (10^{-6}) \quad \text{where,}$$

E = Evaporation Rate,

T_c = Concrete Temp (°F),

r = Relative Humidity (%/100)

T_a = Air Temp (°F),

V = Wind Velocity (mph)

Do not place concrete if the predicted air temperature at the site will be less than 35°F within 72 hours after placement. For a predicted air temperature above 35°F but below 50°F, use insulation to protect the concrete for a period of at least 48 hours. Use insulation that meets the requirements of Subarticle 420-7(C) of the *Standard Specifications* and place on fresh concrete surfaces as soon as initial set permits. Do not remove the insulation during the wet curing period unless the ambient air temperature is at least 40°F and rising.

Place the concrete monolithically in one operation. Concrete shall not be placed in layers. Sections to be reconstructed are to be filled full depth and shall progress horizontally. Deviation from this procedure shall be cause for rejection.

Stop all placement operations during periods of precipitation. Keep an adequate quantity of protective coverings at the worksite and take adequate precautions to protect the freshly placed concrete from precipitation.

When a tight, uniform surface is achieved and before the concrete becomes non-plastic, finish the top surface of the deck repair by burlap dragging or other approved method that produces an acceptable uniform surface texture.

As soon as the surface supports burlap without deformations, cover the surface with two layers of clean, wet burlap. Drain excess water from the burlap before placement. Other wet cure methods are permitted but must be approved by the Engineer prior to start of placement.

Wet cure the concrete a minimum of three (3) hours or until 4,500 psi compressive strength is obtained.

After the concrete has hardened sufficiently, test the finished surface with a straightedge that is designed, constructed, and adjusted such that it will accurately indicate or mark all floor areas which deviate from a plane surface by more than $\frac{1}{8}$ " in 10 feet. Remove all high areas in excess of $\frac{1}{8}$ " in 10 feet with an approved grinding or cutting machine. Where variations are such that the corrections extend below the limits of the top layer of grout, seal the repaired surface with an approved sealing agent. Methods for correcting low areas shall be approved by the Engineer.

Groove finished concrete surfaces unless otherwise shown in the plans.

LIMITATIONS OF OPERATIONS

No vehicular or construction traffic is permitted on finished concrete prior to achieving a compressive strength of 4,000 psi.

If working at night, provide approved lighting

Measurement and Payment

Concrete Work for Joint Replacement will be measured and paid for at the contract unit price bid per square feet and will be full compensation for removal, containment and disposal off-site of unsound concrete, placement and finishing of repair concrete, curb section repairs and work to install expansion joint cover plates, and shall include the cost of labor, tools, equipment and incidentals necessary to complete the repair work.

Pay Item	Pay Unit
Concrete Work for Joint Replacement	Square Feet

BRIDGE JOINT DEMOLITION**(SPECIAL)****DESCRIPTION**

This provision addresses the removal of existing joint material and adjacent concrete to facilitate the installation of new bridge joints at the locations noted in the contract plans.

EQUIPMENT

Use the following surface preparation equipment:

- Sawing equipment capable of sawing concrete to a specified depth.
- Power driven hand tools for removal of concrete are required that meet the following requirements:
 1. Pneumatic hammers weighing a nominal 15 lbs (7 kg) or less.
 2. Pneumatic hammer chisel-type bits that do not exceed the diameter of the shaft in width.
- Hand tools such as hammers and chisels for removal of final particles of concrete.

REMOVAL AND PREPARATION

Prior to any construction, take the necessary precautions to ensure debris from joint construction is not allowed to fall below the bridge deck.

Remove existing joint material by methods approved by the Engineer. Provide a 1" deep saw cut around the perimeter of areas noted for bridge deck removal.

Remove by chipping with hand tools concrete adjacent to the joint to the limits shown on the contract plans. Use a small chipping hammer (15 lb. class) to prepare the edges of the repair area to limit micro fractures. In addition, all loose and unsound concrete shall be removed.

In overhangs, removing concrete areas greater than 0.60 ft²/ft length of bridge will require overhang support. Submit the overhang support method to the Engineer for approval.

Care shall be taken not to cut, stretch, or damage any exposed reinforcing steel. Dispose of the removed concrete.

If the condition of the concrete is such that deep spalls or sheer faces result, notify the Engineer for the proper course of action.

Clean, repair or replace rusted or loose reinforcing steel. Thoroughly clean the newly exposed surface to be free of all grease, oil, curing compounds, acids, dirt, or loose debris.

CLEANUP

Clean bent caps of debris after joint work is complete. All debris generated by joint repair work shall become the property of the Contractor. The Contractor shall be responsible for disposing of

all debris generated by sawing, chipping, shotblasting, sandblasting, and any other surface preparation operations, in compliance with applicable regulations concerning such disposal.

All costs associated with management and disposal of all debris shall be included in the payment of other items.

MEASUREMENT AND PAYMENT

Bridge Joint Demolition will be measured and paid for at the contract unit price bid per square foot and will be full compensation for removal, containment and disposal of existing joint material and concrete and shall include the cost of labor, tools, equipment and incidentals necessary to complete the work.

Pay Item	Pay Unit
Bridge Joint Demolition	Square Feet

ELASTOMERIC CONCRETE FOR PRESERVATION (2-11-19)

DESCRIPTION

Elastomeric concrete is a mixture of a two-part polymer consisting of polyurethane and/or epoxy and kiln-dried aggregate. Provide an elastomeric concrete and binder system that is preapproved. Use the concrete in the blocked-out areas on both sides of the bridge deck joints as indicated on the plans.

MATERIALS

Provide materials that comply with the following minimum requirements at 14 days (or at the end of the specified curing time).

ELASTOMERIC CONCRETE PROPERTIES	TEST METHOD	MINIMUM REQUIREMENT
Compressive Strength, psi	ASTM D695	2000
5% Deflection Resilience	ASTM D695	95
Splitting Tensile Strength, psi	ASTM D3967	625
Bond Strength to Concrete, psi	ASTM C882 (C882M)	450
Durometer Hardness	ASTM D2240	50

BINDER PROPERTIES (without aggregate)	TEST METHOD	MINIMUM REQUIREMENT
Tensile Strength, psi	ASTM D638	1000

Ultimate Elongation	ASTM D638	150%
Tear Resistance, lb/in	ASTM D624	200

In addition to the requirements above, the elastomeric concrete must be resistant to water, chemical, UV and ozone exposure and withstand temperature extremes. Elastomeric concrete systems requiring preheated aggregates are not allowed.

PREQUALIFICATION

Manufacturers of elastomeric concrete materials shall submit samples (including aggregate, primer and binder materials) and a Type 3 certification in accordance with Article 106-3 of the *Standard Specifications* for prequalification to:

North Carolina Department of Transportation
Materials and Tests Unit
1801 Blue Ridge Road
Raleigh, NC 27607

Prequalification will be determined for the system. Individual components will not be evaluated, nor will individual components of previously evaluated systems be deemed prequalified for use.

The submitted binder (a minimum volume of 1 gallon) and corresponding aggregate samples will be evaluated for compliance with the Materials requirements specified above. Systems satisfying all of the Materials requirements will be prequalified for a one (1) year period. Before the end of this period new product samples shall be resubmitted for prequalification evaluation.

If, at any time, any formulation or component modifications are made to a prequalified system that system will no longer be approved for use.

INSTALLATION

The elastomeric concrete shall not be placed until the reinforced concrete deck slab or overlay has cured for seven (7) full days and reached a minimum strength of 3,000 psi.

Provide a manufacturer's representative at the bridge site during the installation of the elastomeric concrete to ensure that all steps being performed comply with all manufacturer installation requirements including, but not limited to: weather conditions (ambient temperature, relative humidity, precipitation, wind, etc.), concrete deck surface preparation, binder and aggregate mixing, primer application, elastomeric concrete placement, curing conditions and minimum curing time before joint exposure to traffic. Do not place elastomeric concrete if the ambient air or surface temperature is below 45°F.

Prepare the concrete surface within 48 hours prior to placing the elastomeric concrete. Before placing the elastomeric concrete, all concrete surfaces shall be thoroughly cleaned and dry. Sandblast the concrete surface in the block-out and clear the surface of all loose debris. Do not place the elastomeric concrete until the surface preparation is completed and approved.

Prepare and apply a primer, as per manufacturer’s recommendations, to all concrete faces to be in contact with elastomeric concrete, and to areas specified by the manufacturer.

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 two (2) hours after applying the primer. Trowel the elastomeric concrete to a smooth finish.

The joint opening in the elastomeric concrete shall match the formed opening in the concrete deck prior to sawing the joint.

FIELD SAMPLING

Provide additional production material to allow freshly mixed elastomeric concrete to be sampled for acceptance. A minimum of six (6) 2-inch cube molds and three (3) 3-inch diameter x 6-inch cylinders will be taken by the Department for each day’s production. Compression, splitting tensile, and durometer hardness testing will be performed by the Department to determine acceptance. Materials failing to meet the requirements listed above are subject to removal and replacement at no cost to the Department.

BASIS OF PAYMENT

Elastomeric Concrete for Preservation will be measured and paid for at the contract unit price bid per cubic foot and will be full compensation for material, labor, tools, and equipment necessary for satisfactorily installing the elastomeric concrete in place.

Pay Item	Pay Unit
Elastomeric Concrete for Preservation	Cubic Feet

CONCRETE DECK REPAIR FOR METHYL

(SPECIAL)

METHACRYLATE OVERLAY

GENERAL

This provision addresses concrete deck repairs prior to placing a methyl methacrylate (MMA) overlay. After surface preparation, the Engineer sounds the deck using a chain drag or other acceptable means and marks areas to be repaired.

MATERIALS

Concrete deck repair material shall have a minimum modulus of elasticity of 2500 ksi. The repair material must be on the NCDOT Approved Product List (APL) and recommended by the MMA manufacturer for use with an MMA overlay system. Materials containing cement mortar are acceptable; however, a 28-day curing period will be required before placing the MMA overlay. The curing period may be adjusted if approved by the MMA overlay

manufacturer and the Engineer. Submit the proposed repair material and schedule of repairs to the Engineer for approval prior to beginning the work.

CLASS II SURFACE PREPARATION (PARTIAL DEPTH DECK REPAIR)

Saw cut a perimeter surrounding the repair to a depth not less than ½” inch and remove all loose, unsound, and contaminated material by chipping with hand tools to an average depth of approximately one-half the deck thickness, but no less than ¾ inch below the top mat of steel. Clean, remove rust, repair, or replace rusted or loose reinforcing steel. Care shall be taken not to cut, stretch, or damage any exposed reinforcing steel. Thoroughly clean the newly exposed surface. Use a bonding agent in accordance with the manufacturer’s recommendations.

CLASS III SURFACE PREPARATION (FULL DEPTH DECK REPAIR)

Saw cut a perimeter surrounding the repair to a depth not less than ½” inch and remove by chipping with hand tools the full depth of slab. Dispose of the removed concrete, clean, repair or replace damaged reinforcing steel and thoroughly clean the newly exposed surface. Care shall be taken not to cut, stretch, or damage any exposed reinforcing steel.

For areas of less than 3 ft² suspending forms from existing reinforcing steel using wire ties is permitted. For larger areas, support forms by blocking from the beam flanges, or other approved method.

Overhang support is required for full depth removal adjacent to bridge rails. Submit details of overhang support to the Engineer for approval prior to beginning the work.

Under Deck Containment: Under deck containment shall be installed where Class III surface preparation occurs. The containment shall be installed prior to demolition in the areas where full depth removal is required.

Submit for approval detailed plans for the under deck containment system. Detail how waste and debris are contained.

APPLICATION

Refill areas where concrete is removed with repair material up to the finished deck surface and cure in accordance with the material manufacturer’s recommendations. Provide a raked finish.

MEASUREMENT & PAYMENT

Class II Surface Preparation will be measured and paid for at the contract unit price per square yard and will be full compensation for Class II (partial depth) deck preparation where required by the plans. The cost will also include removal and disposal of unsound and contaminated concrete, removal of all existing patches, cleaning, repairing or replacing of reinforcing steel, placing and finishing concrete for partial depth repair and all labor, tools, equipment and incidentals necessary to complete the work.

Class III Surface Preparation will be measured and paid for at the contract unit price per square yard and will be full compensation for Class III (full depth) deck preparation and repair where required by the plans. The cost will also include removal and disposal of unsound and contaminated concrete, cleaning, repairing or replacing of reinforcing steel, under deck containment, placing and finishing concrete for full depth repair, and for furnishing all labor, tools, equipment and incidentals necessary to complete the work.

Concrete Deck Repair for Methyl Methacrylate Overlay will be measured and paid for at the contract unit price per cubic feet of material for the appropriate areas repaired.

Reinforcing Steel that is required for the repairs will be in accordance with Section 425 of the *Standard Specifications*.

Payment will be made under:

Pay Item	Pay Unit
Class II Surface Preparation	Square Yard
Class III Surface Preparation	Square Yard
Concrete Deck Repair for MMA Overlay	Cubic Feet

CONCRETE BRIDGE DECK CRACK SEALING

(SPECIAL)

DESCRIPTION

This work consists of sealing and filling full depth cracks in concrete bridge decks prior to the application of the bridge deck overlay. The crack sealer shall be High Molecular Weight Methacrylate (HMWM) in accordance with this provision and as indicated on the plans, or as approved by the Engineer.

Bridge deck crack pretreatment work includes: underdeck sealing of full depth cracks with non-sag epoxy gel or appropriate product approved by the Engineer, gravity filling of the cracks with HMWM, and any incidentals necessary to complete the project, as specified or as indicated on the plans.

SUBMITTALS

The Contractor shall submit for approval the following requested items and any other relevant documents:

- A manufacturer’s safety data sheet (MSDS) for each shipment of the material components.
- HMWM material information and manufacturer’s written installation instructions..
- Certification from an independent testing laboratory that the materials meet the requirements of these provisions.
- The dates of manufacture of the polymer materials, their lot numbers and date of shelf-life expiration for each lot number.
- A table indicating the likely cure time in minutes for the allowable ambient temperature range, in increments of 10° F (6° C).

MATERIAL DELIVERY AND STORAGE

Sufficient quantities of all HMWM materials shall be stored at the site to perform the entire application. These materials shall be stored in their original containers and according to the manufacturer’s directions. These containers must bear the manufacturer’s label. The label must indicate the manufacture date, the batch number, the trade name brand, and quantity. Containers of promoters and initiators shall be stored in a manner that prevents leakage or spillage. The containers and measuring devices shall not be stored in a manner that allows leakage or spilling to contact the containers or materials of the other.

MANUFACTURER’S REPRESENTATIVE

A manufacturer’s representative shall be on site for the initial stages of the work, to provide expert assistance on storage, mixing, application, clean-up, and disposal of materials.

MATERIALS

1) Non-Sag Epoxy Gel

The non-sag epoxy gel for sealing the underside of bridge deck cracks shall meet the requirements of the *NCDOT Standard Specifications* for Type 1 Epoxies. Other appropriate products may be submitted for review and approval by the Engineer.

2) High Molecular Weight Methacrylate (HMWM) Concrete Deck Sealer

Sealer for the bridge concrete deck surface shall be a low odor, high molecular weight methacrylate sealer and consist of a resin, initiator, and promoter. The sealer shall conform to requirements indicated in Table 1, below, and all components shall be supplied by a single manufacturer.

Initiator for the methacrylate resin shall consist of a metal drier and peroxide. If supplied separately from the resin, the metal drier shall not be mixed with the peroxide directly; a VIOLENT EXOTHERMIC REACTION will occur. The containers and measuring devices shall not be stored in a manner that allows leakage or spilling to contact the containers or materials of the other.

**Table 1
HIGH MOLECULAR WEIGHT METHACRYLATE RESIN PROPERTIES
(Tested yearly)**

Property	Test Method	Requirement
Viscosity**	ASTM D 2196	25 cps maximum (Brookfield RVT with UL adapter, 50 RPM at 77 °F)
Volatile Content**	ASTM D 2369	30 percent, maximum
Specific Gravity**	ASTM D 1475	0.90 minimum at 77 °F
Flash Point	ASTM D 3278	180 °F minimum
Vapor Pressure**	ASTM D 323	0.02 psi (140 Pa or 1.0 mm Hg) maximum at 77 °F (25°C)
Tensile Strength 75 ± 5° F	ASTM D638	1,500 psi minimum

Solids Content		100% by weight
**Test shall be performed before initiator is added		

Aggregates

Sand for abrasive sand finish or filling of large cracks shall have the following properties:

- (A) Commercial-quality blast sand.
- (B) Gradation as per AASHTO Test Method T27:

Sieve Size	Percent Passing
No. 8	100
No. 16	80 – 100
No. 40	0 - 7

- (C) Shall be dry at the time of application.

SURFACE PREPARATION

If any areas of the concrete bridge deck require repairs for spalls or delaminations, the repairs shall be completed prior to surface preparation and placement of the HMWM. Any cure time of the concrete deck repair material, as required by the HMWM manufacturer, shall be completed prior to placement of the HMWM.

The surface of concrete deck shall be prepared for application of the HMWM sealer by shotblasting or abrasive sandblasting in order to remove all existing grease, slurry, oils, paint, dirt, striping, curing compound, rust, membrane, weak surface mortar, or any other contaminants that could interfere with the proper adhesion, penetration, and filling of the crack and the curing of the HMWM sealer material.

The final prepared surface shall adhere to the following requirements:

- (A) Apply a seal strip of epoxy gel over full depth cracks in the bottom of the deck slab. Grinding or light abrading of the concrete may be required for adhesive bonding.
- (B) The areas to receive deck seal treatment shall be cleaned by shotblasting, or abrasive sandblasting in the event that the shotblaster cannot access areas to be prepared. The size of shot or sand, and travel speed of the equipment shall be selected to provide a uniformly clean surface with a uniform profile. Striping shall be removed to the maximum extent determined to be practical by the Engineer using up to 3 passes with shotblasting, sandblasting, or other approved equipment. Cleaned surfaces shall not be exposed to vehicular traffic unless approved by the Engineer. If the deck becomes contaminated before

placing the deck sealer, the Contractor shall shotblast or abrasive sandblast the contaminated areas to the satisfaction of the Engineer at no additional cost.

- (C) Prior to filling and sealing, cracks on the concrete bridge deck shall be protected from materials that can interfere with the filling of the crack and the curing of the HMWM crack filling material. Any loose particles shall be removed by magnets and oil free compressed air and vacuuming, such that no excess particles remain, just prior to placement of the HMWM. The concrete deck shall be completely dry. Power washing will not be allowed
- (D) Cracks wider than 0.10 inches (2.5 millimeters) may be filled with dry sand as prescribed in this Special Provision, prior to placement of the crack filling HMWM. Excess sand shall be removed from the deck surface prior to placement of HMWM.
- (E) Cleaning and preparation methods other than those detailed by this Special Provision may be suggested by the HMWM manufacturer and must be approved by the Engineer prior to implementation.

HMWM APPLICATION

Immediately before placing HMWM, all exposed surfaces shall be completely dry and blown clean with oil-free compressed air.

After the exposed surfaces have been prepared and are dry, HMWM shall be applied in accordance with the manufacturer's recommendations. Mixed HMWM shall be applied as soon as practical (approximately 5 minutes) and HMWM that exhibits an increase in viscosity and temperature shall not be placed on the concrete surface. An application rate of approximately one gallon per 100 square feet of deck is typically adequate. The application rate may vary depending on field conditions. The manufacturer's representative shall assist the Contractor in determining the application rates.

The mixed HMWM shall be applied directly to the deck, by flooding, and uniformly spread, allowing time for the polymer to seep down into the cracks, making additional applications until cracks are filled. The HMWM shall be worked across the bridge deck surface and into the cracks with a broom or squeegee. Regardless of the application method used, the polymer shall be applied in sufficient quantity and applications to fill cracks level with the top bridge deck surface. Excess HMWM shall be brushed off the surface prior to the polymer hardening.

For existing bridge decks that have grooving or tining at the time of HMWM application, particular care shall be taken to keep grooving or tining channels from filling with HMWM. For bridge decks that do not yet have grooving at the time of HMWM application, application of the HMWM crack sealer shall be completed prior to grooving of the deck surface, and grooving shall not be performed until the polymer has cured a minimum of 48 hours.

Sand, as prescribed in the Special Provision shall be broadcast over the applied HMWM at the minimum rate of 2.0 pound per square yard. The sand shall be broadcast as soon as practical and before the viscosity of the polymer begins to increase.

LIMITATIONS OF OPERATIONS

- HMWM material shall not be used after the shelf life date.
- If expansion joints are not being replaced or have been replaced prior to shotblasting, they shall be protected from damage from the shotblasting operation. Deck drains and areas of curb or railing above the proposed surface shall be protected from the shotblasting operation.
- All blast media and contaminants shall be picked up and stored in a vacuum unit and no dust shall be created during the blasting operation that will obstruct the view of motorists in adjacent roadways. Blast media and contaminants shall be stored, handled, and disposed of in accordance with all applicable local, state, and federal requirements.
- The Contractor shall cover and seal deck joints and elastomeric material in deck joints, plug deck drain scuppers, seal cracks on underside of deck, and use other necessary protective measures to prevent leakage of deck sealer below the concrete deck, to protect waterways, bridge components, traffic, roadway, and any other items or areas below the bridge.
- The Contractor shall assure that traffic is protected from rebound, dust, and construction activities. Appropriate shielding shall be provided as required and/or directed by the Engineer.
- The Contractor shall provide suitable coverings (e.g. heavy-duty drop cloths) as needed to protect all exposed areas not to receive deck sealer treatment, such as curbs, sidewalks, parapets, etc.
- All damage or defacement resulting from Contractor's operations shall be cleaned and/or repaired to the Engineer's satisfaction at no additional cost to the Department.
- Unless otherwise allowed by the Engineer, the HMWM may not be applied within 48 hours after a rain or when more than 10 percent probability of rain is forecast within 4 hours following the application.
- Prepared surfaces shall be protected from precipitation and heavy dew during and after the application of the HMWM.
- The work shall be conducted in a continuous operation, with the HMWM application immediately following surface preparation.
- HMWM treatment shall be applied only if the deck surface temperature and the air temperatures are between 50° F (10° C) and 90° F (32° C) and the weather forecast indicates air temperatures will remain within that range for at least twelve hours after the end of the application.
- The HMWM to be applied shall be suitable for use at the concrete temperature at the time of the application.
- The HMWM shall be applied during the lowest temperature period of the day, typically between 1:00 a.m. and 9:00 a.m., when the cracks are open to the greatest extent.
- Traffic shall not be permitted on the treated surface until the sand cover adheres sufficiently, so that no tracking will occur.

MEASUREMENT AND PAYMENT

Crack Pretreatment will be measured and paid for at the contract unit price per linear feet as specified. The contract bid price for such work shall be full compensation for surface preparation and sealing of underdeck cracks; and for all labor, tools, access, and incidentals necessary to complete the work.

Concrete Bridge Deck Crack Sealing will be measured and paid for at the contract unit price per square yard as specified. The contract bid price for such work shall be full compensation for bridge deck surface and crack preparation including shotblasting; for furnishing and applying the HMWM crack sealer and sand; for protection of waterways, bridge, and other nearby surfaces, vehicles, and pedestrians; and for all labor, tools, and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
Crack Pretreatment	Linear Feet
Concrete Bridge Deck Crack Sealing	Square Yard

METHYL METHACRYLATE SLURRY

(SPECIAL)

BRIDGE DECK OVERLAY SYSTEM

GENERAL

This work shall consist of furnishing and constructing protective wearing surface of a three-coat methyl methacrylate (MMA) system in which graded aggregates are bound together in slurry with a polymer binder and a broadcast extremely hard aggregate wearing course that is designed to provide a 3/8" thick overlay for the purpose of crack treatment, complete waterproofing, and providing a non-skid surface.

The overlay system shall be formulated and applied to withstand continuous heavy traffic, extreme changes in weather conditions, and deformations due to structure loading and temperature changes.

PERFORMANCE GUARANTEE

The Contractor shall provide a warranty bond to the Department, guaranteeing the wearing surface for a period of 36 months against the following defects: delamination of the MMA overlay from the deck surface, and skid resistance less than 40 as measured by AASHTO T242.

The guarantee period will start on the date of Department final acceptance of the project. This applies to the performance bond guarantee (12 month) and the warranty bond guarantee (36 month).

The performance bond will be invoked if 25 square feet of the deck surface meets the defect criteria prior to the end of the 12-month project guarantee period.

At the end of the 36-month warranty guarantee period, the warranty bond will be invoked if any part of deck surface meets the defect criteria, regardless of quantity.

The Contractor shall replace defective materials and workmanship at no cost to the Department. The Contractor will not be responsible for damage due to normal wear and tear, negligence on the part of the Department, or use in excess of the design.

The warranty bond amount shall be the bid quantity of MMA overlay multiplied by the statewide average unit bid price for the MMA overlay. The guarantee period of 36 months and bond value shall be specified in the warranty bond provided to the Department prior to final acceptance of the project.

MATERIALS

This three-coat MMA polymer overlay system shall be formulated to provide flexibility in the system without any sacrifice of the hardness, chemical resistance, or strength of the system.

The Contractor shall submit a Certified Test Report from independent labs for all the materials associated with the overlay in accordance with this special provision.

All components shall be shipped in strong, substantial containers, bearing the manufacturer's label specifying batch/lot number, brand name, and quantity. If bulk resin is to be used, the contractor shall notify the Engineer in writing ten (10) working days prior to the delivery of the bulk resin to the job site. Bulk resin is any resin that is stored in containers in excess of 55 gallons.

(A) MMA

MMA primer, resin, slurry, and topcoat shall conform to the following requirements:

MMA PRIMER PROPERTIES		
Property	Requirement	Test Method
Viscosity	100 cps maximum	ASTM D2393
Density	8.93 lb/gal (1.07 kg/L)	ASTM D2849
Pot Life	10 – 30 minutes	ASTM C881 at 70°F
Solids Content (w/ catalyst)	100%	ASTM 1644

MMA RESIN PROPERTIES		
Property	Requirement	Test Method
Viscosity	1100 - 1300 cps	ASTM D2393
Density	8.85 lb/gal (1.07 kg/L)	ASTM D2849
Pot Life	10 – 15 minutes	ASTM C881 at 70°F
Elongation at Break	14.5%	ASTM D638 Type I
Solids Content (w/ catalyst)	100%	ASTM 1644

MMA SLURRY PROPERTIES		
Property	Requirement	Test Method
Compressive Strength	2,000 psi, min	ASTM C579 Method B
Flexural Strength	700 psi, min	ASTM C580 Method A
Tensile Strength	600 psi, minimum	ASTM C307
Coefficient of Thermal Expansion	4.4 x 10 ⁻⁵ in/in/°F (111.8 c 10 ⁻⁵ mm/mm/°C)	ASTM D531

Tensile Adhesion (pull-off concrete)	>250 psi	ASTM 1583
Water Absorption	0.5 %/24h	ASTM D570

MMA TOPCOAT PROPERTIES		
Property	Requirement	Test Method
Viscosity	1100 - 1300 cps	ASTM D2393
Density	8.85 lb/gal (1.07 kg/L)	ASTM D2849
Pot Life	10 – 15 minutes	ASTM C881 at 70°F
Elongation at Break	14.5%	ASTM D638 Type I
Solids Content (w/ catalyst)	100%	ASTM 1644

(B) Aggregate

Aggregate for the MMA slurry shall be supplied with the MMA material and meet all manufacturer’s requirements.

Aggregate used for broadcast aggregate wearing course shall be non-friable, non-polishing, clean and free from surface moisture. Unless otherwise approved by the Engineer, the aggregate shall be flint rock, basalt, or calcined bauxite, 100% fractured, thoroughly washed and kiln dried to a maximum moisture content of 0.2% by weight, measured in accordance with ASTM C566. The fracture requirements shall be at least one mechanically fractured face and will apply to materials retained on a U.S. No. 10 sieve. Calcined bauxite shall have a minimum aluminum oxide content of 87%, in accordance with ASTM C25. Aggregate shall conform to the following requirements:

AGGREGATE PROPERTIES		
Property	Value	Test Method
Moisture Content, max.	0.2% by weight	AASHTO T255
Mohs Hardness, min.	7	
Soundness Loss, 5 cycles in Sodium Sulfate, max.	5.4%	AASHTO T104
Micro-Deval, max.	10%	AASHTO T327

AGGREGATE GRADATION	
Sieve	Percent Passing
No. 4	100
No. 8	30-75
No. 16	Max. 5
No. 30	Max. 1

AGGREGATE ABSORPTION PROPERTIES		
Aggregate Type	Value	Test Method
Flint	< 3.5%	ASTM C128
Basalt	< 2%	ASTM C128
Calcined Bauxite	< 1.5%	ASTM C128

SURFACE PREPARATION

Remove all existing overlays if applicable, and all loose, disintegrated, unsound or contaminated concrete from the bridge deck. Necessary repairs to the concrete bridge deck shall be done accordance with *Concrete Deck Repair for Methyl Methacrylate Overlay*; repair material shall be compatible with the MMA overlay system. Prepare the bridge deck prior to applying the overlay system, in accordance with the manufacturer's recommendations and this special provision.

Prior to overlay placement and upon completion of the deck repairs, clean the entire deck surface by shot blasting and other means to remove asphaltic material, oils, dirt, rubber, curing compounds, pavement markings, paint carbonation, laitance, weak surface mortar and other materials that may interfere with the bonding or curing of the overlay. Do not begin shot blasting until all grinding or milling operations are completed. Use sandblasting equipment on areas that cannot be reached by the shot-blasting operation. All surfaces, including those that are patched or repaired, must be thoroughly shot-blasted or sand-blasted to ICRI concrete surface profile (CSP-5), steel deck surfaces should be blasted to SSCP-SP5 Near White with an anchor profile of 4 mils minimum. If expansion joints are not being replaced or have been replaced prior to shot-blasting they shall be protected from damage from the shot-blasting operation. Pavement markings shall be considered clean when the concrete has exposed aggregate showing through the paint stripe. Deck drains and areas of curb or railing above the proposed surface shall be protected from the shot-blasting operation. Mortar that is soundly bonded to the coarse aggregate shall have open pores to be considered adequate for bond. Provide a self-propelled vacuum capable of picking up dust and other loose material from the shot-blasting, sand blasting, or other surface preparation operation. Provide air compressors equipped with oil/water separators, capable of blowing off all remaining dust and debris, and drying all moisture from the bridge deck. Care shall be taken, and methods used to fully capture and collect the excess material.

Prior to overlay placement and upon completion of surface preparation, perform bond testing of the MMA overlay material in accordance with ASTM C1583 on two (2) pre-selected 1.5' x 3' test patches. Test locations will be determined by the Engineer. The average minimum bond strength of the MMA overlay system on normal weight concrete shall be 250 psi, with no individual test measured below 225 psi. An acceptable test will demonstrate that the overlay bond strength is sufficient, or by producing a concrete subsurface failure area greater than 50% of the test surface area. Install test sections with the same materials, equipment, personnel, timing, and sequence of operations and curing time that will be used for the installation of the overlay. Test locations shall be repaired with approved repair materials.

If the cleaning method, materials, and installation procedure do not produce acceptable test results, the contractor must remove failed test patches, make the necessary adjustments, and retest all patches at no additional cost to the Department until satisfactory test results are obtained.

MMA based overlays shall not be placed on hydraulic cement concrete that is less than 28 days old. Patching and cleaning operations shall be inspected and approved prior to placing each layer of the overlay. Any contamination of the deck or intermediate courses, after initial cleaning, shall be removed.

The deck shall be completely dry at the time of application of the MMA concrete overlay. Deck drains shall be closed off during application of MMA overlay.

EQUIPMENT

Equipment shall consist of no less than appropriate rollers, brushes, or squeegees; MMA mixing system; steel gauge rake; aggregate spreader; heavy nap rollers; vacuum truck; and a source of lighting, if work is to be performed at night. Use appropriate rollers, brushes, or squeegees to apply MMA primer. The mixing system shall accurately measure and mix the MMA resin, filler, and hardening or activator agent. Steel gauge rakes and other appropriate equipment shall uniformly and accurately apply the MMA materials at the specified rate to the bridge deck in such a manner as to cover 100% of the work area. The aggregate spreader shall be propelled in such a manner as to uniformly and accurately apply the aggregate to cover 100% of the MMA material. The vacuum truck shall be self-propelled. Use appropriate rollers, brushes, or squeegees to apply MMA topcoat.

APPLICATION

Handling and mixing of the MMA resin and hardening agent shall be performed in a safe manner to achieve the desired result in accordance with the manufacturer's recommendations as approved and as directed by the Engineer. MMA overlay materials shall not be placed when weather or surface conditions are such that the material cannot be properly handled, placed, spread, and cured within the specified requirements of traffic control.

Priming

Concrete or steel substrates must be dry prior to application of the primer. Priming shall be done with rollers, brushes, or squeegees at a rate as recommended by the MMA manufacturer. A rate of approximately 100 square feet per gallon is anticipated. The primer resin shall be mixed with an appropriate amount of powder hardener as recommended by the manufacturer. Care should be taken to avoid puddling of the primer. Re-prime any areas that indicate surface absorption of the primer. The prime coat must be allowed to cure tack-free before application of the MMA slurry.

Slurry Application

Proportion and mix MMA resin, filler, and hardener or activator in accordance with manufacturer recommendations. Slurry may be mixed in five gallon pails with a mixing blade or in concrete mortar mixers. Distribute by means of steel gauge rake to desired thickness.

Broadcast Aggregate

Broadcast the specified aggregate onto the fresh, uncured slurry until complete coverage is achieved. Aggregate shall be sprinkled or dropped vertically in a manner such that the level of the MMA mixture is not disturbed, and rippling is avoided. The dry aggregate shall be applied in such a manner as to completely cover the MMA mixture so that no wet spots appear and before it begins to gel. Allow slurry to cure for approximately one hour or as recommended by the manufacturer. Remove excess aggregate, prior to application of topcoat. Excess aggregate may be reused if uncontaminated.

Topcoat

Mix the topcoat resin with the appropriate amount of powder hardener, as recommended by the manufacturer. Apply topcoat to the freshly swept or vacuumed wearing course aggregate using heavy nap rollers at the rate as recommended by the MMA manufacturer. A rate of approximately 40 square feet per gallon is anticipated. The surface should be dry, and the topcoat should not be allowed to puddle.

Apply the primer, slurry, aggregate, and topcoat at the rates as recommended by the MMA manufacturer

The final overlay thickness shall be a minimum of 3/8”.

LIMITATIONS

- There shall be no longitudinal joints of the MMA overlay in the wheel path.
- The temperature of the bridge deck surface and all MMA and aggregate components shall be 30°F or above at the time of application. MMA shall not be applied if the air temperature is expected to drop below 30°F within eight (8) hours after application or if air temperatures would cause the gel time to be less than ten (10) minutes. Consult with the manufacturer when placing overlay at temperatures below 30°F and above 90°F.
- Traffic and equipment shall not be permitted on the overlay surface during the curing period. The minimum curing periods shall be as recommended by the MMA manufacturer. The Contractor shall plan and execute the work to provide the curing periods as required, or manufacturer proposed curing periods may be submitted to the Engineer for review and approval.
- Do not apply MMA overlay courses over modular joints, metal expansion joints, or foam joint seals. A bond breaker shall be placed on all expansion joints.

In the event the Contractor's operation damages the MMA overlay, the Contractor shall remove the damaged areas by saw-cutting in rectangular sections to the top of the concrete deck surface and replacing the various courses in accordance with this special provision at no additional cost to the Department.

Prior to acceptance, perform bond testing for each span or 300 square yards, whichever is smaller, in accordance with ASTM C1583. Test locations will be determined by the Engineer. The average minimum bond strength of the MMA overlay system on normal weight concrete shall be 250 psi, with no individual test measured below 225 psi. An acceptable test will demonstrate that the overlay bond strength is sufficient, or by producing a concrete subsurface failure area greater than 50% of the test surface area. Unacceptable test results will require removal and replacement of overlay as directed by the Engineer at no cost to the Department. Test locations shall be repaired with approved repair materials.

MEASUREMENT & PAYMENT

MMA Overlay System will be measured and paid for at the contract unit price per square feet. The price shall include surface preparation, furnishing and placing the overlay system, providing a 36-month warranty bond, and all tools, labor, materials, bond strength testing and any incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
MMA Overlay System	Square Feet

PREFORMED SILICONE EXPANSION JOINT SEAL

(2-11-19)

SEALS

Use an inverted “V” shaped , preformed extruded silicone rubber seal compatible with concrete and resistant to abrasion, oxidation, oils, gasoline, salt and other materials that are spilled on or

applied to the surface. Seal shall be secured to concrete surfaces with a single component silicone locking adhesive and a primer.

Use seals set in a sawed joint opening with a depth that meets the manufacturer's recommendation, and is not less than ½" below the top of the deck slab at the opening's minimum width specified in the plans. Seal edges shall be set on the bottom of the sawed joint opening that is at least ⅛" wide. Provide a seal that has a working temperature range of 0°F to 120°F and meets the requirements given below.

TEST	TEST METHOD	REQUIREMENT
Tensile Strength	ASTM D412	1,000 psi (min.)
Elongation at Break	ASTM D412	300% (min.)
Tear Strength	ASTM D624	100 ppi (min.)
Compression Set 212°F @ 70 hrs.	ASTM D395	30% (max.)
Water Resistance	ASTM D471	70 hrs. @ 212°F
Durometer (Shore A)	ASTM D2240	55-65 +/-5

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

BONDING ADHESIVE

For silicone adhesive, use a single component, 100% solid, silicone locking adhesive supplied by the joint seal manufacturer that meets the following requirements:

TEST	TEST METHOD	REQUIREMENT
Tensile strength	ASTM D412	200 psi (min.)
Tack Free Time	ASTM C679	20 minutes (max.)
Cure Time (¼" Bead)	ASTM C679	24 hours (max.)
Resistance to UV	ASTM C793	No cracking, ozone chalking, or degradation
Elongation to Break	ASTM D412	450% (min.)

Use an adhesive that is workable to 45°F. When installing in ambient air or surface temperatures below 45°F or for application on moist, difficult to dry concrete surfaces, use an adhesive specified by the manufacturer of the joint seal.

SAWING THE JOINT

The joint opening shall be initially formed to the width shown on the plans including the blackout for the elastomeric concrete, (if present).

The concrete at the face of the joint (elastomeric concrete, polyester polymer concrete, Portland cement concrete, etc.) shall have sufficient time to cure such that no damage can occur to the concrete prior to sawing to the final width and depth as specified in the plans.

When sawing the joint to receive the joint 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 (2) metal blades on the saw shaft to the desired width for the joint opening.

The desired depth of the saw cut is the depth of the seal plus ½” minimum above the top of the seal at the minimum sawed joint width. An irregular bottom of sawed joint is permitted as indicated on the plans. Maximum surface amplitude at the bottom of the saw cut joint is ⅛”. Grind exposed corners on saw cut edges to a ¼” chamfer.

Saw cut a straight joint, centered over the formed opening and to the desired width specified in the plans. Prevent any chipping or damage to the sawed edges of the joint.

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

PREPARATION OF SAWED JOINT FOR SEAL INSTALLATION

The elastomeric concrete or polyester polymer concrete at the joint shall cure a minimum of 24 hours prior to seal installation. Portland cement concrete at the joint shall cure following the special provisions.

After sawing the joint, the Engineer will thoroughly inspect the sawed joint opening for spalls, popouts, cracks, etc. All necessary repairs will be made by the Contractor, at no additional cost to the Department, prior to blast cleaning and installing the seal. Seals shall be secured to substrate that is clean and sound.

Clean the joints by sandblasting with clean dry sand immediately before placing the bonding agent. Sandblast the joint opening to provide a firm, clean joint surface free of curing compound, loose material and any foreign matter. Sandblast the joint opening without causing pitting or uneven surfaces. The aggregate in the 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 is used to clean the joint opening, 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.

SEAL INSTALLATION

Install the joint seal according to the manufacturer's procedures and recommendations and as recommended herein. Do not install the joint seal if the ambient air or surface temperature is below 45°F. Have a manufacturer's certified trained factory representative present during the installation of the first seal of the project.

Before installing the joint seal, check the uninstalled seal length to insure the seal is the same length as the required seal length shown in the plans. Splices in joint seals will not be permitted.

Begin installation by protecting the top edges of the concrete deck adjacent to the vertical walls of the joint as a means to minimize clean up. The joint seal shall be installed to strict conformance with the manufacturer's requirements for atmospheric conditions, concrete surface preparation, mixing and application of adhesive, seal material installation procedure, minimum cure time prior to exposure to traffic, as well as worker health and safety. Once work on placing a seal begins, do not stop until it is completed. Clean any excess adhesive from the top of the joint seal immediately with a trowel. Do not use solvents or any cleaners to remove the excess adhesive from the top of the seal. Remove the protective cover at the joint edges and check for any adhesive on concrete surfaces. Remove excess adhesive with a trowel, the use of solvents or any cleaners will not be allowed.

The installed system shall be watertight and will be monitored until final inspection and approval. Do not place pavement markings on top of preformed silicone joint seals.

(A) Watertight Integrity Test

- (1) Upon completion of each strip seal expansion joint, perform a water test on the top surface to detect any leakage. Cover the roadway section of the joint from curb to curb, or barrier rail to barrier rail, with water, either ponded or flowing, not less than 1 inch above the roadway surface at all points. Block sidewalk sections and secure an unnozzled water hose delivering approximately 1 gallon of water per minute to the inside face of the bridge railing, trained in a downward position about six (6) inches above the sidewalk, such that there is continuous flow of water across the sidewalk and down the curb face of the joint.
- (2) Maintain the ponding or flowing of water on the roadway and continuous flow across sidewalks and curbs for a period of five (5) hours. At the conclusion of the test, the underside of the joint is closely examined for leakage. The strip seal expansion joint is considered watertight if no obvious wetness is visible on the Engineer's finger after touching a number of underdeck areas. Damp concrete that does not impart wetness to the finger is not considered a sign of leakage.
- (3) If the joint system leaks, locate the place(s) of leakage and take any repair measures necessary to stop the leakage at no additional cost to the Department. Use repair measures

recommended by the manufacturer and approved by the Engineer prior to beginning corrective work.

- (4) If measures to eliminate leakage are taken, perform a subsequent water integrity test subject to the same conditions as the original test. Subsequent tests carry the same responsibility as the original test and are performed at no additional cost to the Department.

BASIS OF PAYMENT

Preformed Silicone Expansion Joint Seals will be paid at the contract unit price bid per linear foot. Prices and payment will be full compensation for furnishing all material, labor, tools and equipment necessary for installing these units in place and accepted.

Pay Item	Pay Unit
Preformed Silicone Expansion Joint Seals	Linear Feet

SILICONE JOINT SEALANT

(SPECIAL)

1.0 SEALS

Provide and install a low modulus silicone sealant (non-sag or self-leveling) and backer rod which conforms to the Standard Specifications (Subsections 1023-3 and 1023-4, respectively) and this Special Provision. Use silicone approved for use on joint openings as indicated on project plans and provide a seal with a working range of minimum 50% compression and extension. Silicone joint seal product shall be designated as approved for use on the NCDOT Approved Products List. If non-sag and self-leveling sealants are to be in contact with each other, they shall be from the same manufacturer and shall be compatible for such use.

Self leveling silicone joint sealant used for horizontal joint sealing shall be type Dow Corning 902 RCS or equal.

Non-sag silicone joint sealant used for vertical joint sealing shall be type Dow Corning 888 or equal.

2.0 PREPARATION OF FORMED OR SAWED JOINT FOR SEAL INSTALLATION

The concrete or elastomeric concrete header of the joint opening shall cure a minimum of 24 hours prior to seal installation.

After forming or sawing the joint, or for sealing existing elastomeric headers, the Engineer will thoroughly inspect the joint opening for spalls, popouts, cracks, etc. All necessary repairs shall be made by the Contractor prior to blast cleaning and installing the seal.

Clean the joints by sandblasting the joint opening to provide a firm, clean joint surface free of curing compound, loose material, and any foreign matter. Sandblast the joint opening without causing pitting or uneven surfaces. The aggregate in the polyester polymer 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 is used to clean the joint opening, 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.

Install the backer rod and silicone sealant in the blast cleaned opening on the same day the surface is blast cleaned.

3.0 SEAL INSTALLATION

Install the silicone joint sealant(s) as indicated on the plans, in accordance with the manufacturer’s procedures and recommendations, and as recommended below. Do not install the joint seal if the ambient air or surface temperature is below 45°F. Have a manufacturer’s certified trained factory representative present during the installation of the first seal of the project, to provide guidance for the proper installation of the silicone joint sealant(s).

After a joint has been sealed, remove excess joint sealer on the pavement or bridge deck concrete as soon as possible.

The installed system shall be watertight and will be monitored until final inspection and approval.

Do not place pavement markings on top of joint seals.

4.0 MEASUREMENT AND PAYMENT

Silicone Joint Sealant will be measured and paid for at the contract unit price bid per linear foot and will be full compensation for furnishing all self leveling and non-sag seal material, including backer rod, sawing, surface preparation, labor, tools, and equipment necessary for installing these seals in place and accepted.

Pay Item
Silicone Joint Sealant

Pay Unit
Linear Feet

SHOTCRETE REPAIRS TO UNDERDECK, CAPS AND COLUMNS (SPECIAL)

GENERAL

The work covered by this special provision consists of removing deteriorated concrete from the caps, columns, underdeck areas of the superstructure, and pile strap footings at Bents 116 thru 120 in accordance with the limits, depth and details shown on the plans, described herein and as

established by the Engineer. This work also includes removing and disposing all loose debris, cleaning and repairing reinforcing steel and applying structural shotcrete.

The location and extent of repairs shown on the plans are general in nature. The Engineer shall determine the extent of removal in the field based on an evaluation of the condition of the exposed surfaces.

Any portion of the structure that is damaged from construction operations shall be repaired to the Engineer's satisfaction, at no extra cost to the Department.

MATERIAL REQUIREMENTS

Use prepackaged shotcrete conforming to the requirements of ASTM C1480, the applicable sections of the *Standard Specifications* and the following:

Test Description	Test Method	Age (Days)	Specified Requirements
Silica Fume (%)	ASTM C1240	-	10 (Max.)
Water/Cementitious Materials Ratio	-	-	0.40 (Max.)
Air Content - As Shot (%)	ASTM C231	-	4 ± 1
Slump - As Shot (Range in inches)	ASTM C143	-	2 - 3
Minimum Compressive Strength (psi)	ASTM C39	7 28	3,000 5,000
Minimum Bond Pull-off Strength (psi)	ASTM C1583	28	145
Rapid Chloride Permeability Tests (range in coulombs)	ASTM C1202	-	100 - 1000

Admixtures: Use a migrating corrosion inhibitor according to AASHTO M194, from the below list of pre-qualified suppliers for pre-packaged shotcrete:

- a. BASF Corporation
- b. Euclid Chemical Company
- c. Kaufman Products, Inc.
- d. The Quikrete Companies
- e. US Concrete Products

Store shotcrete in an environment where temperatures remain above 40°F and less than 95°F.

All equipment must operate in accordance with the manufacturer's specifications and material must be placed within the recommended time.

QUALITY CONTROL

Qualification of Shotcrete Contractor

The shotcrete Contractor shall provide proof of experience by submitting a description of jobs similar in size and character that have been completed within the last five (5) years. The name, address and telephone number of references for the submitted projects shall also be furnished. Failure to provide appropriate documentation will result in the rejection of the proposed shotcrete contractor.

(A) Qualification of Nozzleman

The shotcrete Contractor's nozzleman shall be certified by the American Concrete Institute (ACI). Submit proof of certification to the Engineer prior to beginning repair work. The nozzleman shall maintain certification at all times while work is being performed for the Department. Failure to provide and maintain certification will result in the rejection of the proposed nozzleman.

TEMPORARY WORK PLATFORM

Prior to beginning any repair work, provide details for a sufficiently sized temporary work platform at each repair location. Design steel members to meet the requirements of the American Institute of Steel Construction Manual. Design timber members in accordance with the *National Design Specification for Stress-Grade Lumber and Its Fastenings* of the National Forest Products Association. Submit the platform design and plans for review and approval. The design and plans shall be sealed and signed by a North Carolina registered Professional Engineer. Do not install the platform until the design and plans are approved. Drilling holes in the superstructure for the purpose of attaching the platform is prohibited. Upon completion of work, remove all anchorages in the substructure and repair the substructure at no additional cost to the Department.

SURFACE PREPARATION

Prior to starting the repair operation, delineate all surfaces and areas assumed to be deteriorated by visually examining and sounding the concrete surface with a hammer or other approved method. The Engineer is the sole judge in determining the limits of deterioration.

Prior to removal, introduce a shallow saw cut approximately ½" in depth around the repair area at right angles to the concrete surface. Remove all concrete within repair area to a depth 1 inch behind the reinforcing steel with a 17 lb (maximum) pneumatic hammer with points that do not exceed the width of the shank or with hand picks or chisels as directed by the Engineer. Do not cut or remove the existing reinforcing steel. Unless specifically directed by the Engineer, do not remove sound concrete deeper than 1 inch behind the reinforcing steel.

Abrasive blast all exposed concrete surfaces and existing reinforcing steel in repair areas to remove all debris, loose concrete, loose mortar, rust, scale, etc. After sandblasting examine the reinforcing steel to ensure at least 80% of the original diameter remains. If there is more than 20% reduction in the rebar diameter, splice in and securely tie supplemental reinforcing bars as shown on the plans or as directed by the Engineer.

For overhead repair areas, provide stainless wire mesh reinforcement at each repair area larger than one square foot if the depth of the repair exceeds 2" from the "As Built" outside face and where the existing reinforcing steel is not engaged in the repair. Provide a minimum 1" - 20 gage

stainless wire mesh unless otherwise shown on the plans. Rigidly secure the welded wire fabric to existing steel or to $\frac{3}{16}$ " diameter stainless hook fasteners adequately spaced to prevent sagging. Encase the welded wire fabric in shotcrete a minimum depth of $1\frac{1}{2}$ inches.

For vertical repair areas, provide stainless wire mesh reinforcement at each repair area larger than one square foot if the depth of the repair exceeds $3\frac{1}{2}$ " inches from the "As Built" outside face and where the existing reinforcing steel is not engaged in the repair. Provide a minimum 1" - 20 gage stainless wire mesh unless otherwise shown on the plans. Rigidly secure the welded wire fabric to existing steel or to $\frac{3}{16}$ " diameter stainless hook fasteners adequately spaced to prevent sagging. Encase the welded wire fabric in shotcrete a minimum depth of $1\frac{1}{2}$ inches.

For shotcrete repair operations over water, synthetic fiber reinforcement shall not be used as an alternate to welded wire mesh.

Thoroughly clean the repair area of all dirt, grease, oil or foreign matter, and remove all loose or weakened material before applying shotcrete. Saturate the repair area with clean water the day before applying shotcrete. Bring the wetted surface to a saturated surface dry (SSD) condition prior to applying shotcrete and maintain this condition until the application begins. Use a blowpipe to facilitate removal of free surface water. Only oil-free compressed air is to be used in the blowpipe.

The time between removal of deteriorated concrete and applying shotcrete shall not exceed five (5) calendar days. If the time allowance exceeds (5) calendar days, prepare the surface at the direction of the Engineer before applying shotcrete.

APPLICATION AND SURFACE FINISH

Apply shotcrete only when the surface temperature of the repair area is greater than 40°F and less than 95°F. Do not apply shotcrete to frosted surfaces. Maintain shotcrete at a minimum temperature of 40°F for three (3) calendar days after placement.

Apply shotcrete in layers. The properties of the applied shotcrete determine the proper thickness of each layer or lift.

The nozzleman should hold the nozzle three (3) to four (4) feet from the surface being covered in a position that ensures the shotcrete strikes at right angles to the surface being covered without excessive impact. The nozzleman shall maintain the water amount at a practicable minimum, so the mix properly adheres to the repair area. Water content should not become high enough to cause the mix to sag or fall from vertical or inclined surfaces, or to separate in horizontal layers.

Use shooting wires or guide strips that do not entrap rebound sand. Use guide wires to provide a positive means of checking the total thickness of the shotcrete applied. Remove the guide wires prior to the final finish coat.

To avoid leaving sand pockets in the shotcrete, blow or rake off sand that rebounds and does not fall clear of the work, or which collects in pockets in the work. Do not reuse rebound material in the work.

If a work stoppage longer than two (2) hours takes place on any shotcrete layer prior to the time it has been built up to required thickness, saturate the area with clean water and use a blowpipe as outlined previously, prior to continuing with the remaining shotcrete course. Do not apply shotcrete to a dry surface.

Finish all repaired areas, including chamfered edges, as close as practicable to their original "As Built" dimensions and configuration. Provide a minimum 2" of cover for reinforcing steel exposed during repair. Slightly build up and trim shotcrete to the final surface by cutting with the leading edge of a sharp trowel. Use a rubber float to correct any imperfections. Limit work on the finished surface to correcting imperfections caused by trowel cutting.

Immediately after bringing shotcrete surfaces to final thickness, thoroughly check for sags, bridging, and other deficiencies. Repair any imperfections at the direction of the Engineer.

Prevent finished shotcrete from drying out by maintaining 95% relative humidity at the repair and surrounding areas by fogging, moist curing or other approved means for seven (7) calendar days.

MATERIAL TESTING & ACCEPTANCE

Each day shotcreting takes place, the nozzleman shall shoot one 18" x 18" x 3" test panel in the same position as the repair work that is being done to demonstrate the shotcrete is being applied properly. Store, handle and cure the test panel in the same manner as the repaired substructure.

Approximately 72 hours after completing the final shotcrete placement, thoroughly test the surface with a hammer. At this time, the repair area should have sufficient strength for all sound sections to ring sharply. Remove and replace any unsound portions prior to the final inspection of the work. No additional compensation will be provided for removal and replacement of unsound shotcrete.

After seven (7) calendar days, core three (3) 3" diameter samples from each test panel and from the repaired structure as directed by the Engineer. Any cores taken from the structure shall penetrate into the existing structure concrete at least two (2) inches. Cores shall be inspected for delamination, sand pockets, tested for bond strength and compressive strength. If a core taken from a repaired structure unit indicates unsatisfactory application or performance of the shotcrete, take additional cores from the applicable structure unit(s) for additional evaluation and testing as directed by the Engineer. Any repair work failing to meet the requirements of this provision will be rejected and the Contractor shall implement a remediation plan to correct the deficiency at no additional cost to the Department. No extra payment will be provided for drilling extra cores. Patch all core holes in repaired structure units to the satisfaction of the Engineer. All material testing, core testing and sampling will be done by the Materials and Tests Unit of North Carolina Department of Transportation.

MEASUREMENT AND PAYMENT

Shotcrete Repairs will be measured and paid for at the contract unit price bid per cubic foot and will be full compensation for removal, containment and disposal off-site of unsound concrete including the cost of materials, labor, tools, equipment and incidentals necessary to complete the repair work. Depth will be measured from the original outside concrete face. The Contractor and Engineer will measure quantities after removal of unsound concrete and before application of

repair material. Payment will also include the cost of sandblasting, surface cleaning and preparation, cleaning of reinforcing steel, placement of new steel, cost of temporary work platform, testing for soundness, curing of shotcrete and taking core samples from the test panels and substructure units.

Reinforcing Steel that is required for the repairs will be in accordance with Section 425 of the *Standard Specifications*.

Payment will be made under:

Pay Item	Pay Unit
Shotcrete Repairs	Cubic Feet

BRIDGE JACKING **(SPECIAL)**

DESCRIPTION

Bridge jacking at end bents and interior bents is to facilitate beam or bent cap repairs and to replace and/or reset bearings, as necessary. This work shall consist of furnishing all engineering, labor, equipment, and materials necessary for construction and subsequent removal of jacking support system, including jacks, jack supports, shims and all necessary blocking. Included under this item shall be all work to raise and support the existing structure as specified on the plans and as noted herein.

UTILITY COORDINATION

Utility owners with active utilities on the bridge shall be notified by the contractor of the jacking operation 30 days before the operation begins.

SCOPE OF WORK

Work for bridge jacking includes calculating existing and applied bridge loads, designing proper strength jacking scheme, evaluating stresses imposed on the bridge members, setting blocking and jacks, jacking bridge girders, mechanically locking jacks, and lowering bridge spans onto bearing assemblies.

Submit calculations, working drawings, and jacking procedure to the Engineer for review and approval prior to the start of work. Calculations and jacking procedure shall account for all loads expected while bridge is jacked or temporarily supported. Working drawings and all calculations (for determination of all applied loads, for design of the jacking scheme, to evaluate stresses imposed on the bridge members, and any other necessary calculations) for the required jacking scheme shall be sealed by an engineer licensed in the State of North Carolina. Included in the submittal, the Contractor shall submit all relevant information about the jacking system to be used.

Prior to bridge jacking, complete all diaphragm modifications necessary at the location where jacking is to occur. If a span connected to an end bent is to be jacked, ensure the curtain wall is either clear of the girders, or fully free to move with the jacked span prior to jacking. Lock jacks

and install blocking while the bridge is in the raised condition. While in the raised condition, follow bridge plans for any work that may be required. After all repairs requiring bridge jacking are completed, lower the bridge onto the bearing assemblies. Complete repair work, as needed.

Unless otherwise allowed by the Engineer, all bridge jacking operations shall be complete before new deck overlay or deck joints and seals are placed on the existing structure.

Bridge jacking will be designated as one of two jacking arrangements, as follows:

Type I

Type I Bridge Jacking shall be applicable for jacking at individual beam or bearing locations. On a particular bridge bent or end bent, there might be more than one Type I Bridge Jacking. When jacking individual beam or bearing locations, all adjacent bearings of beams not being jacked may be loosened to decrease the resistance of the deck slab during jacking. The maximum differential between adjacent beams that are being jacked is 1/8". Should the jacking of an individual beam require the jacking of adjacent beams to reduce stresses or damage in the bridge, the jacking of the individual beam and adjacent beams shall be considered one Type I Bridge Jacking. All bearings loosened shall be tightened back after repair operations are completed and the jacks and blocking have been removed.

Type II

Type II Bridge Jacking shall be applicable for jacking an entire span end (i.e., all beams at one time) on a bent or end bent.

BASIS OF PAYMENT

Payment will be made at the price bid for each set-up to complete *Type I Bridge Jacking Bridge No. ___* or *Type II Bridge Jacking Bridge No. ___* as shown in the contract plans. The price per each jacking set-up Type required will be full compensation for designing proper strength jacking scheme (calculations, working drawings, and jacking procedure), all materials, equipment, tools, labor, and incidentals necessary to complete the work of this scope, including any jacking frames, jacking plates, and concrete repair required due to jacking operations.

EPOXY RESIN INJECTION

(08-08-22)

GENERAL

For repairing cracks, an applicator certified by the manufacturer of epoxy injection system to be used is required to perform the epoxy resin injection. The Contractor shall submit documentation that indicates the firm, supervisor and the workmen have completed an instruction program in the methods of restoring concrete structures utilizing the epoxy injection process and have five (5) years of relative experience with a record of satisfactory performance on similar projects.

The Contractor furnishes all materials, tools, equipment, appliances, labor and supervision required when repairing cracks with the injection of an epoxy resin adhesive.

SCOPE OF WORK

Using Epoxy Resin Injection, repair all cracks 30 mils (750 μm) wide or greater in the interior bent columns and caps.

Repair the column cracks to the top of the footings. Make the underwater repairs when water surface elevation is low and the water is still. For underwater repairs, use manufacturer recommended materials.

Repair any crack, void, honeycomb or spall area unsuitable for repair by injection with epoxy mortar, or as otherwise approved by the Engineer.

SUBMITTALS

Prior to construction, the Contractor shall submit the following to the Engineer for review and approval:

- (A) Materials – Information detailing the materials and their properties, storage and handling requirements, and Material Safety Data Sheets. Material certifications and sampling shall be as required as per the NCDOT *Standard Specifications* Section 106.
- (B) Injection Procedures – Preparation and epoxy injection installation procedures, including written instructions from the manufacturer of the proportioning dispenser and the procedures recommended to monitor and assure its proportioning accuracy of the unit.
- (C) Contingencies – Proposed injection repair procedures in the event that during testing it is found that the injection installation procedure did not completely fill the cracks with epoxy.
- (D) Qualifications – The resumes of the Contractor’s staff and/or the epoxy resin manufacturer’s Technical Representative that will be on site performing the epoxy injection. The resumes shall detail the installer's applicable certifications and epoxy injection installation experience.
- (E) References – The names and telephone numbers of contact persons for recent (< 2years?) epoxy injection projects.

COOPERATION

Cooperate and coordinate with the Technical Representative of the epoxy resin manufacturer for satisfactory performance of the work.

Have the material manufacturer's Technical Representative present when the epoxy resin injection process begins and until the Engineer is assured that their service is no longer needed.

The expense of having this representative on the job is the Contractor’s responsibility at no additional cost to the Department .

MATERIAL PROPERTIES

Provide a two-component structural epoxy adhesive for injection into cracks or other voids. Provide modified epoxy resin (Component “A”) that conforms to the following requirements:

	Test Method	Specification Requirements
Viscosity @ 40 ± 3°F, cps	Brookfield RVT Spindle No. 4 @ 20 rpm	6,000 – 8,000
Viscosity @ 77 ± 3°F, cps	Brookfield RVT Spindle No. 2 @ 20 rpm	400 - 700
Epoxide Equivalent Weight	ASTM D1652	152 - 168
Ash Content, %	ASTM D482	1 max.

Provide the amine curing agent (Component “B”) used with the epoxy resin that meets the following requirements:

	Test Method	Specification Requirements
Viscosity @ 40 ± 3°F, cps	Brookfield RVT Spindle No. 2 @ 20 rpm	700 - 1400
Viscosity @ 77 ± 3°F, cps	Brookfield RVT Spindle No. 2 @ 20 rpm	105 - 240
Amine Value, mg KOH/g	ASTM D664*	490 - 560
Ash Content, %	ASTM D482	1 max.
		* Method modified to use perchloric acid in acetic acid.

Certify that the Uncured Adhesive, when mixed in the mix ratio that the material supplier specifies, has the following properties:

Pot Life (60 gram mass)

@ 77 ± 3°F - 15 minutes minimum

@ 100 ± 3°F - 5 minutes minimum

Certify that the Adhesive, when cured for seven (7) days at 77 ± 3°F unless otherwise specified, has the following properties:

	Test Method	Specification Requirements
Ultimate Tensile Strength	ASTM D638	7,000 psi (min.)
Tensile Elongation at Break	ASTM D638	4% max.
Flexural Strength	ASTM D790	10,000 psi (min.)
Flexural Modulus	ASTM D790	3.5 x 10 ⁵ psi
Compressive Yield Strength	ASTM D695	11,000 psi (min.)
Compressive Modulus	ASTM D695	2.0 - 3.5 x 10 ⁵ psi
Heat Deflection Temperature Cured 28 days @ 77 ± 3°F	ASTM D648*	125°F min. 135°F min.

<p>Slant Shear Strength, 5,000 psi (34.5 MPa) compressive strength concrete</p> <p>Cured 3 days @ 40°F wet concrete</p> <p>Cured 7 days @ 40°F wet concrete</p> <p>Cured 1 day @ 77°F dry concrete</p>	<p>AASHTO T237</p>	<p>3,500 psi (min.)</p> <p>4,000 psi (min.)</p> <p>5,000 psi (min.)</p>
<p>* Cure test specimens so the peak exothermic temperature does not exceed 77°F.</p>		

Use an epoxy bonding agent, as specified for epoxy mortar, as the surface seal (used to confine the epoxy resin during injection).

EQUIPMENT FOR INJECTION

Use portable positive displacement type pumps with interlock to provide positive ratio control of exact proportions of the two (2) components at the nozzle to meter and mix the two (2) injection adhesive components and inject the mixed adhesive into the crack. Use electric or air powered pumps that provide in-line metering and mixing.

Use injection equipment with automatic pressure control capable of discharging the mixed adhesive at any pre-set pressure up to 200 ± 5 psi and equipped with a manual pressure control override.

Use equipment capable of maintaining the volume ratio for the injection adhesive as prescribed by the manufacturer. A tolerance of ± 5% by volume at any discharge pressure up to 200 psi is permitted.

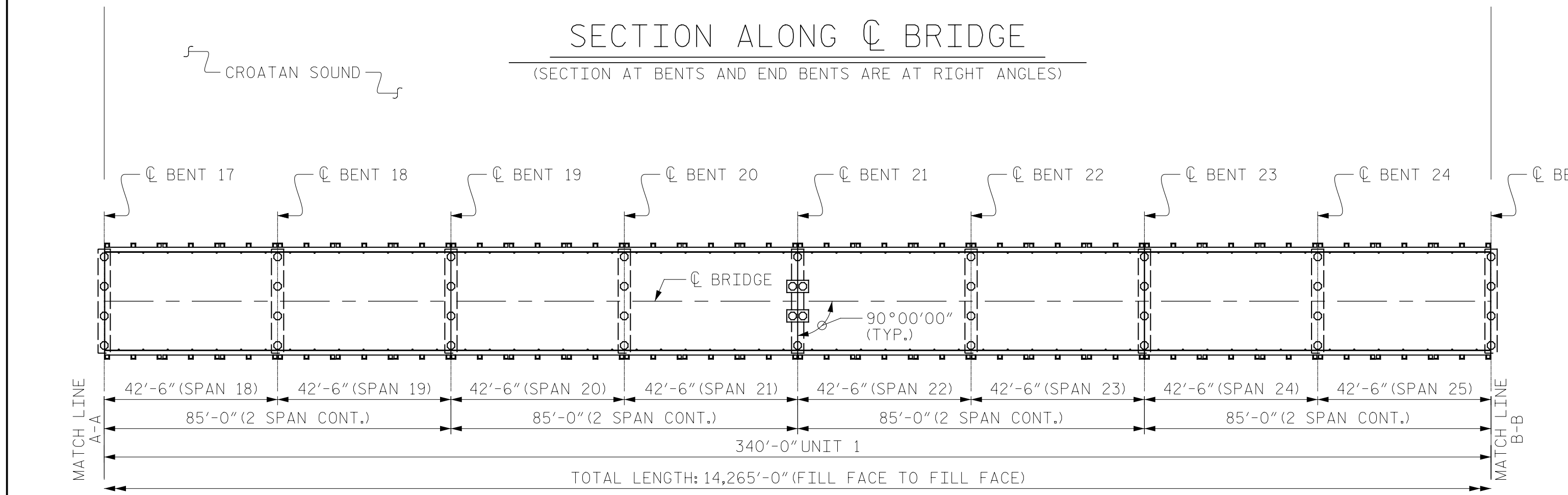
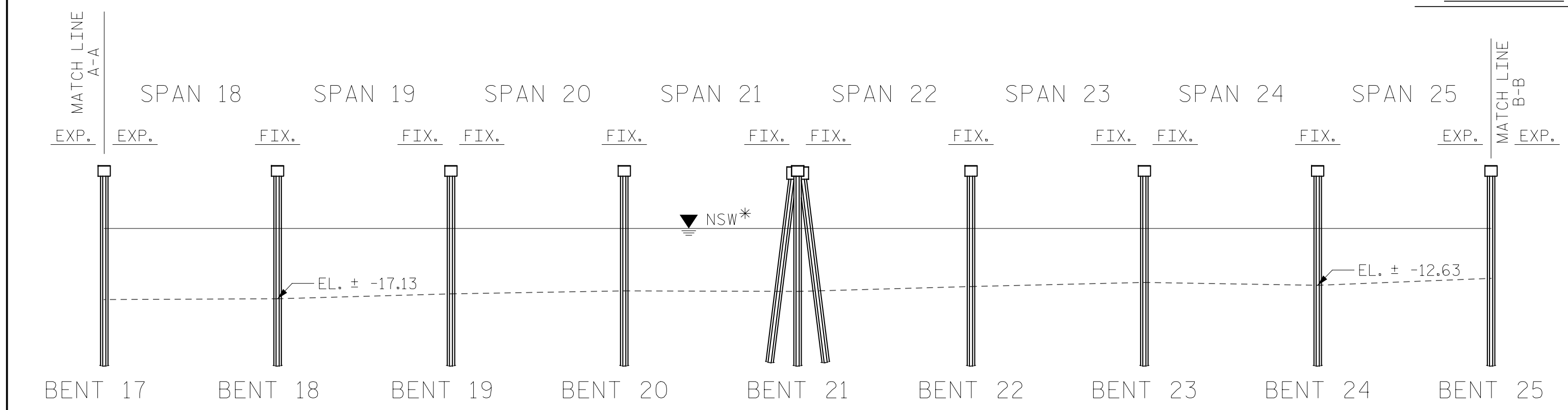
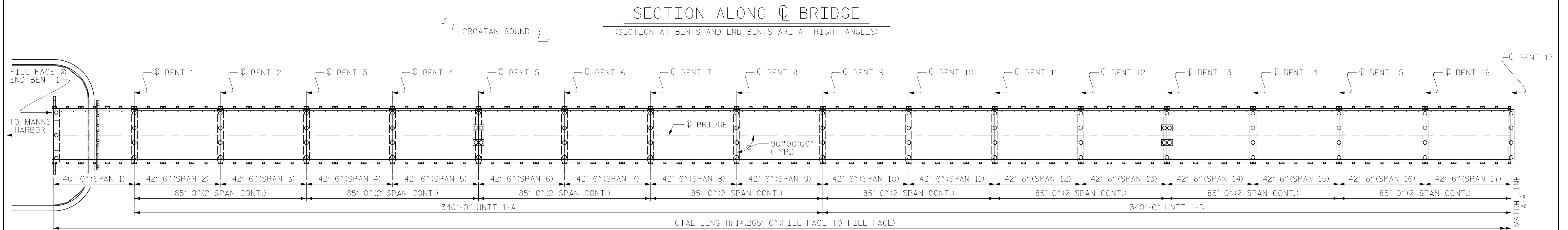
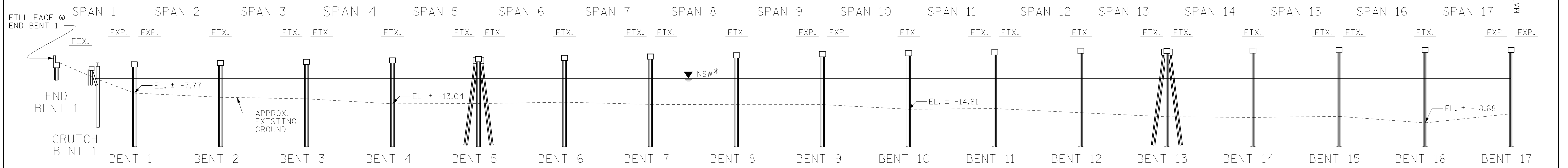
Provide injection equipment with sensors on both the Component A and B reservoirs that automatically stop the machine when only one component is being pumped to the mixing head.

PREPARATION

Follow these steps prior to injecting the epoxy resin:

- (A) Remove all dirt, dust, grease, oil, efflorescence and other foreign matter detrimental to the bond of the epoxy injection surface seal system from the surfaces adjacent to the cracks or other areas of application. Acids and corrosives are not permitted.
- (B) Provide entry ports along the crack at intervals determined by the Contractor to ensure full penetration of the crack.
- (C) Apply surface seal material to the face of the crack between the entry ports. For through cracks, apply surface seal to both faces.

EL. 0.4'
* FROM ORIGINAL
PLANS (NAD 29)



SCOPE OF WORK

- REPLACEMENT OF FINGER PLATE EXPANSION JOINTS
- REPLACEMENT OF STANDARD BRIDGE DECK JOINTS
- BRIDGE DECK CRACK PRETREATMENT AND SEALING
- BRIDGE DECK OVERLAY WITH MMA OVERLAY SYSTEM
- SHOTCRETE REPAIRS TO UNDERDECK, CAPS, COLUMNS, AND STRAP FOOTINGS AT BENTS 116-120
- PILE CONCRETE RESTORATION AT PILE BENTS
- PILE FRP PROTECTIVE SYSTEM AT PILE BENTS AND COLUMN BENTS
- PILE FOOTING RESTORATION AT COLUMN BENTS
- PILE SPLICING AND PRELOADING AT BENT 114
- PILE JACKETING AT BENTS 114 AND 119

CONSTRUCTION SEQUENCE

FOR BENTS REQUIRING BRIDGE JACKING TO REPAIR CONCRETE AT BEARINGS, COMPLETE ALL JACKING OPERATIONS PRIOR TO BEGINNING JOINT WORK AT THE BENTS OR DECK OVERLAYS IN ADJACENT SPANS.

NOTES

PROFILE INFORMATION IS TAKEN FROM THE ORIGINAL PLANS AND BRIDGE INSPECTION REPORTS.
NORMAL WATER SURFACE ELEVATION IS TAKEN FROM ORIGINAL BRIDGEPLANS
BED ELEVATIONS ARE TAKEN FROM THE 2017 BRIDGE INSPECTION REPORT
FOOTING DIMENSIONS FOR BENT 116 THRU 120 ARE BASED ON FIELD MEASUREMENTS. ALL OTHER SHOWN DIMENSIONS ARE BASED UPON ORIGINAL BRIDGE PLANS AND BRIDGE INSPECTION REPORTS.

MISCELLANEOUS NOTES

THE CONTRACTOR IS REQUIRED TO SUBMIT JACKING PLANS AND CALCULATIONS TO THE ENGINEER FOR APPROVAL PRIOR TO BRIDGE JACKING.

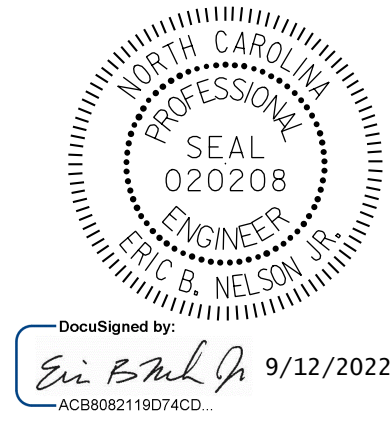
LIMITS OF REPAIR

LIMITS OF REPAIR SHOWN IN THE PLANS ARE BASED ON A FIELD INSPECTION OF THE BRIDGE. DUE TO THE TIME SINCE FIELD INSPECTION, NOTED DEFICIENT AREAS MAY HAVE INCREASED AND/OR NEW DEFICIENT AREAS MAY BE PRESENT. CONTRACTOR SHALL NOTIFY THE ENGINEER OF SIGNIFICANT CHANGES OF ACTUAL VERSUS PLANNED REPAIR AREAS.

PROJECT NO. HB-0017
DARE COUNTY
BRIDGE NO. 270009

I HEREBY CERTIFY THAT THIS STRUCTURE WAS REHABILITATED ACCORDING TO THESE PLANS OR AS NOTED HEREIN.

RESIDENT ENGINEER _____ DATE _____



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
BRIDGE #270009 ON US 64
OVER CROATAN SOUND

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			S-1
2			4			TOTAL SHEETS 355

DRAWN BY: T.HARTLEY DATE: 2/2019
CHECKED BY: R.WERTMAN DATE: 3/2019



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

COORDINATES: LATITUDE 35°55'10.95", LONGITUDE 75°44'45.01"



LOCATION SKETCH

INFORMATION INDICATED ON THE LOCATION SKETCH SHALL BE CONSIDERED GENERAL INFORMATION ONLY. CONTRACTOR SHALL CONFIRM, THROUGH OTHER SOURCES, SPECIFIC INFORMATION REGARDING THE BRIDGES, ROADWAYS, UTILITIES, THE SURROUNDING AREA, AND ANY OTHER ASPECTS THAT MAY BE NECESSARY TO PERFORM AND COMPLETE THE PROJECT.

ENVIRONMENTAL NOTES:

STANDARD CONSTRUCTION CONDITIONS SHALL BE IMPLEMENTED FOR THE FOLLOWING PROTECTED/ENDANGERED SPECIES AS APPLICABLE AND INCLUDED IN THE CONTRACT DOCUMENTS:

- A. WEST INDIAN MANATEE
- B. VARIOUS SEA TURTLE SPECIES
- C. ATLANTIC STURGEON

WORK ON THE WATER:

CONTACT THE U.S. COAST GUARD 30 DAYS PRIOR TO BEGINNING IN-WATER CONSTRUCTION ACTIVITIES. THE NAVIGATION CHANNEL SHALL NOT BE BLOCKED DURING CONSTRUCTION. FOR U.S. COAST GUARD CONTACT INFORMATION, SEE COORDINATION WITH THE U.S. COAST GUARD SPECIAL PROVISION.

THE CONTRACTOR SHALL NOTIFY AND COORDINATE WITH THE COAST GUARD FOR ALL IN-WATER WORK OPERATIONS.

LIMITS TO CONSTRUCTION OPERATIONS:

CONSTRUCTION OPERATIONS AT VARIOUS LOCATIONS ON THE BRIDGE WILL BE RESTRICTED DURING THE ANNUAL PURPLE MARTIN MIGRATORY ROOSTING PERIOD. SEE THE CONTRACT DOCUMENTS FOR TIME AND LOCATIONS FOR RESTRICTIONS.

MARINE TRAFFIC:

MARINE TRAFFIC CONSTRUCTION SIGNS SHALL BE PLACED ON BOTH FACES OF THE BRIDGE AT LOCATIONS WHERE WORK IS BEING PERFORMED. PLACEMENT OF THE SIGNS SHALL BE SUCH THAT THEY ARE CLEARLY VISIBLE TO THE APPROACHING MARINE TRAFFIC. BARGES LEFT IN THE WATER IN LOW-LIGHT CONDITIONS SHALL BE ILLUMINATED SO AS TO BE VISIBLE TO MARINE TRAFFIC.

GENERAL NOTES:

EXISTING DIMENSIONS AND BRIDGE CONDITION ARE FROM THE BEST INFORMATION AVAILABLE. THE CONTRACTOR SHALL FIELD VERIFY THE INFORMATION SHOWN ON THE PLANS AND NOTIFY THE ENGINEER IF ACTUAL DIMENSIONS AND CONDITIONS DIFFER.

IT IS THE CONTRACTOR'S RESPONSIBILITY TO FOLLOW ALL STATE AND FEDERAL SAFETY REQUIREMENTS.

PRIOR TO BEGINNING WORK, CONTRACTOR SHALL SUBMIT FOR REVIEW AND APPROVAL A COMPLETE SEQUENCE OF TASKS FOR CONSTRUCTION OPERATIONS.

WORK ON THE BRIDGE SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL SUBMIT PLANS FOR CONSTRUCTION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

ANY DAMAGE TO EXISTING REINFORCING STEEL, DURING CONTRACTOR'S OPERATIONS, SHALL BE REPAIRED AS DIRECTED BY THE ENGINEER AND PERFORMED AT NO ADDITIONAL COST TO THE DEPARTMENT.

FOR CONTROL OF TRAFFIC, LIMITS ON PHASING OF CONSTRUCTION, AND INTERMEDIATE CONTRACT TIME, SEE TRANSPORTATION MANAGEMENT PLANS AND CONTRACT DOCUMENTS.

ROADWAY MILLING IS INCLUDED TO ENSURE A SMOOTH TRANSITION ONTO THE BRIDGE FLOOR. DIMENSIONS SHOWN FOR MILLING AND RESURFACING ARE APPROXIMATE. MILL AND RESURFACE AS REQUIRED TO PROVIDE A SMOOTH TRANSITION TO THE ROADWAY AT BOTH ENDS OF THE BRIDGE.

LONGITUDINAL CONSTRUCTION JOINTS OF OVERLAYS SHALL BE LOCATED ALONG LANE LINES OR EDGE LINES UNLESS OTHERWISE NOTED ON THE PLANS.

EXISTING CONCRETE BRIDGE DECK SHALL BE REPAIRED PRIOR TO SURFACE PREPARATION FOR DECK OVERLAYS.

EXISTING JOINTS AND DECK DRAINS SHALL BE SEALED PRIOR TO AND DURING REPAIR OF BRIDGE DECKS. WHEN RAIN IS PREDICTED BETWEEN WORK PERIODS THE CONTRACTOR SHALL REMOVE DECK DRAIN SEAL DEVICES. REINSTALL DECK DRAIN DEVICES PRIOR TO RESUMING DECK REPAIR ACTIVITIES.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR WORK IN, OVER OR ADJACENT TO NAVIGABLE WATERS, SEE SPECIAL PROVISIONS.

FOR MAINTENANCE OF WATER TRAFFIC, SEE SPECIAL PROVISIONS.

FOR SECURING OF VESSELS, SEE SPECIAL PROVISIONS.

FOR CONCRETE WORK FOR JOINT REPLACEMENT, SEE SPECIAL PROVISIONS.

FOR BRIDGE JOINT DEMOLITION, SEE SPECIAL PROVISIONS.

FOR ELASTOMERIC CONCRETE FOR PRESERVATION, SEE SPECIAL PROVISIONS.

FOR CONCRETE DECK REPAIR FOR MMA OVERLAY, SEE CONCRETE DECK REPAIR FOR METHYL METHACRYLATE OVERLAY SPECIAL PROVISIONS.

FOR CLASS II SURFACE PREPARATION AND CLASS III SURFACE PREPARATION SEE CONCRETE DECK REPAIR FOR METHYL METHACRYLATE OVERLAY SPECIAL PROVISION.

FOR CONCRETE BRIDGE DECK CRACK SEALING, SEE SPECIAL PROVISIONS.

FOR MMA OVERLAY SYSTEM, SEE METHYL METHACRYLATE SLURRY BRIDGE DECK OVERLAY SYSTEM SPECIAL PROVISION.

FOR PREFORMED SILICONE EXPANSION JOINT SEAL, SEE SPECIAL PROVISIONS.

FOR SILICONE JOINT SEALANT, SEE SPECIAL PROVISIONS.

FOR SHOTCRETE REPAIRS TO UNDERDECK, CAPS AND COLUMNS, SEE SPECIAL PROVISIONS.

FOR BRIDGE JACKING, SEE SPECIAL PROVISIONS.

FOR EPOXY RESIN INJECTION, SEE SPECIAL PROVISIONS.

FOR PILE CONCRETE RESTORATION, SEE SPECIAL PROVISIONS.

FOR PILE FRP PROTECTIVE SYSTEM, SEE SPECIAL PROVISIONS.

FOR PILE FOOTING RESTORATION, SEE SPECIAL PROVISIONS.

FOR PILE SPLICE AND PRELOAD, SEE SPECIAL PROVISIONS.

FOR PILE JACKETS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR PARTIAL REMOVAL OF EXISTING STRUCTURE, SEE SPECIAL PROVISIONS.

FOR REINFORCED APPROACH FILL AT END BENT 1, SEE SPECIAL PROVISIONS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS (360,000 KG) OF REINFORCING STEEL, ONE 30 INCH (760 MM) SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS (360,000 KG) OF REINFORCING STEEL, TWO 30 INCH (760 MM) SAMPLES OF EACH SIZE BAR USED. THE SAMPLE BARS SHOULD COME FROM STEEL ACTUALLY USED IN THE PROJECT AND THE SAMPLE BARS SHOULD BE REPLACED BY SPLICED BARS AS SPECIFIED IN THE SAMPLE BAR REPLACEMENT CHART. PAYMENT FOR THE SAMPLE BARS AND REPLACEMENT REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

TOTAL BILL OF MATERIAL												
INCIDENTAL MILLING	ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C	ASPHALT BINDER FOR PLANT MIX	REINFORCING STEEL	CLASS AA CONCRETE	CLASS II SURFACE PREPARATION	CLASS III SURFACE PREPARATION	SHOTCRETE REPAIRS	EPOXY RESIN INJECTION	REINFORCED APPROACH FILL	PARTIAL REMOVAL OF EXISTING STRUCTURE	CRACK PRETREATMENT	PREFORMED SILICONE EXPANSION JOINT SEALS
S.Y.	TON	TON	LBS.	C.Y.	S.Y.	S.Y.	C.F.	L.F.	L.S.	L.S.	L.F.	L.F.
306	26	1.6	39589	32.4	0.8	4.4	3113.4	89.1	L.S.	L.S.	20361.5	914.4

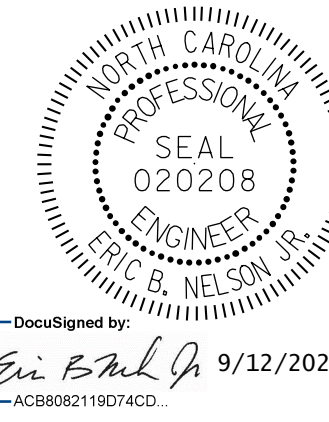
TOTAL BILL OF MATERIAL															
PILE SPLICE AND PRELOAD	PILE JACKETS	SILICONE JOINT SEALANT	FOOTING CONCRETE REPAIRS	ELASTOMERIC CONCRETE FOR PRESERVATION	CONCRETE DECK REPAIR FOR MMA OVERLAY	PILE CONCRETE RESTORATION	WATERLINE GROUTING	MMA OVERLAY SYSTEM	CONCRETE WORK FOR JOINT REPLACEMENT	BRIDGE JOINT DEMOLITION	FRP PROTECTIVE SYSTEM ABOVE WATERLINE	FRP PROTECTIVE SYSTEM BELOW WATERLINE	CONCRETE BRIDGE DECK CRACK SEALING	TYPE II BRIDGE JACKING BRIDGE No. 270009	
L.F.	L.F.	L.F.	C.Y.	C.F.	C.F.	C.F.	C.F.	S.F.	S.F.	S.F.	S.F.	S.F.	S.Y.	EA.	
14	20	4006.6	523.6	760.4	24.6	3445	500	339072.5	2034	2948	47168.7	30691.2	37239.6	11	

SAMPLE BAR REPLACEMENT	
SIZE	LENGTH
#3	6'-2"
#4	7'-4"
#5	8'-6"
#6	9'-8"
#7	10'-10"
#8	12'-0"
#9	13'-2"
#10	14'-6"
#11	15'-10"

NOTE: SAMPLE BAR REPLACEMENT LENGTHS BASED ON 30" (SAMPLE LENGTH) PLUS TWO SPLICE LENGTHS AND f_y = 60ksi.

PROJECT NO. HB-0017
 DARE COUNTY
 BRIDGE NO. 270009

SHEET 15 OF 15



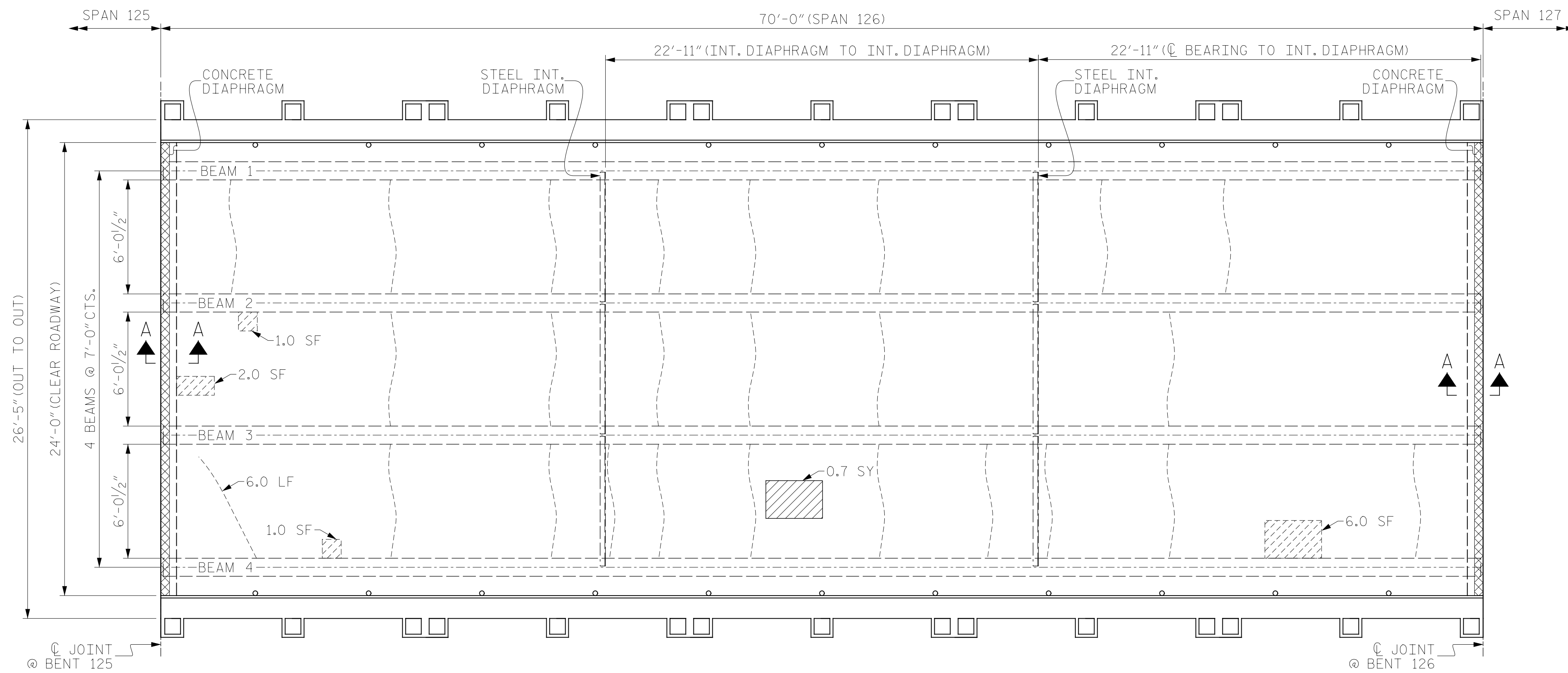
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
GENERAL DRAWING
 BRIDGE #270009 ON US 64
 OVER CROATAN SOUND



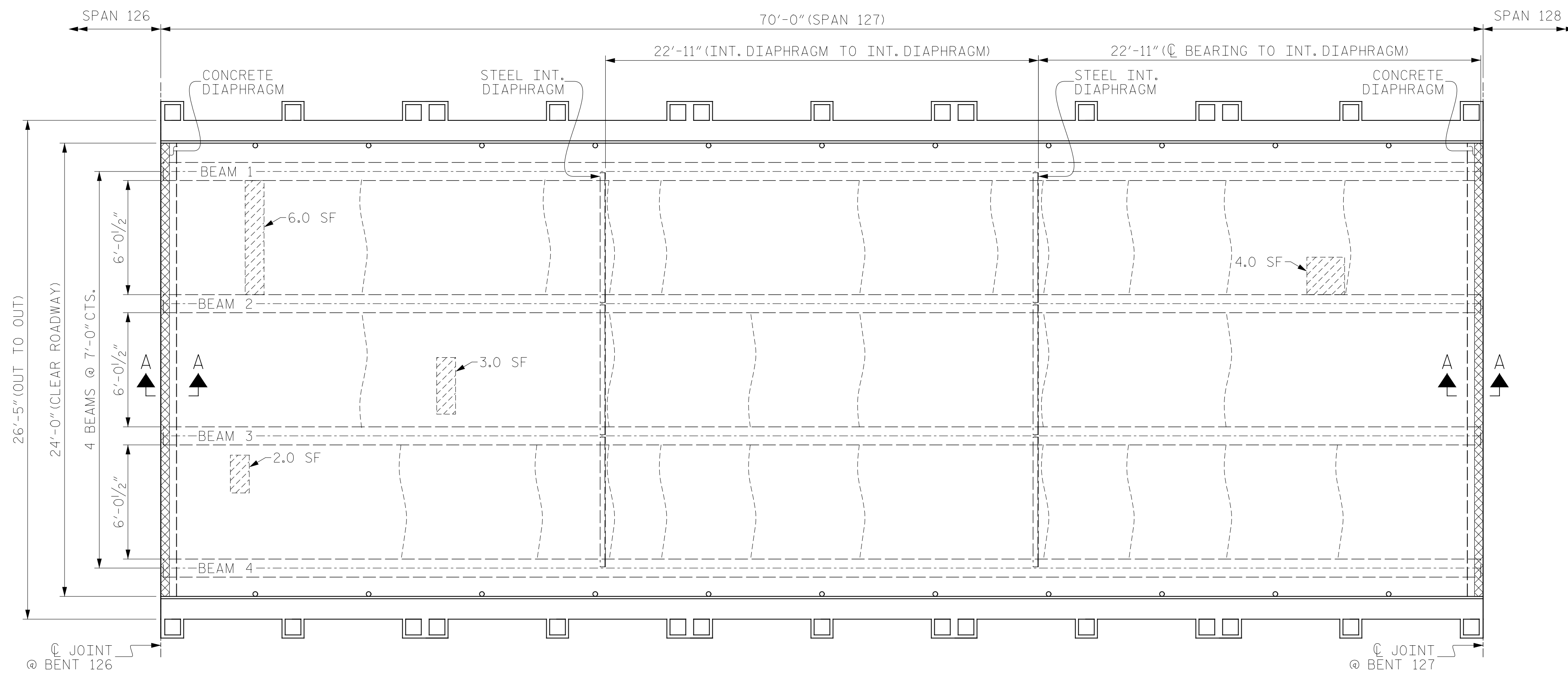
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-15
1			3			TOTAL SHEETS
2			4			355

DRAWN BY: M.A. LEE DATE: 5/2019
 CHECKED BY: R. NELSON DATE: 5/2019



PLAN OF SPAN 126



PLAN OF SPAN 127

SUMMARY OF QUANTITIES FOR SPAN 126		
	ESTIMATE	ACTUAL
SHOTCRETE REPAIRS (UNDERDECK)	3.4 CF	
BRIDGE JOINT DEMOLITION	22.0 SF	
CLASS II SURFACE PREPARATION	0.7 SY	
CLASS III SURFACE PREPARATION	1.3 CF	
CONCRETE DECK REPAIR FOR MMA OVERLAY	1.7 CF	
CRACK PRETREATMENT	151.0 LF	
CONCRETE BRIDGE DECK CRACK SEALING	184.3 SY	
MMA OVERLAY SYSTEM	1658.0 SF	

SUMMARY OF QUANTITIES FOR SPAN 127		
	ESTIMATE	ACTUAL
SHOTCRETE REPAIRS (UNDERDECK)	5.0 CF	
BRIDGE JOINT DEMOLITION	22.0 SF	
CLASS II SURFACE PREPARATION	-	
CLASS III SURFACE PREPARATION	-	
CONCRETE DECK REPAIR FOR MMA OVERLAY	-	
CRACK PRETREATMENT	157.1 LF	
CONCRETE BRIDGE DECK CRACK SEALING	184.3 SY	
MMA OVERLAY SYSTEM	1658.0 SF	

- SHOTCRETE REPAIRS (UNDERDECK)
- BRIDGE JOINT DEMOLITION
- CLASS II DECK REPAIR
- CLASS III DECK REPAIR
- MMA OVERLAY SYSTEM
- CRACK PRETREATMENT

PROJECT NO. HB-0017
DARE COUNTY
 BRIDGE NO. 270009



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SURFACE PREPARATION
 & UNDERDECK REPAIRS
 SPANS 126 THRU 127

NOTE:

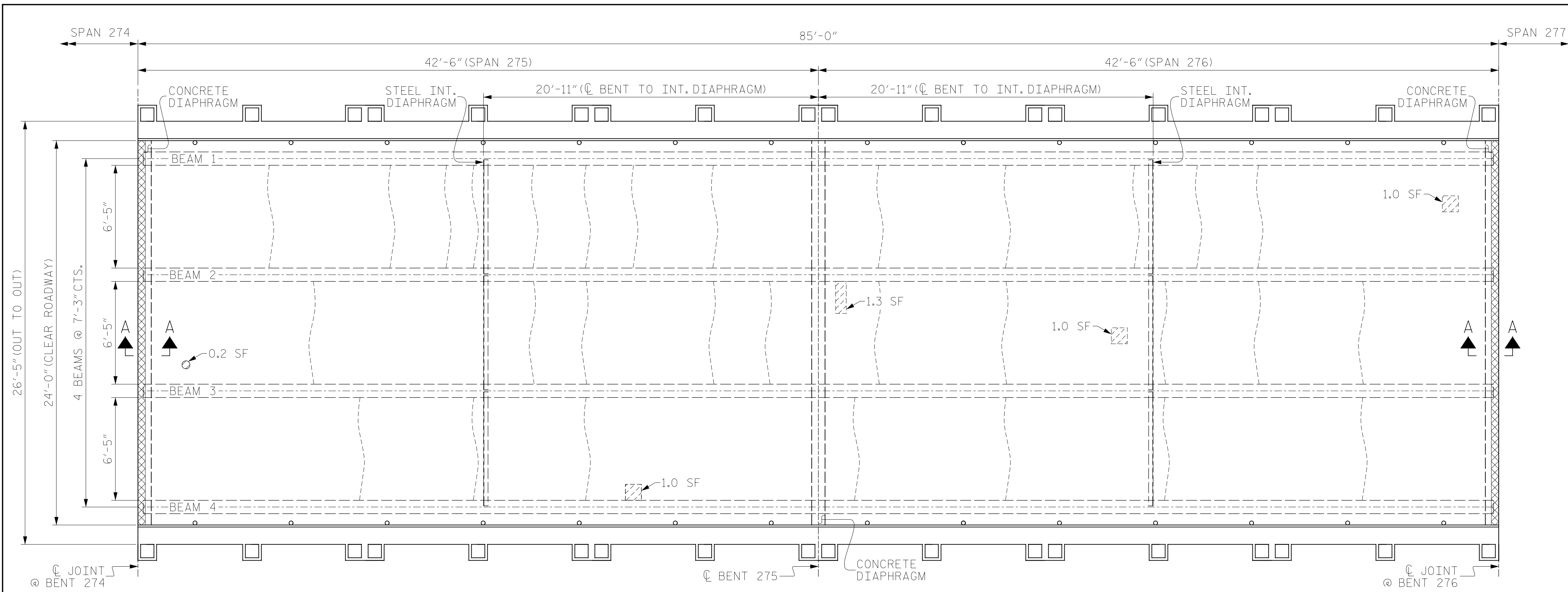
REPAIR LOCATIONS AND ESTIMATED QUANTITIES ARE GIVEN WITH THE BEST INFORMATION AVAILABLE. IF ADDITIONAL REPAIRS NOT SHOWN ON THE DRAWINGS ARE DEEMED NECESSARY BY THE ENGINEER, THE ENGINEER WILL NOTE ON THE DRAWINGS THE APPROXIMATE LOCATIONS AND DESCRIPTION OF THE REPAIRS AND ADJUST THE ACTUAL QUANTITIES ENTERED INTO THE AS-BUILT REPAIR QUANTITY TABLE.

DRAWN BY : M. SPENCER DATE : 12/2018
 CHECKED BY : J. FARNHAM DATE : 03/2019



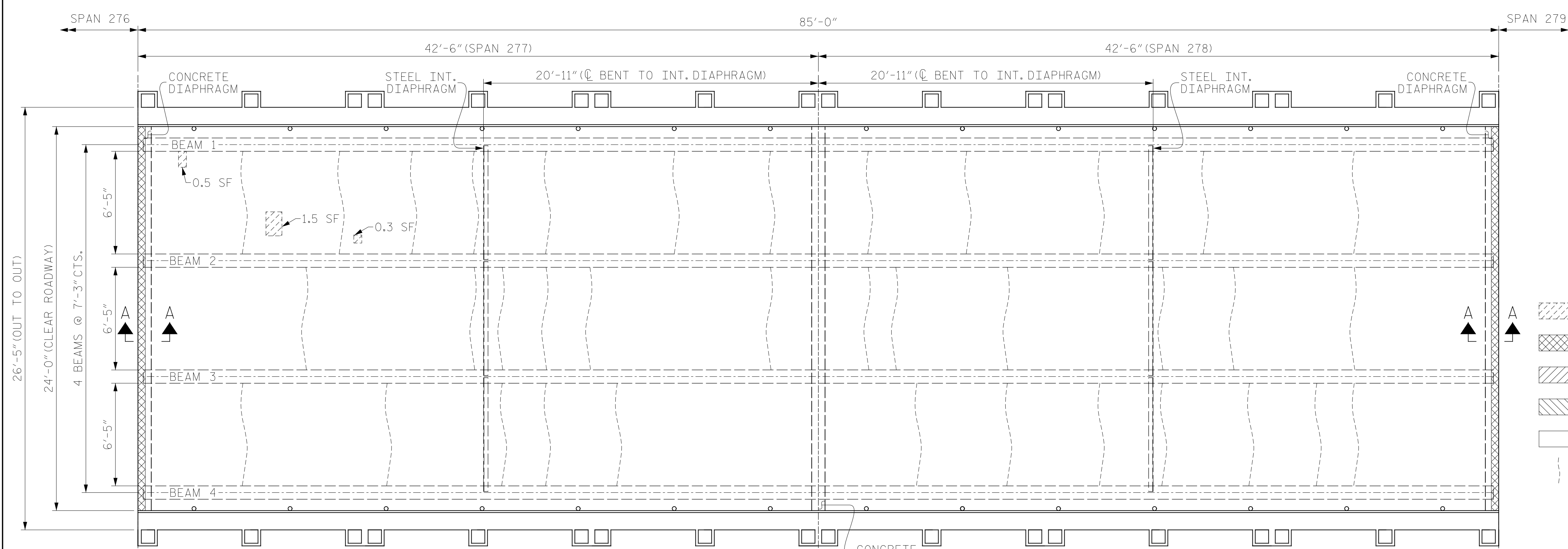
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			S-51
2			4			355



PLAN OF SPAN 275

PLAN OF SPAN 276



PLAN OF SPAN 277

PLAN OF SPAN 278

SUMMARY OF QUANTITIES FOR SPAN 275		
	ESTIMATE	ACTUAL
SHOTCRETE REPAIRS (UNDERDECK)	0.4 CF	
BRIDGE JOINT DEMOLITION	11.0 SF	
CLASS II SURFACE PREPARATION	0.1 SY	
CLASS III SURFACE PREPARATION	02 CF	
CONCRETE DECK REPAIR FOR MMA OVERLAY	0.1 CF	
CRACK PRETREATMENT	102.7 LF	
CONCRETE BRIDGE DECK CRACK SEALING	112.0 SY	
MMA OVERLAY SYSTEM	1008.0 SF	

SUMMARY OF QUANTITIES FOR SPAN 276		
	ESTIMATE	ACTUAL
SHOTCRETE REPAIRS (UNDERDECK)	1.1 CF	
BRIDGE JOINT DEMOLITION	11.0 SF	
CLASS II SURFACE PREPARATION	-	
CLASS III SURFACE PREPARATION	-	
CONCRETE DECK REPAIR FOR MMA OVERLAY	-	
CRACK PRETREATMENT	89.8 LF	
CONCRETE BRIDGE DECK CRACK SEALING	112.0 SY	
MMA OVERLAY SYSTEM	1008.0 SF	

SUMMARY OF QUANTITIES FOR SPAN 277		
	ESTIMATE	ACTUAL
SHOTCRETE REPAIRS (UNDERDECK)	0.8 CF	
BRIDGE JOINT DEMOLITION	11.0 SF	
CLASS II SURFACE PREPARATION	-	
CLASS III SURFACE PREPARATION	-	
CONCRETE DECK REPAIR FOR MMA OVERLAY	-	
CRACK PRETREATMENT	115.5 LF	
CONCRETE BRIDGE DECK CRACK SEALING	112.0 SY	
MMA OVERLAY SYSTEM	1008.0 SF	

SUMMARY OF QUANTITIES FOR SPAN 278		
	ESTIMATE	ACTUAL
SHOTCRETE REPAIRS (UNDERDECK)	-	
BRIDGE JOINT DEMOLITION	11.0 SF	
CLASS II SURFACE PREPARATION	-	
CLASS III SURFACE PREPARATION	-	
CONCRETE DECK REPAIR FOR MMA OVERLAY	-	
CRACK PRETREATMENT	115.5 LF	
CONCRETE BRIDGE DECK CRACK SEALING	112.0 SY	
MMA OVERLAY SYSTEM	1008.0 SF	

- SHOTCRETE REPAIRS (UNDERDECK)
- BRIDGE JOINT DEMOLITION
- CLASS II DECK REPAIR
- CLASS III DECK REPAIR
- MMA OVERLAY SYSTEM
- CRACK PRETREATMENT

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STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SURFACE PREPARATION & UNDERDECK REPAIRS
 SPANS 275 THRU 278

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			97
2			4			355

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