

EXPANSION JOINT EPDM OR NEOPRENE GLAND ELASTOMERIC REPLACEMENT**1.0 GENERAL**

Furnish and install a continuous premolded neoprene or EPDM gland elastomeric seals for each expansion joint within the limits indicated on the plans.

Use either elastic polychloroprene (neoprene) or ethyl propylene diene monomer (EPDM) for the elastomer component that will properly fit the existing waterproof system. These existing expansion joints may be fabricated by:

WABOMODULAR as manufactured by Watson Bowman and Acme Corporation of Amherst New York, BROWN/MAURER as manufactured by the D. S. Brown Company of North Baltimore, Ohio or an approved equal.

Inspect all expansion joint rails and support mechanism. Ensure the rails maintain parallel and equidistant spacing.

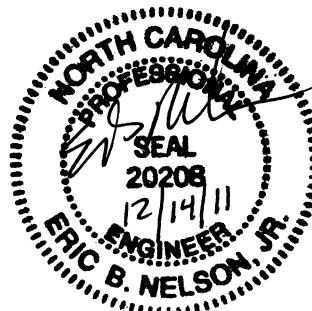
See Standard Drawing for EPDM or Neoprene Gland Seal.

2.0 MATERIAL

Provide expansion joint seals capable of handling a total movement measured parallel to the centerline of the roadway. Clear distance between support angles shall be capable of handling 2" movement.

Provide an elastomeric component for each expansion joint seal that is a continuous unit for the entire length of the joint. Do not field splice the elastomeric component. Only vulcanized shop splicing of the elastomeric component is permitted. The minimum length of an elastomeric component before shop splicing is 20 feet. However, one piece shorter than 20 feet is permitted. Provide an elastomeric component that is clearly shop marked to indicate the top side and joint location of the elastomeric component. On skewed bridges, or under unsymmetrical conditions, clearly mark the left side of the elastomeric component. Left is defined as being on the left when facing in the direction of increasing station. Inspect the seals upon receipt to ensure that the marks are clearly visible upon installation.

Make sure the convolution of the gland does not project above the top of the hold-down plates when the joint opening is in the most compressed condition. Use either elastic polychloroprene (neoprene) or ethyl propylene diene monomer (EPDM) for the elastomer that meets the following minimum properties:



	ASTM TEST METHOD	REQUIREMENTS
Hardness, Durometer - Shore A	D2240	60 ± 5, Neoprene (upward corrugated shape - fabric reinforced) 75 ± 5, EPDM and Neoprene (upward non-corrugated shape) 80 ± 5, EPDM (upward corrugated shape-fabric reinforced)
Tensile Strength	D412	2000 psi (min.)
Elongation at Break	D412	250% (min.)
Width of Gland in Relaxed Condition	N/A	10" ± 0.25"
Thickness of Upturned portion of gland	N/A	0.25" non-corrugated shape, -0.032" to +0.032"
Thickness of Upturned portion of gland	N/A	0.1875" corrugated shape, -0.032" to +0.032"
Thickness of Flat portion of gland	N/A	0.1563", -0.032" to +0.032"

For fabric reinforced glands, submit one unreinforced sample per lot number, up to 500 feet of Expansion Joint Seal, to the Engineer for testing.

3.0 SUBMITTALS

Submit two (2) complete sets of removal and installation instructions for review and approval. Submit this information well in advance of the scheduled installation time for the expansion joint seals. Include material requirements, installation procedures and special tools required to properly remove and replace the existing joint seal.

Upon approval of the removal and installation instruction submit five (5) additional sets for field distribution and Bridge Maintenance's records.

Provide all submittals 3 weeks in advance of the scheduled installation time for the expansion joint seal

4.0 REMOVAL

Remove the existing modular expansion joint elastomeric seal as recommended by the manufacturer, utilizing methods that will not damage any other portion of the joint system or the bridge. If any portion of the joint or bridge is damaged, notify the Engineer immediately for inspection and method of repair.

Any portion of the joint or the bridge that is damaged and is deemed to be caused by Contractor negligence shall be properly repaired and or replaced at no additional expense to the Department

5.0 INSTALLATION

Protect the components of the joint seal and clean in accordance with installation guidelines. Repair any abraded or damaged coated surfaces as specified for repair of galvanizing in Section 1076 Galvanizing of the 2012 Standard Specifications.

Install the joint seal according to the typical drawing and approved procedures, except as authorized in writing by the Engineer.

For damaged areas, depressions, spalls, cracks, or irregularities of curbs or decks adjacent to the expansion joint, submit a proposed method of repair and repair material specifications for approval.

Lay the gland material on the base angle and field mark the gland for the bolt holes. Holes in the gland shall be punched 7/8" in diameter with a hand punch.

In order to check for proper alignment, place the gland and hold-down plate on the base angle. Do not apply neoprene sealant. Bolt the hold-down plates to the base angle, but do not tighten. The Engineer shall inspect the seal device for alignment.

After the inspection and approval, remove the hold-down plates and gland and apply neoprene sealant to the base angle in accordance with approved installation submittal. Place gland and hold-down plates on the base angle. Prepare all fasteners in accordance with Article 440-8 of the 2012 Standard Specifications; bolt the hold-down plates to the base angle to a torque value of 88 FT.LBS with a calibrated torque wrench. Check the torque after one (1) hour and, if necessary, re-torque the bolts to 88 FT.LBS. Continue this check until the bolts have obtained the required torque. A final check shall be made at seven (7) days. Torque shall not be less than 80 FT.LBS after seven (7) days.

If the Engineer deems any aspects of the expansion joint seals unacceptable, make necessary corrections.

6.0 INSPECTION

Watertight Integrity Test

- Upon completion of an expansion joint seal, 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 6 inches above the sidewalks, such that there is continuous flow of water across the sidewalk and down the curb face of the joint.
- Maintain the ponding or flowing of water on the roadway and continuous flow across sidewalks and curbs for a period of 5 hours. At the conclusion of the test, the underside of the joint is closely examined for leakage. The expansion joint seal 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 a sign of leakage.
- 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.

- 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 extra cost to the Department.

7.0 BASIS OF PAYMENT

Basis of payment for all expansion joint seals will be at the linear foot contract price for “Expansion Joint EPDM or Neoprene Gland Elastomeric Replacement” which price and payment will be full compensation for furnishing all material, labor, tools, and incidentals necessary for installing the expansion joint seal in place and including all materials, labor, tools and incidentals for performing the original watertight integrity test.

Pay Item	Pay Unit
Expansion Joint EPDM or Neoprene Gland Elastomeric Replacement	Linear Foot

FOAM JOINT SEALS

(REVISED)

1.0 SEALS

Use preformed seals compatible with concrete and resistant to abrasion, oxidation, oils, gasoline, salt and other materials that are spilled on or applied to the surface. Use a resilient, UV stable, preformed, impermeable, flexible, expansion joint seal. The joint seal shall consist of low-density, closed cell, cross-linked polyethylene non-extrudable, foam. The joint seal shall contain no EVA (Ethylene Vinyl Acetate). Cell generation shall be achieved by being physically blown using nitrogen. No chemical blowing agents shall be used in the cell generation process.

Use seals manufactured with grooves 1/8"± wide by 1/8"± deep and spaced between 1/4" and 1/2" apart along the bond surface running the length of the joint. Use seals with a depth that meets the manufacturer’s recommendation, but is not less than 70% of the uncompressed width. Provide a seal designed so that, when compressed, the center portion of the top does not extend upward above the original height of the seal by more than 1/4". Provide a seal that has a working range of 30% tension and 60% compression and meets the requirements given below.

TEST	TEST METHOD	REQUIREMENT
Tensile strength	ASTM D3575-08, Suffix T	110 – 130 psi
Compression Set	ASTM D1056 Suffix B, 2 hr recovery	10% - 16%
Water Absorption	ASTM D3575	< 0.03 lb/ft ²
Elongation at Break	ASTM D3575	180% - 210%
Tear Strength	ASTM D624 (D3575-08, Suffix G)	14 – 20 pli
Density	ASTM D3575-08, Suffix W, Method A	1.8 – 2.2 lb/ft ³
Toxicity	ISO-10993.5	Pass (not cytotoxic)

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.

2.0 BONDING ADHESIVE

Use a two component, 100% solid, modified epoxy adhesive supplied by the joint seal manufacturer that meets the requirements given below.

TEST	TEST METHOD	REQUIREMENT
Tensile strength	ASTM D638	3000 psi (min.)
Compressive strength	ASTM D695	7000 psi (min.)
Hardness	Shore D Scale	75-85 psi
Water Absorption	ASTM D570	0.25% by weight max.
Elongation to Break	ASTM D638	5% (max.)
Bond Strength	ASTM C882	2000 psi (min.)

Use an adhesive that is workable to 40°F. When installing in ambient air or surface temperatures below 40°F or for application on moist, difficult to dry concrete surfaces, use an adhesive specified by the manufacturer of the joint seal.

3.0 ELASTOMERIC CONCRETE

If required to re-establish the bridge decks joint edge:

The elastomeric concrete shall not be placed until the reinforced concrete deck slab has cured for seven full days and reached a minimum strength of 3000 psi.

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 blockout and clear the surface of all loose

debris. Do not place the elastomeric concrete until the surface preparation is completed and approved.

A manufacturer's representative shall be present when placing elastomeric concrete. Do not place elastomeric concrete if the ambient air or surface temperature is below 45°F.

Prepare and apply a primer, as per manufacturer's recommendations, to all vertical 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 2 hours after applying the primer. Trowel the elastomeric concrete to a smooth finish.

4.0 REMOVAL

Prior to the installation of the replacement seal, perform the following:

Measure the joint opening. Document the bridge number, county, joint, joint width and accurate temperature and the time and date the temperature was taken.

Submit this data to the Engineer for submittal to Mr. Rick Nelson Assistant State Bridge Management Engineer-Operations. The data shall be reviewed and the proper joint size provided to the Contractor within 5 working days.

Remove the Foam/Evazote expansion joint as recommended by the manufacturer, utilizing methods that will not damage any other portion of the joint system or the bridge. If any portion of the joint or bridge is damaged, notify the Engineer immediately for inspection and method of repair.

Any portion of the joint or the bridge that is damaged and is deemed to be caused by Contractor negligence shall be properly repaired and or replaced at no additional expense to the Department

5.0 SAWING THE JOINT

The joint opening shall be initially formed to the width shown on the plans including the blockout for the elastomeric concrete.

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

When sawing the joint to receive the foam seal, always use a rigid guide to control the saw in the desired direction. To control the saw and to produce a straight line as indicated on the plans, anchor and positively connect a template or a track to the bridge deck. Do not

saw the joint by visual means such as a chalk line. Fill the holes used for holding the template or track to the deck with an approved, flowable non-shrink, non-metallic grout.

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

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

6.0 PREPARATION OF SAWED JOINT FOR SEAL INSTALLATION

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 prior to blast cleaning and installing the seal.

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 elastomeric concrete may be exposed after sandblasting.

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

If nozzle blasting 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.

7.0 SEAL INSTALLATION

Install the joint seal according to the manufacturer's procedures and recommendations and as recommended below. Do not install the joint seal if the ambient air 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 deck opening. When the joint seal requires splicing, use the heat welding method by placing the joint material ends against a teflon heating iron of 425-475°F for 7 - 10 seconds, then pressing the ends together tightly. Do not test the welding until the material has completely cooled.

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. After opening both cans of the bonding agent, stir each can using separate stirring rods for each component to prevent premature curing of the bonding agent. Pour the two components, at the specified mixing ratio, into a clean mixing bucket. Mix the components with a low speed drill (400 rpm max.) until a uniform gray color is achieved without visible marbling. Apply bonding agent to both sides of the elastomeric concrete as well as both sides of the joint seal, making certain to completely fill the grooves with epoxy. With gloved hands, compress the joint seal and with the help of a blunt probe, push the seal into the joint opening until the seal is recessed approximately 1/4" below the surface. When pushing down on the joint seal, apply pressure only in a downward direction. Do not push the joint seal into the joint opening at an angle that would stretch the material. Seals that are stretched during installation shall be removed and rejected. Once work on placing a seal begins, do not stop until it is completed. Clean the excess epoxy from the top of the joint seal immediately with a trowel. Do not use solvents or any cleaners to remove the excess epoxy from the top of the seal. Remove the protective cover at the joint edges and check for any excess epoxy on the surface. Remove excess epoxy 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 foam joint seals.

8.0 BASIS OF PAYMENT

Payment for all foam joint seals will be at the linear foot contract price bid for "Foam Joint Seals". Prices and payment will be full compensation for furnishing all material, including elastomeric concrete, labor, tools and equipment necessary for installing these units in place and accepted.

Pay Item	Pay Unit
Foam Joint Seals	Linear Foot

MODULAR EXPANSION JOINT ELASTOMERIC SEAL REMOVAL & REPLACEMENT(11-28-11)

1.0 GENERAL

Furnish and install modular expansion joint elastomeric seal for each modular expansion joint within the limits indicated on the plans.

Use a modular expansion joint elastomeric component that will properly fit the existing waterproof system: These existing modular expansion joints may be joint fabricated by:

WABOMODULAR as manufactured by Watson Bowman and Acme Corporation of Amherst New York, BROWN/MAURER as manufactured by the D. S. Brown Company of North Baltimore, Ohio or an approved equal.

Inspect all modular expansion joint transverse rails and support mechanism. Ensure the rails maintain parallel and equidistant spacing.

Provide a correctly sized elastomeric component for each modular expansion joint seal that is one continuous unit for the entire length of the joint, which meets the manufactures specifications. Do not field splice the elastomeric component. Only vulcanized shop splicing of the elastomeric component is permitted. Provide an elastomeric component that is clearly shop marked to indicate the top side and joint location of the elastomeric component. On skewed bridges, or under unsymmetrical conditions, clearly mark the left side of the elastomeric component also. Left is defined as being on the left when facing in the direction of increasing station. Inspect the seals upon receipt to ensure that the marks are clearly visible upon installation.

Provide modular expansion joint elastomeric seals capable of handling a total movement measured parallel to the centerline of the roadway. Clear distance between centerbeams, and edgebeams and centerbeams shall be, capable of handling 3½" movement.

2.0 DRAWING AND SPECIFICATION SUBMITTAL

Submit two (2) complete sets of removal and installation instructions for review and approval. Submit this information well in advance of the scheduled installation time for the modular expansion joint seal elastomeric. Include material requirements, installation procedures and special tools required to properly remove and replace the existing joint seal elastomeric.

Upon approval of the removal and installation instruction submit five (5) additional sets for field distribution and Bridge Maintenance's records.

3.0 REMOVAL

Remove the existing modular expansion joint elastomeric seal as recommended by the manufacturer, utilizing methods that will not damage any other portion of the joint system or the bridge. If any portion of the joint or bridge is damaged, notify the Engineer immediately for inspection and method of repair.

Any portion of the joint or the bridge that is damaged and is deemed to be caused by Contractor negligence shall be properly repaired and or replaced at no additional expense to the Department.

4.0 INSTALLATION

Protect the components of the modular expansion joint elastomeric seal and clean in accordance with manufactures guidelines. Repair any abraded or damaged coated surfaces as specified for repair of galvanizing in Section 1076 Galvanizing of the 2012 Standard Specifications.

Install the modular expansion joint seal elastomeric according to the approved manufacturer recommended procedures, except as authorized in writing by the Engineer.

If the Engineer deems any aspects of the modular expansion joint seals unacceptable, make necessary corrections.

Watertight Integrity Test

Upon completion of each modular expansion joint elastomeric seal installation, 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 6 inches above the sidewalk, such that there is continuous flow of water across the sidewalk and down the curb face of the joint.

Maintain the ponding or flowing of water on the roadway and continuous flow across sidewalks and curbs for a period of 5 hours. At the conclusion of the test, the underside of the joint is closely examined for leakage. The modular expansion joint seal 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.

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.

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.

4.0 BASIS OF PAYMENT

Basis of payment for all modular expansion joint elastomeric seal will be at the linear foot contract price for “Modular Expansion Joint Elastomeric Seal” which price and payment will be full compensation for furnishing all material, including labor, tools, and incidentals necessary for installing the modular expansion joint elastomeric seals in place and including all materials, labor, tools and incidentals for performing the original watertight integrity test.

Pay Item	Pay Unit
Modular Expansion Joint Elastomeric Seal	Linear Foot

BRIDGE DECK CRACK SEALER

SPECIAL

Description

This work consists of furnishing and applying a two component methacrylate crack sealer for concrete bridge decks.

Materials

(A) Methacrylate Crack Sealer

1. Component “A” shall be a Methacrylate Monomer
2. Component “B” shall be an activator
3. Materials shall be supplied in a factory proportioned 2-component units.

Physical Requirements of Crack Sealer: When Components A and B are mixed in the appropriate ratio, the cured resin shall conform to the following requirements:

Property	Requirement	Test Method
Viscosity (Brookfield RVT)	14 – 25 cps at 50 rpm	ASTM C-881
Surface Cure	4 Hours (max) @ 72F	
Gel Time	60 minutes (max)	ASTM 2471
Bond Strength	1,500 psi (min.)	ASTM C-882
Tensile Strength	1,300 psi (min.)	ASTM D-638
Tensile Elongation	5% (min.)	ASTM D-638

(B) Aggregate for Surface Friction

Aggregate shall be pre-packaged, clean, dry, fine grained sand as per resin manufacturer’s specifications.

Construction Methods

(A) Surface Preparation

Immediately prior to product application, the deck shall be completely free of moisture in accordance with the manufacturer’s recommendations. Cracks to be filled and adjacent substrate must be dry and free of dust, dirt and other debris prior to filling, and shall be air blasted with oil free compressed air prior to application of the deck crack sealer. Use heated air lances at the Engineer’s direction. Remove all dust and other loose material. Completely seal traffic markers, markings and paint with material approved by the Engineer. Material shall provide a barrier to keep deck crack sealing material from interfacing with traffic markers, markings and paint. Fully cure the bridge deck crack sealer before removing the traffic markers, markings and paint protection. The concrete surface temperature shall not be less than 45°F when the deck crack sealer

is applied. The deck crack sealer shall be applied during the lowest temperature period of the day, when the cracks are open to the greatest extent but also within allowable working times consistent with lane closure restrictions contained in the intermediate contract time requirements.

(B) Environmental Controls

During surface preparation and product application, take care to fully collect the excess material and limit loss to the environment. Completely seal all deck expansion joints with material approved by the Engineer. Material shall provide a barrier to keep deck crack sealing material from interfacing with existing deck joint material. Fully cure the bridge deck crack sealer before removing the deck expansion joint protection. The contractor shall take all steps necessary to eliminate the flow of material through the expansion joints, and any other locations material could leak from the deck.

Prior to performing the work, seal all deck drains in the immediate work area and other sections of the bridge which may be affected. They shall remain sealed until it has been determined that materials from the bridge deck crack sealing operation cannot be discharged through them any longer.

In addition to standard personal protective equipment (PPE), the contractor shall provide and use PPE in accordance with the manufacturer's recommendation.

(C) Addressing Existing Cracks

Prior to installing the bridge deck crack sealer, determine if any cracks are full depth appearing from top to bottom of the concrete deck. Where accessibility to the underside of the slab is available, seal all visible cracks with an epoxy resin adhesive to act as a dam to hold the liquid methacrylate until cured. Pre-treat individual cracks wider than 1/8" and less than 1/4" by filling with dry silica sand and pouring with deck crack sealing material in accordance with the manufacturer's recommendation.

Treat cracks less than 1/8" by pouring bridge deck crack sealer to rejection.

(D) Mixing and Application

Apply the bridge deck crack sealer in accordance with the manufacturer's recommendations, except as otherwise specified herein. Thoroughly mix each container of bridge deck crack sealing material in compliance with the manufacturer's recommendations. Apply the sealer using brush or roller. Do not thin the sealer, except as may be specifically required by the manufacturer. The rate of application shall be in accordance with the manufacturer's recommendations. Do not pond or pool the deck crack sealing material prior to aggregate application and care shall be taken to ensure there is no build up in grooved or tined surfaces as the product gels. Apply aggregate according to manufacturer's recommendations and back roll

with a clean, dry roller to seat the aggregate material. Fully cure and remove loose aggregate before opening to traffic.

Measurement and Payment

Placement of bridge deck crack sealer will be measured and paid for in square feet. Price shall include full compensation for deck preparation, pre-treatment of existing cracks, furnishing and placing bridge deck crack sealer, and all tools, labor, materials, maintenance and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
Placement of Crack/Deck Sealer	Square Feet

PREFORMED COMPRESSION JOINT SEALS

9.0 SEALS

Provide preformed seals manufactured from elastic polychloroprene material. Provide seals that are compatible with concrete and resistant to abrasion, oxidation, oils, gasoline, salt and other materials that are spilled on or applied to the surface. Splicing is not permitted.

Choose the appropriate seal design and cross-section so that it is substantially solid when fully compressed. A middle vertical rib in the seal cross-section is required. Use a seal with closure, defined as the point at which the seal is fully compressed, in the range of 50-70% of the original seal width. Provide a seal that, when compressed, the center portion of the top surfaces does not extend upward above the original height of the seal. Install the compression seal so that it is watertight along its entire length including the ends.

Provide seals that meet the requirements given below.

TEST SPECIFICATIONS FOR PREFORMED COMPRESSION JOINT SEALS		
TEST	REQUIREMENT	TEST METHOD
Min. Tensile Strength, psi (MPa)	2000 (13.8)	ASTM D412
Elongation at Break, %min.	250	ASTM D412
Hardness, Type A Durometer	55 ± 5	ASTM D2240
Oven Aging, 70 hrs. @ 212°F (100°C)		
Tensile strength, % change, max.	-20	ASTM D573
Elongation, % change max.	-20	
Hardness, points change, max.	0 to ± 10	

Ozone Resistance 20% strain, 300 pphm in air, 70 hrs. @ 104°F (40°C) (Wipe with solvent to remove surface contamination)	No cracks	ASTM D1149
High Temperature Recovery 70 hrs. @ 212°F (100°C), under 50% deflection, % min.	85	AASHTO M220
Low Temperature Recovery 22 hrs. @ -20°F (-29°C), under 50% deflection, % min. 72 hrs. @ 14°F (-10°C), under 50% deflection, % min.	83 88	AASHTO M220
Compression-Deflection Test P = Force per square inch (sq. mm) @ 15% deflection of minimum seal width @ 50% deflection of minimum seal width	3 psi (20.7 kPa) min. 15 psi (103.4 kPa) max.	

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

10.0 BON-LASTIC ADHESIVE

Provide bon-lastic adhesive that is one-part moisture polyurethane and hydrocarbon solvent mixture with the following physical properties:

- Average weight per gallon (liter).....8.00 lbs (3.6 kg) = 10%
- Solid content 72 - 74% by weight
- Adhesive to remain fluid from.....5°F (-15°C) to 120°F (49°C)
- Film strength (ASTM D412)1200 psi (8.3 MPa)
- Elongation..... 350%

Submit to the Engineer the manufacturer’s affidavit that all materials furnished by the manufacturer are in conformance with this Special Provision. Submit these affidavits for each separate project and clearly state the project number.

11.0 REMOVAL

Prior to the installation of the replacement seal, perform the following:

Measure the joint opening. Document the bridge number, county, joint, joint width and accurate temperature and the time and date the temperature was taken.

Submit this data to the Engineer for submittal to Mr. Rick Nelson Assistant State Bridge Management Engineer-Operations. The data shall be reviewed and the proper joint size provided to the Contractor within 5 working days.

Remove the existing seal material expansion joint as recommended by the manufacturer, utilizing methods that will not damage any other portion of the joint system or the bridge. If any portion of the joint or bridge is damaged, notify the Engineer immediately for inspection and method of repair.

Any portion of the joint or the bridge that is damaged and is deemed to be caused by Contractor negligence shall be properly repaired and or replaced at no additional expense to the Department.

12.0 SAWING THE JOINTS

Where the existing joint's field conditions warrant or as directed by the Engineer, properly form up the joint edge to restore the uniformity of the edge and saw the joint as needed to establish a uniform opening.

Allow the concrete slab to cure for at least 2 days prior to sawing the concrete joint to its final specified width and depth.

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

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

The desired depth is the depth of the compression seal plus 1/4 inch (6 mm) above the top of the seal plus approximately 3/4 inch (19 mm) below the bottom of the seal. An irregular bottom of sawed joint is permitted as indicated on the plans. Grind exposed corners on saw cut edges to a 1/4" (6 mm) chamfer.

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

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

13.0 PREPARATION OF SAWED JOINT

The Engineer thoroughly inspects the sawed joint opening for spalls, popouts, cracks, etc. Make all necessary repairs prior to blast cleaning and installing the sealer. The installed compression seal is required to be watertight.

Immediately before sealing, clean the joints by sandblasting. Sandblast to provide a firm, clean joint surface free of curing compound, loose material and any foreign matter. Sandblast without causing pitting or uneven surfaces.

Dry blast cleaning is required. Use clean dry sand for the abrasive when blast cleaning.

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

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

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

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

14.0 BASIS OF PAYMENT

Payment for all compression sealing assemblies will be at the linear foot contract price bid for "Preformed Compression Joint Seals" which prices and payment will be full compensation for furnishing all material, labor, tools and equipment necessary for installing these units complete in place and accepted.

Pay Item	Pay Unit
Preformed Compression Joint Seals	Linear Foot

FILLED EXPANSION JOINT REPLACEMENT

15.0 REMOVAL OF PREVIOUS SEAL PRIOR TO INSTALLATION

Prior to the installation of the replacement seal, perform the following:

Remove the existing material as recommended by the manufacturer, utilizing methods that will not damage any other portion of the joint system or the bridge. If any portion of the joint or bridge is damaged, notify the Engineer immediately for inspection and method of repair.

Any portion of the joint or the bridge that is damaged and is deemed to be caused by Contractor negligence shall be properly repaired and or replaced at no additional expense to the Department

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 elastomeric concrete may be exposed after sandblasting.

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

If nozzle blasting 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 joint filler material the same day the surface is blast cleaned.

16.0 SEAL INSTALLATION

Install the filled joint seal material according to the manufacturer’s procedures and recommendations and per Article 420-10 of the Standard Specifications. Seal all expansion joints with low modulus silicone sealant per Article 1028-3 of the Standard Specifications.

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

17.0 BASIS OF PAYMENT

Payment will be at the linear foot contract price for “Filled Expansion Joint Replacement” which price and payment will be full compensation for furnishing all material, including labor, tools, and incidentals necessary for replacing the filled joint seals in place.

Pay Item	Pay Unit
Filled Expansion Joint Replacement	Linear Foot

ELASTOMERIC CONCRETE

(11/6/11)

1.0 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.

2.0 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 (MPa)	ASTM D695	2000 (13.8)
5% Deflection Resilience	ASTM D695	95
Splitting Tensile Strength	ASTM D3967	625 (4.31)
Bond Strength to Concrete, psi (MPa)	ASTM D882 (D882M)	450 (3.10)
Durometer Hardness	ASTM D2240	50

BINDER PROPERTIES (without aggregate)	TEST METHOD	MINIMUM REQUIREMENT
Tensile Strength, psi (MPa)	ASTM D638	1000 (6.89)
Ultimate Elongation	ASTM D638	150%
Tear Resistance, lb/in (kN/m)	ASTM D624	200 (34.9)

- 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.

3.0 PREQUALIFICATION

- Manufacturers of elastomeric concrete materials shall submit samples (including aggregate, primer and binder materials) and a Type 4 certification in accordance with article 106-3 (E) 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 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.

4.0 MATERIAL CERTIFICATION AND INSTALLATION

- Provide a Type 5 certification in accordance with article 106-3 (E) of the Standard Specifications, verifying that the materials satisfy the above requirements and proof of NCDOT prequalification.
- Prior to placing the elastomeric concrete, thoroughly clean and dry all concrete surfaces. Sandblast the concrete surface in the blockout and clear the surface of all loose debris.
- 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.

5.0 FIELD SAMPLING

- Provide additional production material to allow freshly mixed elastomeric concrete to be sampled for acceptance. A minimum of six 2 inch cube molds and three 3x6 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.

6.0 BASIS OF PAYMENT

- No separate payment will be made for elastomeric concrete. The linear foot contract price bid for various joint seal replacements will be full compensation for furnishing and placing the Elastomeric Concrete.