SCDOT
South Carolina
Department of Transportation

DM0200

April 17, 2000

# MEMORANDUM TO GROUP LEADERS AND CONSULTANTS

**SUBJECT:** Evazote Joints

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The use of evazote joints may be used on structures with 20 degrees or less skew. The joint shall be sized and detailed on the joint sheet (see Detail "B"). The size of the joint shall be determined by using the attachments. The joints are to be paid for as Compression Joint Seal, LF.

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Bridge Design Engineer

cc: Assistant Bridge Design Engineers
Bridge Construction Engineer
File: PC/JLC

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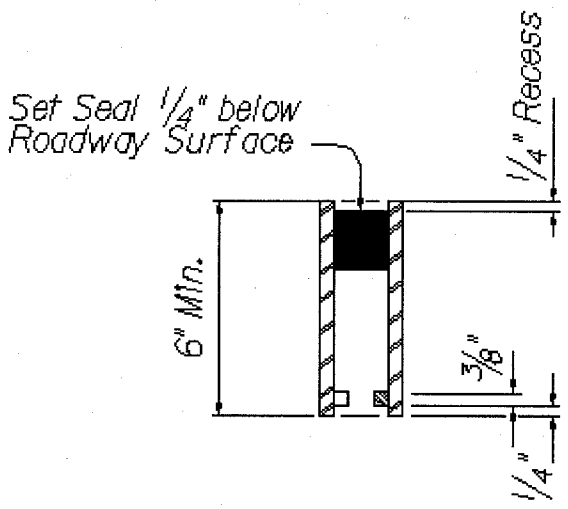



**DETAIL "B"**

To select the appropriate uncompressed seal width, compute $M_{tot}$ and enter chart below. The chart is based on a minimum compression of 25% @ 30° F, a maximum compression of 60% @ 100° F and a maximum joint opening of 3 1/2" @ 20° F.

$M_{tot}$ = Total Movement Normal to Joint = $1.5 \times (6 \times 10^{-6}) \times L \times 12 \times 80° \times \cos \theta$
$= 0.00864 \times L \times \cos \theta$

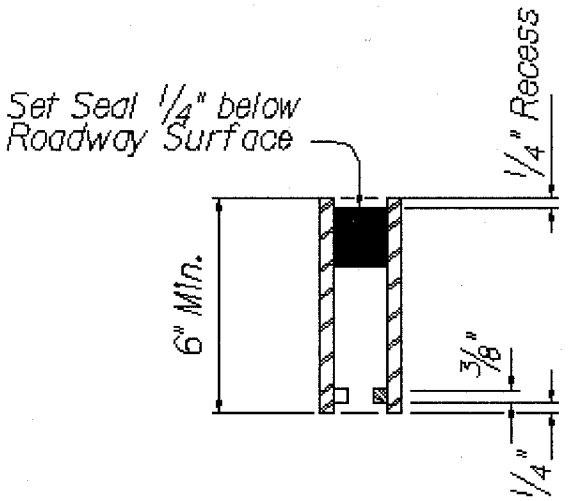
Where:

1.5 = a factor to account for end rotation due to creep and shrinkage
$6 \times 10^{-6}$ = coefficient of thermal expansion, per ° F
L = length of superstructure expanding, feet
80° F = range of temperature for concrete superstructure, (20° F to 100° F )
$\theta$ = skew angle of joint, degrees

| $M_{tot}$ | W (Seal) | W @ 60° |
|---|---|---|
| $M_{tot} \leq 1.125"$ | 2 13/16" | 1 11/16" |
| $1.125" < M_{tot} \leq 1.250"$ | 3 1/8" | 1 7/8" |
| $1.250" < M_{tot} \leq 1.375"$ | 3 7/16" | 2 1/16" |
| $1.375" < M_{tot} \leq 1.500"$ | 3 3/4" | 2 1/4" |
| $1.500" < M_{tot} \leq 1.625"$ | 4 1/16" | 2 7/16" |
| $1.625" < M_{tot} \leq 1.750"$ | 4 3/8" | 2 5/8" |

W = Width of uncompressed Evazote seal

**EVAZOTE JOINT SEALS FOR CONCRETE SUPERSTRUCTURE**




**DETAIL "B"**

To select the appropriate uncompressed seal width, compute $M_{tot}$ and enter chart below. The chart is based on a minimum compression of 25% @ 30° F, a maximum compression of 60% @ 120° F and a maximum joint opening of 3 1/2" @ 0° F.

$M_{tot}$ = Total Movement Normal to Joint = $1.25 \times (6.5 \times 10^{-6}) \times L \times 12 \times 120° \times \cos \theta$
$= 0.0117 \times L \times \cos \theta$

Where:

1.25 = a factor to account for end rotation due to creep and shrinkage
$6.5 \times 10^{-6}$ = coefficient of thermal expansion, per ° F
L = length of superstructure expanding, feet
120° F = range of temperature for steel superstructure, (0° F to 120° F )
$\theta$ = skew angle of joint, degrees

| $M_{tot}$ | W (Seal) | W @ 60° |
|---|---|---|
| $M_{tot} \leq 1.313"$ | 2 13/16" | 1 13/16" |
| $1.313" < M_{tot} \leq 1.458"$ | 3 1/8" | 2" |
| $1.458" < M_{tot} \leq 1.604"$ | 3 7/16" | 2 3/16" |
| $1.604" < M_{tot} \leq 1.750"$ | 3 3/4" | 2 3/8" |
| $1.750" < M_{tot} \leq 1.896"$ | 4 1/16" | 2 9/16" |

W = Width of uncompressed Evazote seal

**EVAZOTE JOINT SEALS FOR STEEL SUPERSTRUCTURE**

evazote_jt.dgn

Design Data
Coefficient of Exp and Contr - 0.0000065 per °F
Temp range for Concrete structures 30°F - 100°F
Temp range for Steel structures 0°F - 110°F

### Seals

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

The seals are to be manufactured with grooves along the bond surface running the length of the joint. The grooves shall be 1/8" wide by 1/8" deep and spaced between 1/4 and 1/2 inch apart. The depth of the seal shall be as recommended by the manufacturer, but shall not be less than 70% of the uncompressed width. The seal shall be designed so that, when compressed, the center portion of the top will not extend upward above the original height of the seal by more than 1/4 inch. Splicing of the seal shall be done using the heat welding method by placing the joint material ends against a teflon heating iron of 350°F for 7 - 10 seconds, then pressing the ends together tightly. Do not test the welding until the material has completely cooled. The material shall be resistant to weathering and ultra-violet rays. The seal shall have a working range of 30% tension and 60% compression. A watertight seal shall be provided along the entire length including the ends of the Evazote Seal.

The seal shall be shop marked to indicate the top side of the seal in such a way as to be clearly visible upon installation.

### Adhesives

The adhesive to be used with the seal shall be two component, 100% solid, modified epoxy adhesive meeting the requirements of ASTM C881, Type I, Grade 3, Class B & C.

The adhesive shall also have the following physical properties:

| | |
|---|---|
| Tensile strength | 3500 psi min. |
| Compressive streth | 7000 psi min |
| Shore D Hardness | 75 psi min |
| Water Absorption | 0.25% by weight |

The adhesive shall be workable to 40°F. For installation temperatures below 40°F or for application on moist, hard to dry concrete surfaces, the adhesive shall be as specified by the manufacturer of the joint material.

### Joint Preparation

The armored joint opening shall be cleaned with a pressure washer rated at 3000 psi minimum. The cleaned surface shall be dry prior to seal installation.

The cleaned surface shall be examined for traces of oil, grease or smudge deposited during the cleaning operations.

The seal shall be bonded to the cleaned surface on the same day the cleaning is done.

### Seal Installation

The joint seal shall be installed according to the procedures and recommendations of the manufacturer and as recommended below. A manufacturer's representative shall be present during the installation of the first seal of the project.

Start installation at low end of joint after applying the mixed epoxy to the sides of both the joint material and both sides of the joint, being certain to completely fill the grooves with the epoxy. With gloved hands, compress the material and with the help of a blunt probe, push it down into the joint until it is recessed approximately 1/4 inch below the surface. Care is to be taken so as not to push at an angle that would stretch the material. Once started on a joint, do not stop until completed. Clean the excess epoxy off the surface of the joint material quickly and thoroughly. The use of solvents to remove excess epoxy is not allowed. Excess epoxy shall be removed in accordance with the joint manufacturer's recommendations.

The installed seal shall be watertight. No testing of the joint seal will be required, but it will be observed until final inspection.

The seal shall comply with th erequirements given in the table below

| TEST | TEST METHOD | REQUIREMENT |
|---|---|---|
| Elongation at break | ASTM D3575 | 210 - 15% |
| Tensile strength (psi) | ASTM D3575 | 110 - 15 |
| Compression Recovery (% of original width) | AASHTO T42 50% compr for 22 hr. @ 73°F 1/2 hr recovery | 87 - 3 |
| Weather/Deterioration | AASHTO T42 Accelerated Weathering | No deterioration for 10 years min |
| Compression/Deflection | @ 50% deflection of original width<br>@50% deflection of original width | 10 psi min<br>60 psi max |
| Tear Strength (psi) | ASTM D624 | 16 - 3 |
| Density | ASTM D545 | 2.8 to 3.4 |
| Water Absorption (% vol/vol) | ASTM D3575 Total Immersion for 3 months | 3 |

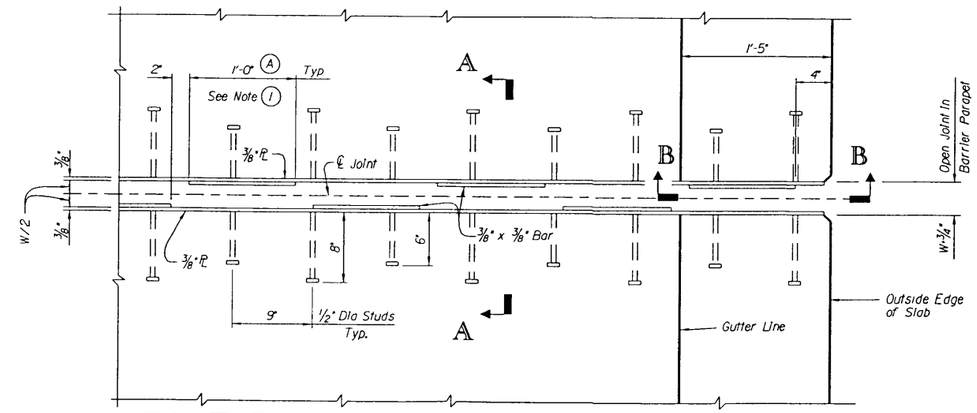
# EVAZOTE SEALS

The nominal joint width, "W", shall be equal to 1 7/8" @ 60°F. At the time of construction, decrease the joint opening by 0.07" for each 10°F that the temperature exceeds 60°F or increase the joint opening by 0.07" for each 10°F that the temperature is below 60°F. The temperature shall be the actual air temperature averaged over the preceding 24 hour period measured in the shade.

. Prior to installation of seals, the Contractor shall furnish the Engineer 3 copies of certifications of conformance with the specifications for seals and lubricant/adhesive. These certifications shall consist of a copy of the manufacture's test reports, or a statement by the supplier accompanied by the test results, certifying that the materials have been sampled, tested and inspected. Certifications shall be signed by an authorized agent of the manufacturer or supplier. Failure to provide the above certification for seals and lubricant/adhesives may be considered grounds for rejection of the seals.

Each lot of seal shall be marked to show the lot number and shall be identifiable as to the manufacturer. Each container of lubricant/adhesive shall be clearly marked with the manufacturer, the lot number and the shelf life expiration date. The seal shall be shop marked to indicate the top side of the seal in such a way as to be clearly visible upon installation.

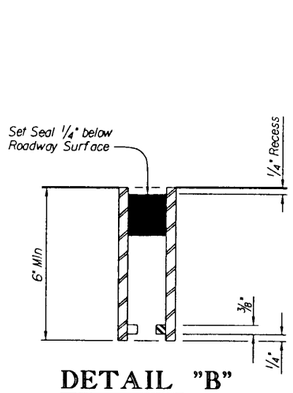
Normal Uncompressed Seal Width = 3 1/8"



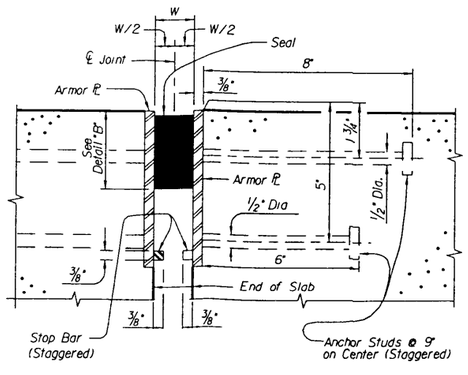

## PART PLAN - EXPANSION JOINT

SEAL NOT SHOWN

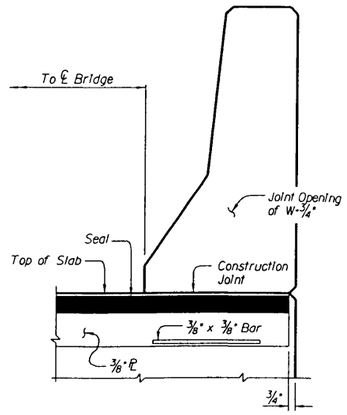
(A) Vary length of 3/8" x 3/8" Bar as necessary at ends of Armor ℄



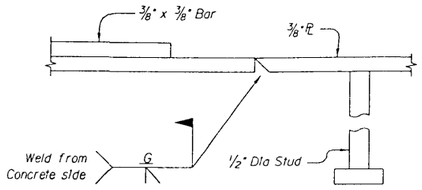

## DETAIL "B"



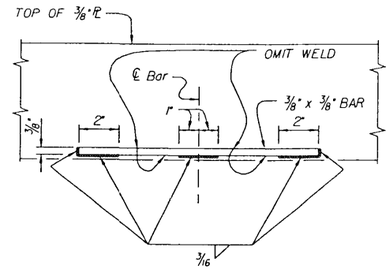

## SECTION A-A




## SECTION B-B




## FIELD BUTT WELD DETAIL




## WELDING DETAILS

FOR 3/8" x 3/8" BAR

# NOTES FOR EXPANSION JOINTS

All Plates shall conform to the requirements of the latest AASHTO M270 Grade 50W (ASTM A709 Gr.50W) and shall be of weldable quality. 3/8" x 3/8" Stop Bars may be AASHTO M270 Grade 36 Steel (ASTM A709 Gr.36).

Top surface of 3/8" Plates shall conform to crown of finished roadway and shall have smooth edges. 3/8" Plates may be fabricated in reasonable lengths and connected at job site with full penetration butt welds. Top and inside surfaces of welds shall be ground flush after welding. Splices shall be welded before bonding seals if desired by the contractor. 9/16" dia. holes at approximately 2 ft on center may be provided in lower portions of 3/8" Plates to bolt Plates to forms.

All studs shall be Electrically Welded.

Exposed areas of armor plates, including stop bars, shall be painted with one shop coat of Inorganic Zinc Silicate paint. A minimum of 3.5 mils dry film thickness will be required. Field painting will not be required. Anchor studs need not be painted.

Field bend top slab reinforcing as required to prevent fouling Anchor Studs.

Expansion joint dimensions shown on this sheet to be adjusted for the temperature at time of casting slabs.

Installation of Seals shall be in accordance with manufacturer's instructions unless otherwise stipulated in these plans or the Special Provisions for this project.

All cost for furnishing materials, fabricating and installing armor plates and seals complete and in place shall be included in the unit price bid per linear foot for "Compression Seal Joint".

Measurement of expansion joint length will be taken along the centerline of joint from edge of slab to edge of slab.

| SHEET NO | TOTAL SHEETS |
|---|---|
| | |

| REV | | | | |
|---|---|---|---|---|
| REV | | | | |
| REV | | | | |
| REVIEWED | | | | |
| QUAN | | | | |
| DR. | JLC | XXX | 02-00 | |
| DES. | JLC | XXX | 02-00 | |
| | BY | CHK | DATE | |

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
BRIDGE DESIGN — COLUMBIA, SC

# EVAZOTE JOINT DETAIL

| FILE NO. | ROUTE | COUNTY | DRAWING NO |
|---|---|---|---|
| | | | |

Auto Drawn 02-00