Examples of Edge Protection and Handrail Extensions
PLAN VIEW

SECTION A

LAMPHOLES IN ASPHALT
ADJUST TO GRADE

N.T.S.
ARU-2
PLAN VIEW

SECTION A

WATER VALVES TO GRADE IN ASPHALT STREET

N.T.S.
PLAN VIEW

NOTE 1: CONCRETE APRON SHALL BE SLOPED AS REQUIRED; MAX SLOPE IS 1" PER LINEAR FOOT.

NOTE 2: IF BASIN WALLS ARE CONCRETE, MAY DOWEL APRON INTO EXIST. WALL.

SECTION A–A

SECTION B–B

INLETS ADJUST TO GRADE

N.T.S.

ARU-4
JOINT REPAIR
WITH OUT NOSING

1. REFER TO TABLE 1
2. DO NOT BOND ELASTOMERIC MORTAR TO WEAK OR ROTTEN CONCRETE.

SYMERIC ABOUT 1 JOINT
WIDTH OF JOINT OPENING

EXISTING BLOCKOUT
PRIMER

RAPID CURE JOINT SEALANT

ELASTOMERIC MORTAR

"" BEVEL (TYP.)

CONCRETE DECK

BACKER ROD

EXISTING CONCRETE SLAB
JOINT REPAIR
WITH NOSING (ONE SIDE)

1. REFER TO TABLE 1
2. DO NOT BOND ELASTOMERIC MORTAR TO WEAK OR ROTTEN CONCRETE.
JOINT REPAIR FOR FIXED JOINTS WITH NO OVERLAY

1. Refer to Table 1
2. Do not bond Elastomeric Mortar to weak or rotten concrete.

Symmetric about Fixed Joint
Width of joint opening

1/2" Bevel (Typ.)

Rapid Cure Joint Sealant

Broken or spalled concrete shall be repaired with Elastomeric Mortar

Broken Rod

Existing expansion material

Existing Concrete Slab

NOTE: Remove broken or spalled concrete to solid material. In some instances, the concrete removal may be so extensive that it may be necessary to reinforce the Elastomeric Mortar.

Nosing of sufficient thickness can be ready for traffic in 2-4 hours depending on temperature.
JOINT REPAIR FOR EXPANSION JOINTS WITH NO OVERLAY

1. "X" should be in the range of 1' to 3'. See Table 2
2. Refer to Table 1
3. If Armor Joint is loose, removal of the Armor Joint is strongly recommended.
4. Do not bond Elastomeric Mortar to weak or rotten concrete.

NOTE: Remove broken or spalled concrete to solid material. In some instances the concrete removal may be so extensive that it may be necessary to reinforce the Elastomeric Mortar.

If full depth removal of the deck is required, and the limits of removal extend more than 6 inches back from the joint edge, contact the Bridge Division for recommendations.

Latex of sufficient thickness can be ready for traffic in 2-4 hours depending on temperature.
JOINT REPAIR FOR FIXED JOINTS WITH A.C. OVERLAY

1. Refer to Table 1
2. Do not bond Elastomeric Mortar to weak or rotten concrete.

NOTE: Asphalt Concrete Overlay across the bridge deck and the approach slabs of the Joint Sealant Locations shall be cut and removed as detailed and the concrete surface prepared in accordance with the Sealant manufacturer specifications. Healing of sufficient thickness can be ready for traffic in 2-4 hours depending on temperature.
JOINT REPAIR FOR JOINTS HAVING OVERLAYS AND OPENINGS OF 1' to 3'

1. "X" should be in the range of 1' to 3'
2. Refer to Table 1
3. Do not bond Elastomeric Mortar to weak or rotten concrete.

NOTE: Asphalt Concrete Overlay across the bridge deck and the approach slabs of the Joint Sealant Locations shall be cut and removed as detailed and the concrete surface prepared in accordance with the Sealant manufacturer's specifications.

Nosing of sufficient thickness can be ready for traffic in 2-4 hours depending on temperature.
JOINT REPAIR FOR JOINTS HAVING SLIDING PLATES AND NO OVERLAY

1. "x" should be in the range of 1" to 3". See Table 2
2. Refer to Table 1
3. If sliding plates are loose, remove the plate and replace with Elastomeric Mortar. If the plate is not loose, leave in place.
4. Do not bond Elastomeric Mortar to weak or rotten concrete.

Roald Cure Joint Sealant

DETAIL OF EXPANSION JOINT WITH SLIDING PLATE REMOVED

DETAIL OF EXPANSION JOINT WITH SLIDING PLATE IN PLACE

Note: Nailing of sufficient thickness can be ready for traffic in 2-4 hours depending on temperature.
JOINT REPAIR FOR FINGER JOINT HAVING NO OVERLAY

1. "A" should be in the range of 1" to 3". See Table 2.
2. Refer to Table 1.
3. Dimension "A" shall be large enough to cover the openings in the fingers. Clip angle as required to fit.

Blow clean tips of fingers prior to placing Elastomeric Mortar.

Even surfaces across top of fingers with Elastomeric Mortar.

\[ 5" \times A \times \frac{1}{2}" \]

Rapid Cure Joint Sealant

\[ \frac{1}{4}" \text{ Revel (Typ.)} \]
JOINT REPAIR FOR FINGER JOINT
HAVING NO OVERLAY

1. "x" should be in the range of 1"-3". See Table 2
2. Cost of welding to be included in price bid for rapid cure joint sealant.

Note: Nosing of sufficient thickness can be ready for traffic in 2-4 hours depending on temperature.
JOINT REPAIR FOR JOINTS HAVING SLIDING PLATES WITH OVERLAY

1. "x" should be in the range of 1" to 3". See Table 2
2. Refer to Table 1
3. Do not bond Elastomeric Mortar to weak or rotten concrete.

DETAIL OF EXPANSION JOINT WITH SLIDING PLATE REMOVED

DETAIL OF EXPANSION JOINT WITH SLIDING PLATE IN PLACE

Note: Nosing of sufficient thickness can be ready for traffic in 2-4 hours depending on temperature.
General Characteristics (wide):

- 6 bay (excluding the nose section bay). First 3 bays use Type I cartridge and last 3 bays use Type II cartridges.
- 10 degree maximum side flare.
- 2 standard backup widths 60 and 90 inches
- Replaceable/crushable cartridges
- Re-directive, bi- and unidirectional, non-gating, non-pocketing
- 20 feet 9 inches long
- This system is not resettable and should be used in areas where minimal impacts are anticipated.
**General Characteristics (narrow):**

- 6 bay (excluding the nose section bay). First 3 bays use Type I cartridge and last 3 bays use Type II cartridges.
- Backup width is 90 inches
- Replaceable/crushable cartridges
- Re-directive, bi- and unidirectional, non-gating, non-pocketing
- 22 feet long
- This system is not resettable and should be used in areas where minimal impacts are anticipated.
Name: QuadGuard™ Elite
Manufacturer: Energy Absorption Systems, Inc.
Website: http://www.energyabsorption.com/products/products_quadguard_elite.asp
FHWA Acceptance: HNG-14 /CC-57 and CC-57B

General Characteristics:
- 11 bay (no cylindrical in the first 2 bays). New approved 8-bay is acceptable.
- Backup widths available in 24, 30, 36, 69, or 90 inches. The 60 and 90 inch system flare out to obtain the required width at backup
- HDPE cylinders
- Re-directive, bi- and unidirectional, non-gating, non-pocketing
- This system can withstand multiple impacts with minimal repair
- This resettable system because High Density Poly Ethylene will return to their original shape
- 33 feet 4 inches long (11-bay)
- 26.6 feet (8-bay)
<table>
<thead>
<tr>
<th>Name</th>
<th>TAU-II™ Family (Parallel, Taper, or Combination)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
<td>Barrier Systems, Inc.</td>
</tr>
<tr>
<td>Website</td>
<td><a href="http://www.barriersystemsinc.com/products/product.asp?key=3&amp;nav_family=2">http://www.barriersystemsinc.com/products/product.asp?key=3&amp;nav_family=2</a></td>
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<tr>
<td>FHWA Acceptance</td>
<td>HSA-10/CC-75 for Narrow or Parallel System</td>
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<td>(<a href="http://safety.fhwa.dot.gov/roadway_dept/road_hardware/barriers/pdf/cc75.pdf">http://safety.fhwa.dot.gov/roadway_dept/road_hardware/barriers/pdf/cc75.pdf</a>)</td>
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<tr>
<td>Letter</td>
<td>HSA-10/CC-75B for Combination (variable width)</td>
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</tbody>
</table>

**General Characteristics (For Parallel or Narrow Systems):**
- Backup widths are available in 24, 30, and 36 inches
- 8 bay with 2 types crushable/replace cartridges. First 3 cartridges are Type A and last B cartridges are Type II.
- Re-directive, bi- and unidirectional, non-gating, non-pocketing
- 26.9 feet long
- This system is not resettable and should be used in areas where minimal impacts are anticipated.
General Characteristics (Combination Systems):

- Backup widths could accommodate up to 60 inches
- 8 bay with 2 types crushable/replace cartridges. First 3 rows are Type A cartridges and remainders are Type B cartridges.
- 26.9 feet long
- 5 degree outward flare rate.
- Re-directive, bi- and unidirectional, non-gating, non-pocketing
- This system is not resettable and should be used in areas where minimal impacts are anticipated.

- Variations for TAU-II (Taper systems):
- Backup widths could accommodate up to 96 inches
<table>
<thead>
<tr>
<th>Name</th>
<th>TRACC Family (FastTRACC™ and WideTRACC™)</th>
</tr>
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<tbody>
<tr>
<td>Manufacturer</td>
<td>Trinity Highway Products, LLC.</td>
</tr>
<tr>
<td>Website</td>
<td><a href="http://www.highwayguardrail.com/products/tracc.html">http://www.highwayguardrail.com/products/tracc.html</a></td>
</tr>
<tr>
<td></td>
<td>HSA-10/CC-54D (for WideTRACC) (<a href="http://safety.fhwa.dot.gov/roadway_dept/road_hardware/barriers/pdf/cc54d.pdf">http://safety.fhwa.dot.gov/roadway_dept/road_hardware/barriers/pdf/cc54d.pdf</a>)</td>
</tr>
</tbody>
</table>

**General Characteristics (FastTRACC or TRACC):**

- Length 21 feet
- Backup width is available in 24 inches
- Re-directive, bi- and unidirectional, non-gating, non-pocketing
- This system is not resettable and should be used in areas where minimal impacts are anticipated.
- No cartridges.
- Consist of impact “sled”, 2 guidance tracks, and steel frames.
General Characteristics (WideTRACC):

- Length 21 feet
- At 9.5 feet from beginning, the side panels begin to flare outward at 7 degrees. At the length of 21 feet, it could shield the hazardous object of up to 58 inches. To accommodate for larger objects, the attenuators need to move forward and maintaining 7 degrees until it covers the hazardous object.
- Re-directive, bi- and unidirectional, non-gating, non-pocketing
- This system is not resettable and should be used in areas where minimal impacts are anticipated.
- No cartridges.
- Consisted of impact “sled”, 2 guidance tracks, and steel frames

![Diagram of WideTRACC configurations](image)

Basic WideTRACC configurations.

(ISO Drawing is not available)
CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

RCI 0648 - 6" THROAT
RCI 1048 - 10" THROAT

SECTION A-A
SCALE: NONE

NOTE:
- #4 BAR @ 9" O.C. EACH WAY
- #4 BENT BAR @ 9" OC
- #4 BAR @ 12" OC
- #4 STD. HOOK
- 1" LESS IN LENGTH THAN OPENING
- 1 1/4" X 1 1/2" X 3/16" ANGLE
- HOT DIP GALVANIZED
- STEEL INLET INSERT SHALL BE AS MANUFACTURED BY SHAWNEE STEEL & STEEL INC.
- INLET INSERT DETAIL
- CAST IN PLACE CONCRETE NOTES
- 1. ALL CONCRETE SHALL BE CLASS A, AS DESIGNATED IN SECTION 509 OF THE ODOT SPECIFICATIONS, LATEST EDITION.
- 2. ALL EXPOSED EDGES OF CONCRETE SHALL BE GROUTED WITH WHITE CONCRETE TO MATCH EXISTING GUTTER OR BE 2" FOR EXTERIOR WALL STEEL OR 3" FOR THE BOTTOM FLOOR STEEL.
- 3. CLEAR DISTANCES FROM CAST-IN-PLACE CONCRETE SURFACES TO REINFORCING SHALL BE 2" FOR WALLS, 1 1/2" FOR SUPPORTED SLABS, 1" FOR UNSupported slabs. 0" FROM THE EDGE OF FOOTINGS AND 0" FROM THE EDGE OF CLASS, UNLESS OTHERWISE NOTED.
- 4. REINFORCING STEEL SHALL MEET ASTM SPECIFICATION A615, GRADE 60.
- 5. ALL JOINTS SHALL BE SEALED WITH AN APPROVED SILICONE SEALANT.
- 6. THE ENTIRE FRAME SHALL BE HOT DIP ZINC COATED IN ACCORDANCE WITH SPECIFICATIONS AND PROCEDURES.
- 7. ALL JOINTS SHALL BE SEALED WITH AN APPROVED SILICONE SEALANT.
- 8. MINIMUM CONCRETE COVER OF REINFORCING STEEL SHALL CONFORM TO AMERICAN CONCRETE INSTITUTE STANDARD NO 318.
- 9. ALL STEEL SHALL BE 7 GAGE OR 3/16" THICK.
- 10. COST OF INLET INSERT SHALL BE INCLUDED IN THE PRICE BID FOR INLET.
- 11. STEEL INLET INSERT SHALL BE AS MANUFACTURED BY SHAWNEE STEEL & STEEL INC.
- 12. CAST IN PLACE CONCRETE NOTES
- 1. ALL CONCRETE SHALL BE CLASS A, AS DESIGNATED IN SECTION 509 OF THE ODOT SPECIFICATIONS, LATEST EDITION.
- 2. ALL JOINTS SHALL BE SEALED WITH AN APPROVED SILICONE SEALANT.
- 3. CLEAR DISTANCES FROM CAST-IN-PLACE CONCRETE SURFACES TO REINFORCING SHALL BE 2" FOR WALLS, 1 1/2" FOR SUPPORTED SLABS, 1" FOR UNSupported slabs. 0" FROM THE EDGE OF FOOTINGS AND 0" FROM THE EDGE OF CLASS, UNLESS OTHERWISE NOTED.
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- 7. ALL STEEL SHALL BE 7 GAGE OR 3/16" THICK.
- 8. COST OF INLET INSERT SHALL BE INCLUDED IN THE PRICE BID FOR INLET.

NOTE:
- STABLE SUBGRADE
- 1/2": 6" COMPACTED CRUSHED STONE
- 3": 8" COMPACTED CRUSHED STONE
- RX WATERSTOP (TYP.)
- CONSTRUCTION JOINT W/ RX WATERSTOP TYPICAL ALL CORNERS
- #4 BAR @ 12" OC
- 1 STIFFENER IN PRICE BID FOR INLET
- #4 BENT BAR @ 12" OC
- #4 BAR @ 12" (EXTEND 1' INTO WALL OR BE 2" FOR EXTERIOR WALL STEEL OR 3" FOR THE BOTTOM FLOOR STEEL.
- STEEL INLET INSERT DETAIL
- SCALE: NONE
- NOTE:
- RCI STRUCTURES W/O MANHOLES SHOULD BE LIMITED TO CASES WHERE A STEEL INLET INSERT DETAIL
- ADDED VERT. FT.
- 8. MINIMUM CONCRETE COVER OF REINFORCING STEEL SHALL CONFORM TO AMERICAN CONCRETE INSTITUTE STANDARD NO 318.
- NOTE:
- FOR SUPPORTED SLABS, 3" FROM THE BOTTOM OF FOOTINGS AND 2" FROM THE TOP OF SLABS, UNLESS OTHERWISE NOTED.
- ALL JOINTS SHALL BE SEALED WITH AN APPROVED SILICONE SEALANT.
- MINIMUM CONCRETE COVER OF REINFORCING STEEL SHALL CONFORM TO AMERICAN CONCRETE INSTITUTE STANDARD NO 318.
- ALL JOINTS SHALL BE SEALED WITH AN APPROVED SILICONE SEALANT.
- MINIMUM CONCRETE COVER OF REINFORCING STEEL SHALL CONFORM TO AMERICAN CONCRETE INSTITUTE STANDARD NO 318.
- ALL JOINTS SHALL BE SEALED WITH AN APPROVED SILICONE SEALANT.
MATCH EXISTING CONCRETE GUTTER (12" MIN - 24" MAX)

Curb Detail

ASPHALT CONCRETE, TYPE C
TACK COAT
CURB FADE

12" TAPE

Roadside Delineator (optional)

Shoulder Detail for Streets Without Curbs

ASPHALT CONCRETE, TYPE C
TACK COAT
SHOULDER

12" TAPE

SECTION B-B

NOTES:

1. FABRICATE DELINEATOR AND WARNING SIGNS WITH ENCAPSULATED LINE AND REFLECTIVE SHEETING SPEC. TYPE III STANDARDS.

2. INSTALL WHITE 100 ML THICK PAVEMENT MARKINGS USING HOT APPLIED THERMOPLASTIC COMPOUND MATERIALS CONFORMING TO 1999 OKLAHOMA DEPT. OF TRANSPORTATION STANDARD SPECIFICATION FOR HIGHWAY CONSTRUCTION.

100' DESIRABLE AT START OF PROJECT

STREET

CENTERLINE

100' DESIRABLE AT START OF PROJECT

STREET

EDGE MILL

12" WIDTH (TYP.)

12" SPACE (TYP.)

6'-7"

12'0"

ROAD SURFACE

PARABOLIC CROWN

SECTION A-A

NOT TO SCALE

2" TYP.

18" TYP.

6'-0"

6'-0"

NOT TO SCALE

TYPICAL PAVEMENT MARKING DETAIL

SHEET SIZE: 24" X 36"

DRAWN: CJS

Recommended Date: 11/08/95

Traffic Engineer

CITY OF TULSA, OKLAHOMA
PUBLIC WORKS DEPARTMENT
TRAFFIC ENGINEERING SECTION

12" ASPHALT SPEED HUMP

REVISION

DATE

IN

APPROVED

DRAWN

PUBLIC WORKS DIRECTOR

DESIGNED

TRAFFIC ENGINEER

DRAWN

DESIGNED NO.